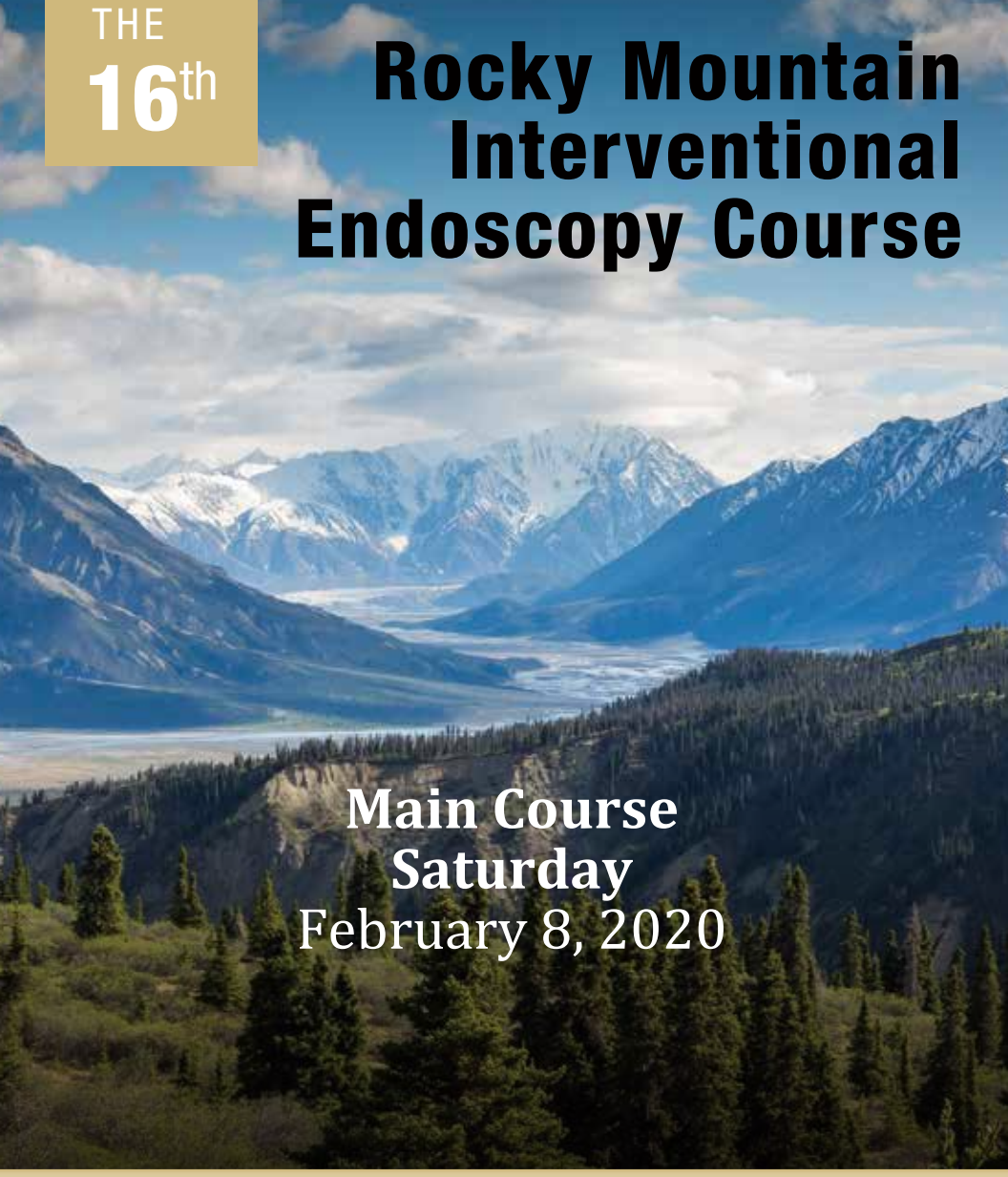
THE 16th

Rocky Mountain Interventional Endoscopy Course



Main Course
Saturday
February 8, 2020

Join The Division of Gastroenterology & Hepatology
at The University of Colorado Anschutz Medical Campus

Presented by:
Division of Gastroenterology & Hepatology

Sponsored by:
University of Colorado School of Medicine
Office of Continuing Medical Education

School of Medicine
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

ASGE

This course is endorsed by the American Society for Gastrointestinal Endoscopy.

The 16th Rocky Mountain Interventional Endoscopy Course would like to

WELCOME

you to the

Main Course- Saturday

AM LECTURES AND CASE REVIEW SCHEDULE

SATURDAY, FEBRUARY 8TH, 2020

Location: AMC, Ed 2 South Building
Main Auditorium

MULTI-DISCIPLINARY EVALUATION AND MANAGEMENT OF BENIGN PANCREAS, BILIARY, and LUMINAL DISEASES		
7:45 AM	Introduction	
ACUTE AND CHRONIC PANCREATITIS		
Moderators		Van Hooft, Edmundowicz
8:00 AM	Approaching Recurrent Acute Pancreatitis	Singh
8:15 AM	Managing Walled Off Necrosis: Step In or Step Up?	Machicado
8:30 AM	Endotherapy for Chronic Pancreatitis: When It's a "Go," When It's a "No"	Van Hooft
8:45 AM	Surgical Therapy for Chronic Pancreatitis: Pancreas Preservation or Total Pancreatectomy?	Ahrendt
9:00 AM	Q&A, Video Case Review from Friday Live Cases; Panel Discussion	
10:00 AM	Break and refreshments	
BILIARY DISORDERS		
Moderators		Teoh and Attwell
10:30 AM	Optimizing Success to Remove Large Biliary Stones	Mounzer
10:45 AM	Minimizing Post-ERCP Pancreatitis Risk in 2020	Buxbaum
11:00 AM	PTC or Interventional EUS for Benign Biliary Diseases?	Teoh
11:15 AM	Managing Symptomatic Primary Sclerosing Cholangitis	Jackson
11:30 AM	Q&A, Video Case Review from Friday Live Cases; Panel Discussion	
12:15 PM	Brian C. Brauer, MD, FASGE in Memoriam	
12:30 PM	Lunch	

PM COURSE SCHEDULE

SATURDAY, FEBRUARY 8TH, 2020
Location: AMC, Ed 2 South Building
Main Auditorium

COLONIC CONTROVERSIES		
Moderators		Shen, Wagh
1:15 PM	Colon Cancer Screening: Timing,Techniques, and Technologies	Patel
1:30 PM	Colon Polyp Resection: When to Cold, Hold, Or Burn?	Wong Kee Song
1:45 PM	Interventional IBD: Indications and Outcomes	Shen
2:00 PM	Timing of Surgical Intervention in Inflammatory Bowel Disease	Vogel
2:15 PM	Q&A, Video Case Review from Friday Live Cases; Panel Discussion	
3:15 PM	Break	
ESOPHAGUS AND STOMACH		
Moderators		Wani, Menard-Katcher
3:45 PM	Current Management and Future Trends in Eosinophilic Esophagitis	Menard-Katcher
4:00 PM	Rescue Therapies for Upper GI Bleeding	Wong Kee Song
4:15 PM	Plug It Up! Managing Leaks and Fistulae	Hammad
4:30 PM	Obesity Management: Gastroenterology's Role	Sullivan
4:45 PM	Q&A, Panel Discussion	
5:30 PM -	Faculty and Attendee Recognition Reception	

ACKNOWLEDGEMENTS

The Division of Gastroenterology & Hepatology at the University of Colorado School of Medicine would like to acknowledge the following for providing educational grants in support of the Rocky Mountain Interventional Endoscopy Course 2020:

EDUCATIONAL GRANTS

PLATINUM

Boston Scientific Corporation

GOLD

Cook Medical

Olympus Corporation

SILVER

Erbe USA

Medtronic

Steris Endoscopy

BRONZE

GI Supply, Inc.

Merit Medical Endotek

Pentax Medical

Fujifilm Medical Systems USA, Inc.

COURSE EXHIBITORS/CONTRIBUTORS

Boston Scientific Corporation

Cook Medical

Olympus Corporation

Erbe USA

Medtronic

Steris Endoscopy

GI Supply, Inc.

Merit Medical Endotek

Pentax Medical

Fujifilm Medical Systems USA, Inc.

Apollo Endosurgery

Cantel

CDx Diagnostics

ChiRhoClin, Inc.

ConMed Endoscopic Technologies

Interpace Diagnostics

Ovesco Endoscopy USA

Omega Medical Imaging

Takeda Pharmaceuticals

IN-KIND DONATIONS

Apollo Endosurgery

Boston Scientific Corporation

Erbe USA

Medtronic

Olympus Corporation

Ovesco Endoscopy USA

Steris Endoscopy

MAIN COURSE DIRECTORS

Raj J. Shah, MD, FASGE, AGAF
Professor of Medicine
Director, Pancreaticobiliary Endoscopy
University of Colorado
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Sachin Wani, MD, FASGE
Associate Professor of Medicine
Medical Director Esophageal and Gastric Center
University of Colorado
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Paul Menard-Katcher, MD
Associate Professor of Medicine
Luminal Section Chief, Associate Fellowship Program Director
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

COURSE FACULTY

Steven Ahrendt, MD
Professor of Surgery, Director of Cytoreductive Surgery/HIPEC Program
Department of Surgery and Surgical Oncology
University of Colorado Anschutz Medical Campus
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Hiroyuki Aihara, MD, PhD, FACG, FASGE
Assistant Professor of Medicine,
Harvard Medical School
Director, Endoscopic Tissue Resection Program
Brigham and Women's Hospital
Division of Gastroenterology, Hepatology and Endoscopy
Boston, Massachusetts

Augustin Attwell, MD, FASGE, AGAF
Associate Professor of Medicine
Division of Gastroenterology & Hepatology
University of Colorado
Denver, Colorado

James L. Buxbaum, MD, MS
Associate Professor of Clinical Medicine
Chief of Endoscopy and Gastroenterology,
Los Angeles County Hospital
University of Southern California
Gastroenterology and Internal Medicine
Los Angeles, California

Blair Fennimore, MD
Associate Professor of Medicine
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Whitney E. Jackson, MD
Assistant Professor of Medicine
Medical Director of Living Donor Liver Transplantation
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Jorge Machicado, MD
Assistant Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Eau Claire, Wisconsin

Marc Moss, MD
Roger S. Mitchell Professor of Medicine
Head, Division of Pulmonary Sciences and Critical Care Medicine
University of Colorado
Aurora, Colorado

Rawad Mounzer, MD
Assistant Professor of Medicine
Director of Center for Pancreaticobiliary Disease
Digestive Institute
Banner-University Medical Center
Phoenix, Arizona

Vikesh K. Singh, MD, MS
Associate Professor of Medicine
Director of Endoscopy, Johns Hopkins Hospital
Director, Pancreatitis Center
Medical Director, Islet Autotransplantation Program
Johns Hopkins University School of Medicine
Gastroenterology and Medicine
Baltimore, Maryland

Shelby Sullivan, MD
Associate Professor of Medicine
Director, Gastroenterology Metabolic and Bariatric Program
University of Colorado Anschutz Medical Campus
Gastroenterology, Hepatology, and Internal Medicine
Aurora, Colorado

Anthony Teoh, FRCSEd, FACS, FASGE
Associate Professor of Surgery
Deputy Director of Endoscopy,
The Chinese University of Hong Kong
Department of Surgery
Hong Kong, China

Jeanin E. van Hooft, MD, PhD, MBA
Associate Professor
Chair of the Gastrointestinal Oncological Center Amsterdam
Amsterdam University Medical Center
Gastroenterology & Hepatology
Amsterdam, Netherlands

Steven A. Edmundowicz, MD, FASGE
Professor of Medicine
Medical Director, Digestive Health Center
Division of Gastroenterology & Hepatology
Aurora, Colorado

Hazem Hammad, MD
Assistant Professor of Medicine
Director of Advanced Endoscopy, Rocky Mountain Regional
VA Medical Center
Division of Gastroenterology & Hepatology
University of Colorado
Anschutz Medical Campus
Aurora, Colorado

Swati G. Patel, MD, MS
Assistant Professor of Medicine
Director, Gastrointestinal Cancer Risk and Prevention Center
University of Colorado, Rocky Mountain Regional
Veterans Affairs Medical Center
Division of Gastroenterology & Hepatology
University of Colorado
Anschutz Medical Campus
Aurora, Colorado

Bo Shen, MD
Professor of Medicine and Surgery
Director of Interventional IBD Center, Vice
Chair for Innovation, Department of Medicine/ Department of Surgery
Columbia University- New York
Presbyterian Hospital
Gastroenterology/Colorectal Surgery
New York, New York

Jon Vogel, MD
Professor of Surgery
GITES Division,
Colorectal Surgery Section
University of Colorado
Aurora, Colorado

Mihir Wagh, MD
Associate Professor of Medicine
Head, Endoscopic Surgery and Tissue Apposition
Division of Gastroenterology & Hepatology
University of Colorado
Anschutz Medical Campus
Aurora, Colorado

Louis M. Wong Kee Song, MD, FASGE
Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Rochester, Minnesota

Steven Ahrendt, MD
Professor of Surgery, Director of Cytoreductive Surgery/HIPEC Program
Department of Surgery and Surgical Oncology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Hiroyuki Aihara, MD, PhD, FACG, FASGE
Assistant Professor of Medicine,
Harvard Medical School
Director, Endoscopic Tissue Resection Program
Brigham and Women's Hospital
Division of Gastroenterology,
Hepatology and Endoscopy
Boston, Massachusetts

Dr. Hiroyuki Aihara is currently Assistant Professor of Medicine at Harvard Medical School and Associate Physician/ Director of Endoscopic Tissue Resection Program in Division of Gastroenterology, Hepatology and Endoscopy at Brigham and Women's Hospital in Boston, MA.

He received his medical degree from Jichi Medical School in Tochigi, Japan in 1998 and completed his PhD program in Gastorenterology from Jikei University School of Medicine in Tokyo, Japan in 2011. He has published over 70 peer- reviewed articles, numerous abstracts, and chapters.

Dr. Aihara is an expert in image-enhanced endoscopy (IEE) and endoscopic submucosal resection (ESD) and has been involved in multiple national/ international educational projects in endoscopic diagnosis and treatment of early gastrointestinal cancers.

Augustin Attwell, MD, FASGE, AGAF
Associate Professor of Medicine
Division of Gastroenterology & Hepatology
University of Colorado
Denver, Colorado

Dr. Attwell studied French and Spanish at Rice University and then received his MD at the University of Texas—Southwestern Medical School. He completed his residency in Internal Medicine and a subsequent fellowship in Gastroenterology at the University of Colorado. He then trained in Advanced Endoscopy under Dr. Peter Cotton at the Medical University of South Carolina. He served on the faculty at Vanderbilt University Medical School for 3 years prior to joining the faculty at University of Colorado in 2010. From 2010 to 2011, he trained in Endoscopic Ultrasound at the University of Colorado-Denver while working as full-time staff at Denver Health Medical Center. Since 2012, he has been the Director of Therapeutics at Denver Health. His clinical and research interests include the endoscopic management of gallstones and chronic calcific pancreatitis, particularly in the indigent population. He is a fellow of the American Society for Gastrointestinal Endoscopy. His non-medical interests include medical missions, traveling abroad, animal rescue, running with his 3 dogs, swimming, skiing, and golf.

James L. Buxbaum, MD, MS
Associate Professor of Clinical Medicine
Chief of Endoscopy and Gastroenterology,
Los Angeles County Hospital
University of Southern California
Gastroenterology and Internal Medicine
Los Angeles, California

Over the past ten years, I have developed an active clinical research program that is closely integrated with my teaching and clinical role at the University of Southern California (USC), Keck School of Medicine.

My academic interests include the management of acute pancreatitis, improvement in the outcomes of endoscopic therapy for pancreaticobiliary disorders, and development of new technology for early detection of gastrointestinal neoplasia. We have had the opportunity to perform a number of randomized controlled trials on these topics. Particularly exciting ongoing projects include the development of quantitative contrast EUS of pancreas masses, gastric narrow band imaging of gastric neoplasia, and evidence based algorithms for giant bile duct stones.

As the Director of the Endoscopy Unit and Gastroenterology Section Chief at the Los Angeles County Hospital, I have had the opportunity to develop truly hands-on endoscopy and biliary teaching services. Our fourth year interventional endoscopy fellowship program will begin in July 2020.

In addition to my duties at USC, I serve as Associate Editor of *Gastrointestinal Endoscopy.* Over the past five years I have also had the privilege to develop evidence-based clinical practice Guidelines under the guidance of Sachin Wani as part of the ASGE Standards of Practice Committee.

Outside of endoscopy, I enjoy hiking in the San Gabriel mountains with my wife Katrina and long distance running with my father who is also a Gastroenterologist. Recently, I have been very busy with my two daughters Ruby and Molly, ages 4 and 1.

Steven A. Edmundowicz, MD, FASGE
Professor of Medicine
Medical Director, Digestive Health Center
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Dr. Steven Edmundowicz is a Professor of Medicine and Director of Interventional Endoscopy at the University of Colorado School of Medicine as well as the Medical Director of the Digestive Health Center at the University Of Colorado Hospital. Clinically, he is a recognized expert in interventional endoscopy including ERCP, EUS and other advanced procedures. He continues to have an active clinical practice while being committed to endoscopic education and clinical research in new endoscopic technologies. Dr. Edmundowicz is also actively involved in endoscopic device and procedure development with a number of medical startup companies. He is a consultant and member of the medical advisory boards of several companies that have a focus in endoscopy and endoscopic bariatric therapies. Dr. Edmundowicz is a past senior associate editor of *Gastrointestinal Endoscopy* and is currently an associate editor for both *ASGE News* and *Practice Update Gastroenterology*. He is a member of the Executive Committee of the American Society of Gastrointestinal Endoscopy (ASGE) Governing Board, past ASGE treasurer, and current ASGE president elect.

Blair Fennimore, MD
Associate Professor of Medicine
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Hazem Hammad, MD
Assistant Professor of Medicine
Director of Advanced Endoscopy,
Rocky Mountain Regional Veterans Affairs Medical Center
Division of Gastroenterology & Hepatology
Interventional Endoscopy
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Dr. Hammad is an Assistant Professor of Medicine in the Division of Gastroenterology and Hepatology, section of Advanced Therapeutic Endoscopy at the University of Colorado and VA Eastern Colorado Health Care System. He obtained his medical degree from the University of Jordan Medical School, and completed his Internal Medicine Residency training at Wayne State University, Detroit, MI. He then completed his Gastroenterology and Hepatology Fellowship at the University of Missouri Hospital and Clinics, after which he was on faculty as an Assistant Professor of Clinical Medicine for four years before pursuing Advanced Therapeutic Endoscopy training at University of Colorado in Denver. He also pursued further training in enhanced imaging and endoscopic resection, including endoscopic submucosal dissection in the United States and Japan. Dr. Hammad's clinical and research interests include endoscopic resection techniques, enhanced endoscopic imaging, early detection of GI neoplasia, esophageal disorders and pancreatico-biliary diseases. Dr. Hammad has authored numerous scientific papers, reviews and book chapters.

Whitney E. Jackson, MD
Assistant Professor of Medicine
Medical Director of Living Donor Liver Transplantation
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Dr. Jackson is an Assistant Professor in Medicine in the Division of Gastroenterology and Hepatology at the University of Colorado. She obtained her medical degree from Sidney Kimmel Medical College of Thomas Jefferson University and completed Internal Medicine Residency at Thomas Jefferson University Hospital in Philadelphia, Pennsylvania. She then completed her Gastroenterology and Hepatology Fellowship at the Cleveland Clinic where she served as Chief Fellow during her final year, followed by Transplant Hepatology Fellowship at the New York Presbyterian Hospital of Columbia and Cornell Universities in New York City.

Her clinical and research interests are in the field of liver transplantation, the role of living donor liver transplantation, donor selection with expertise in the non-directed anonymous donor as well as transplant outcomes research. She is the medical director of living donor liver transplantation at the UC Health. She enjoys speaking for outreach and education. She was previously a member of the American Association for the Study of Liver Diseases (AASLD) practice guidelines committee. She is currently integrally involved in the American Society of Transplantation (AST) liver and intestinal community as well as live donor community working groups.

In her free time, she enjoys spending time with her husband and young daughter.

Jorge Machicado, MD
Assistant Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Eau Claire, Wisconsin

Dr. Machicado completed medical school at Universidad Peruana Cayetano Heredia in Lima, Peru. He completed his internal medicine residency at the University of Texas Health Science Center in Houston, gastroenterology fellowship at the University of Pittsburgh Medical Center, and advanced therapeutic endoscopy fellowship at the University of Colorado. He is currently an Asssistant Professor of Medicine in the Division of Gastroenterology and Hepatology at Mayo Clinic Collecge of Medicine, and practices as an advanced endoscopist at Mayo Clinic Health System in Eau Claire, Wisconsin. Dr. Machicado's clinical interests are in pancreatobiliary diseases and gastrointestinal cancers. He specializes in advanced diagnostic and therapeutic procedures including EUS, ERCP, cholangiopancreatoscopy, luminal stenting, endoscopic mucosal resection, radiofrequency ablation, and advanced imaging modalities. His research focuses on patients with acute pancreatitis, recurrent acute pancreatitis, and chronic pancreatitis. Dr. Machicado has authored numerous peer-reviewed original articles, abstracts, and book chapters.

Paul Menard-Katcher, MD
Associate Professor of Medicine
Luminal Section Chief
Associate Fellowship Program Director
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Mark Moss, MD
Roger S. Mitchell Professor of Medicine
Head, Division of Pulmonary Sciences
and Critical Care Medicine
University of Colorado
Aurora, Colorado

Marc Moss is the Roger S. Mitchell Professor of Medicine, Vice Chair of Clinical Research for the Department of Medicine, and Interim Head of the Division of Pulmonary Sciences and Critical Care Medicine at the University of Colorado School of Medicine. Dr. Moss has a longstanding interest in critical care-related research and he has held continuous NIH funding as a Principal Investigator for over 19 consecutive years. More specifically, Dr. Moss's research interests include identifying new treatment modalities for patients with the Acute Respiratory Distress Syndrome (ARDS), exploring the diagnosis and treatment of neuromuscular dysfunction in critically ill patients who require mechanical ventilation, and studying burnout syndrome, posttraumatic stress disorder, and wellness in critical care healthcare professionals, specifically ICU nurses. Dr. Moss' research on wellness is funded by the NIH and he recently received funding from the National Endowment of the Arts. Dr. Moss is the principal investigator for the Colorado center in the NHLBI sponsored Prevention and Early Treatment of Acute Lung Injury (PETAL) network. Based on his expertise in clinical/translational research and mentoring, Dr. Moss served as the Program Director for the Education, Training, and Career Development Core of the Colorado Clinical Translational Sciences Institute (CCTSI) from 2008-2016. More recently, he served as the President of the American Thoracic Society from 2017-2018.

Rawad Mounzer, MD
Assistant Professor of Medicine
Director of Center for Pancreaticobiliary Disease
Digestive Institute
Banner-University Medical Center
Phoenix, Arizona

Swati G. Patel, MD, MS
Assistant Professor of Medicine
Director, Gastrointestinal Cancer Risk and Prevention Center
Rocky Mountain Regional Veterans Affairs Medical Center
Division of Gastroenterology & Hepatology
University of Colorado
Anschutz Medical Campus
Aurora, Colorado

Dr. Patel completed a Masters in Health Systems Administration from Union University and attended Albany Medical College for her medical degree. She completed her Internal Medicine Residency and Gastroenterology fellowship at the University of Colorado. She is board certified in Internal Medicine and Gastroenterology. She was on faculty at the University of Michigan from 2013 to 2015 and joined the University of Colorado in 2015. She is the Director of the Gastrointestinal Cancer Risk and Prevention Clinic at the Anschutz Medical Center where she cares for patients at high risk for cancer based on their family history and genetics. Her clinical and research interests are in colorectal cancer prevention, identification and management of patients at high-risk for colorectal cancer and colonoscopy quality & training.

Raj J. Shah, MD, FASGE, AGAF
Professor of Medicine
Director, Pancreaticobiliary Endoscopy
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Dr. Shah completed a 6-year combined BS/MD program at the Northeastern Ohio Universities' College of Medicine. He completed his Internal Medicine Residency at the University of Pittsburgh, Gastroenterology and Hepatology Fellowship at the University of Cincinnati, and an Advanced Interventional Endoscopy Fellowship at Maine Medical Center. He is an Editorial Board Member of *Gastrointestinal Endoscopy*. He also represents the American Gastroenterological Association on the FDA's Gastroenterologic and Urologic Medical Devices Panel. His clinical interests are in the advanced therapeutic treatment of benign and malignant pancreaticobiliary and GI luminal diseases. His primary research interests are investigating novel methods for the diagnosis and endoscopic treatment of pancreatic and biliary cancer utilizing ERCP and interventional EUS techniques, endoscopic treatment for benign pancreatic and biliary diseases, and cholangiopancreatoscopy. He has published nearly 200 peer-reviewed original articles, scientific reviews, book chapters, and abstracts.

Bo Shen, MD
Professor of Medicine and Surgery
Director of Interventional IBD Center, Vice Chair for Innovation, Department of Medicine/ Department of Surgery
Columbia University- New York Presbyterian Hospital
Gastroenterology/Colorectal Surgery
New York, New York

Dr. Shen is Professor of Medicine/Surgery, Vice Chair for Innovation in Medicine and Surgery, Director of Interventional IBD Center, and Medical Director of IBD Center at the Columbia University Irving Medical Center/NewYork Presbyterian Hospital, New York, NY. Before he joined Columbia in 2019, he has held long tenure at Cleveland Clinic, Cleveland, OH, as the Ed and Joey Story Endowed Chair, Professor of Medicine of Lerner College of Medicine of Case Western Reserve University, Section Head of IBD, Department of Gastroenterology/Hepatology, Cleveland Clinic, Cleveland, OH. Dr. Shen is specialized in medical and endoscopic management of inflammatory bowel disease (IBD), colorectal surgery-associated complications, pouchitis, and ileal pouch disorders. He established the subspecialty Pouchitis Clinic (now the Center for Ileal Pouch disorders) at the Cleveland Clinic in 2002, the first and the largest of its kind in the world. He is also credited for the establishment of the first endoscopy unit specialized in the treatment of IBD and colorectal surgery complications (the Cleveland Clinic Interventional IBD [i-IBD] Unit) in the world. He also established the first Interventional IBD Fellowship in the US for the training of PGY7-PGY8 GI fellows. Dr. Shen has conducted numerous clinical and translational research projects in IBD, endoscopy, and pouch disorders. Dr. Shen's research has been funded by the grants from the National Institutes of Health (NIH), the American College of Gastroenterology (ACG), Broad Foundation, Crohn's and Colitis Foundation (CCF), American Society of Colorectal Surgeons, American Gastroenterological Association (AGA), and philanthropic funds. He lectures extensively in the US and more than 20 countries. He has published 500 peer-reviewed articles in high-impact journals, including *Science, Nat Immunol, PNAS, Nat Rev Gastroenterol Hepatol, Gastroenterology, Lancet Gastroenterol Hepatol, Gut, Am J Gastroenterol, Cancer, Blood, Endoscopy, Inflamm Bowel Dis, J Crohns Colitis, Clin Gastroenterol Hepatol, Gastrointest Endosc, Br J Surg,* and *Ann Surg*. He is a contributor for UpToDate®. He edited 3 reference books and co-edited 4 textbook/reference books in IBD, pouch disorders and interventional IBD. In addition, he published more than 450 meeting abstracts and dozens of book chapters. He has been visiting professor/guest professor in 50 leading academic institutions in the Australia, Belgium, Brazil, Canada, China, Czech Republic, India, Ireland, Israel, Japan, Korea, Spain, Serbia, Turkey, and US. Dr. Shen is a scientific reviewer for more than 40 professional journals. He is also a grant reviewer for the NIH, ACG, CCF and Broad Foundation. Dr. Shen serves in editorial boards in more than 10 of professional journals and has also served in advisory board for the Food and Drug Administration (FDA). Dr. Shen has held the Fellowship in ACG, AGA, and ASGE (American Society for Gastrointestinal Endoscopy). He has committee assignments from the Cleveland Clinic Foundation, ACG, ASGE, AGA, and CCF. Dr. Shen has won multiple awards, including The Ed and Joey Story Endowed Chair, the Physician of the Year Award and Senior Fellow Teacher of the Year Award from Department of Gastroenterology/Hepatology, the Cleveland Clinic, Physician/PhysicianAssistant Team of Year Award of the Cleveland Clinic Foundation, and the Premier Physician of Year Award from CCFA Northeast Ohio Chapter. He has been the primary research mentor for more than 100 medical students, medical residents, GI fellows, IBD fellows, junior faculty, and oversea scholars.

Vikesh K. Singh, MD, MS
Associate Professor of Medicine
Director of Endoscopy, Johns Hopkins Hospital
Director, Pancreatitis Center
Medical Director, Islet Autotransplantation Program
Johns Hopkins University School of Medicine
Gastroenterology and Medicine
Baltimore, Maryland

Shelby Sullivan, MD
Associate Professor of Medicine
Director, Gastroenterology Metabolic and Bariatric Program
University of Colorado Anschutz Medical Campus
Gastroenterology, Hepatology, and Internal Medicine
Aurora, Colorado

Anthony Teoh, FRCSEd, FACS, FASGE
Associate Professor of Surgery
Deputy Director of Endoscopy,
The Chinese University of Hong Kong
Department of Surgery
Hong Kong, China

Professor Anthony Y. B., TEOH is currently the Deputy Director of Endoscopy and Associate Professor in The Chinese University of Hong Kong. He graduated from the Chinese University of Hong Kong in 2001. After completing his surgical training, he has received overseas training in many international centres including the Kitasato University East Hospital and the Cancer Institute Hospital (Ariake) in Japan, the University of Washington, Cornell University and Stanford University in USA. His research interests are multifold and these include advanced interventional endoscopic ultrasonography (EUS) and endoscopic retrograde cholangiography (ERCP), minimally invasive upper gastrointestinal cancer surgery, hernia surgery and robotics surgery. He is a winner of multiple awards including 2019 Asian Pacific Digestive Week Emerging Leaders Lectureship, Carlos Pellegrini Traveling Fellow, American Society for Gastrointestinal Endoscopy endoscopic research awards, the GB Ong and Li Shield's Medal (best candidate in the fellowship examinations both locally and internationally). He has served as a Visiting Professor to the Stanford Medical Center, Fujian University Medical Hospital, Consultant for Hepatopancreatobiliary Minimally Invasive Surgery Institute of Central South University. He is also a steering committee member for the Asian EUS group, member of upper GI committee of the World Endoscopy Organization, Secretary to the Hong Kong EUS society, council member of Hong Kong Hernia society, Hong Kong society of Robotic surgery and Hong Kong Society of Digestive Endoscopy. In addition, he is also an Associate Editor for Digestive Endoscopy and is in the editorial board for several internationally renowned journals including Clinical gastroenterology and hepatology, VideoGIE, Endoscopic ultrasound, Saudi journal of gastroenterology, World journal of Gastrointestinal endoscopy and World Journal of Gastroenterology. He has published over 120 journal papers and written 14 book chapters. He is currently a Consultant for Boston Scientific, Cook, Taewoong and Microtech Medical Corporations.

Jeanin E. van Hooft, MD, PhD, MBA
Associate Professor
Chair of the Gastrointestinal
Oncological Center Amsterdam
Amsterdam University Medical Center
Gastroenterology & Hepatology
Amsterdam, Netherlands

Jeanin Elise van Hooft became a consultant gastroenterologist in 2006 and is a Fellow of the American Society for Gastrointestinal Endoscopy (FASGE) and the European Board of Gastroenterology and Hepatology (EBGH). Besides her consultancy work she undertook her PhD-training dedicated to endoscopic treatment of gastrointestinal strictures with a main focus on enteral stenting. After finishing her PhD (2010) she received an ESGE grant for further specialization in hepato-pancreatico-biliary interventions, for this purpose she went to the Asian Institute of Gastroenterology in Hyderabad (India). In the meantime she was appointed coordinator of the pancreatico-biliary research group of the Academic Medical Centre Amsterdam. In 2015 she was appointed associate professor; her research team currently consists of five full-time research fellows and is supported by four physicians/endoscopists. The group has a strong focus on pancreatic diseases as well as on enteral stenting. Dr. Van Hooft has authored and co-authored over 120 peer reviewed publications and textbook chapters and has lectured at more than 100 national and international meetings. In 2016 she obtained her Master of Business Administration (MBA) degree and was appointed chair of the Gastro Intestinal Oncology Center Amsterdam. Currently she is a board member of the ESGE as well as the chair of the ESGE guideline committee, responsible for coordinating around 8 international guidelines per year. Furthermore she is co-founder and member of the board of Women in Endoscopy (WIE) and participates in the UEG-diversity board.

Jon Vogel, MD
Professor of Surgery
GITES Division,
Colorectal Surgery Section
University of Colorado
Aurora, Colorado

Jon Vogel, MD, FACS, FSCRS is Professor of Surgery at the University of Colorado. He is a member of the GITES surgery division and heads the Colorectal Surgery section. Dr. Vogel completed his general surgery training at The Johns Hopkins Hospital (2004) and his colorectal specialty training at the Cleveland Clinic (2005). He is a member of the ASCRS clinical Practice Guidelines committee.

Mihir Wagh, MD
Associate Professor of Medicine
Head, Endoscopic Surgery and Tissue Apposition
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

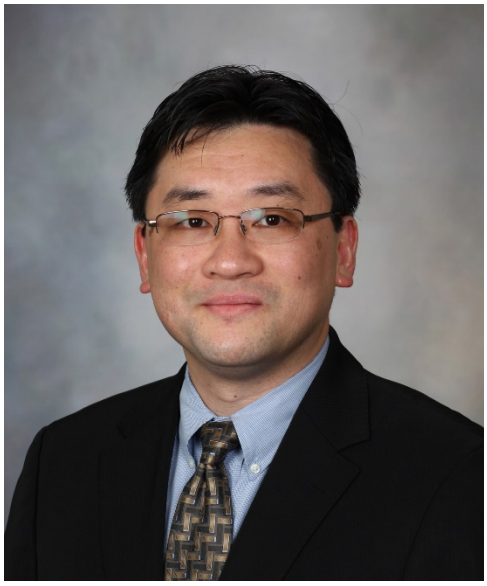
Dr. Wagh trained in Gastroenterology and Hepatology at Brigham and Women's Hospital and Harvard Medical School in Boston. He then pursued advanced fellowships in Interventional Endoscopy including Endoscopic Ultrasound (EUS) and pancreatobiliary endoscopy (ERCP) at the University of Chicago and Indiana University. He was on the faculty at the University of Florida in Gainesville before recently moving to UC Denver. Dr. Wagh's clinical and research interests focus on endoscopic therapy of pancreatobiliary diseases, esophageal disorders and gastrointestinal cancer. He also specializes in complex endoscopy such as rendezvous procedures for unsuccessful pancreatobiliary access during ERCP, complete esophageal obstruction, as well as Endoscopic Suturing and Per-Oral Endoscopic Myotomy (POEM) for achalasia and therapy of Zenker's diverticulum. Dr. Wagh performs the full range of interventional endoscopic procedures with a focus on novel and experimental endoscopy.He directed an active endoscopic research lab involved in the development of novel endoscopic techniques and devices (presented at various national and international meetings). Dr. Wagh has authored numerous scientific papers, reviews and book chapters. His book on "Pancreas masses" was just recently published in 2015. Dr. Wagh serves on national committees such as the American Society for Gastrointestinal Endoscopy (ASGE) Training Committee and the American College of Gastroenterology (ACG) Educational Affairs Committee.

Sachin Wani, MD, FASGE
Associate Professor of Medicine
Medical Director Esophageal and Gastric Center
University of Colorado
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Dr. Wani is an Associate Professor in Medicine in the Division of Gastroenterology and Hepatology at the University of Colorado. He obtained his medical degree from the Dr. D.Y. Patil Medical College, Mumbai, and completed his Internal Medicine Residency training at Lincoln Medical Center, New York. He then completed his Gastroenterology and Hepatology Fellowship at the University of Kansas School of Medicine followed by Advanced Therapeutic Endoscopy Fellowship at Washington University in St. Louis.

His clinical and research interests are in the field of Barrett's esophagus and early esophageal cancer, advanced imaging, endoscopic outcomes research, endoscopic ultrasound and training and competency in advanced endoscopy training. He received the American College of Gastroenterology (ACG) Clinical Research Award, the American Gastroenterology Association —Takeda Research Scholar Award in Barrett's esophagus and GERD and the University of Colorado Department of Medicine Early Scholars Award and recently the American Society for Gastrointestinal Endoscopy Endoscopic Research Award. He chairs the American Society for Gastrointestinal Endoscopy (ASGE) Standards of Practice Committee and serves as a member of the ACG Research Committee, and the American Gastroenterology Association Research Award Panel and Center for GI Innovation and Technology Committees.

He is married to Anuja and has twin boys, Kaahan and Krish. In his free time, he enjoys spending time with his kids, traveling, and tennis.



Louis M. Wong Kee Song, MD, FASGE
Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Rochester, Minnesota

Dr. Wong Kee Song is a native of the Island of Mauritius in the Indian Ocean. Following his family's immigration to Canada, he obtained his training in Montreal, Quebec, including undergraduate and medical degrees. Thereafter, he pursued his residency in Internal Medicine and fellowship in Gastroenterology at the Mayo Clinic in Rochester, Minnesota. He subsequently obtained advanced endoscopic training under the auspice of a Mayo Foundation Scholar at the Wellesley Central Hospital/St. Michael's Hospital in Toronto, Ontario, Canada, including postgraduate studies in biomedical photonics and enhanced imaging relevant to advanced endoscopy.

Dr. Wong Kee Song joined the staff of the Mayo Clinic in 2000 and is Professor of Medicine in the Division of Gastroenterology and Hepatology at Mayo Clinic Rochester. Dr. Wong Kee Song is a career endoscopist and his interests include advanced resection techniques, endoscopic hemostasis, and innovative procedures, including robotic-assisted resection. At Mayo Clinic, he served as Director of the GI Bleeding Team and is Co-Director of the Advanced Endoscopy Group. He received the Department of Medicine Laureate Award for his outstanding achievements in the Division of Gastroenterology and Hepatology, as well as the Master Endoscopist Award from the American Society for Gastrointestinal Endoscopy.

Dr. Wong Kee Song has been active at the GI societal level, having served on several ASGE committees, including Technology, Research and Publications. He has directed or participated in numerous institutional and societal sponsored courses or workshops, and has over 200 publications that pertain primarily to endoscopy.

ACUTE AND CHRONIC PANCREATITIS

Approaching Recurrent Acute Pancreatitis

Vikesh K. Singh, MD, MS
Associate Professor of Medicine
Director of Endoscopy, Johns Hopkins Hospital
Director, Pancreatitis Center
Medical Director,
Islet Autotransplantation Program
Johns Hopkins University School of Medicine
Gastroenterology and Medicine
Baltimore, Maryland

Managing Walled Off Necrosis: Step In or Step Up?

Jorge Machicado, MD
Assistant Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Eau Claire, Wisconsin

Managing Walled Off Necrosis: Step In or Step Up?

Jorge D. Machicado, MD
Assistant Professor of Medicine
Mayo Clinic Heath System – Eau Claire, WI

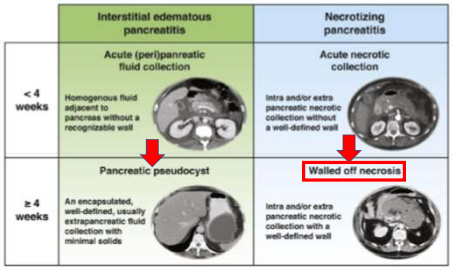
Disclosures

None

Objectives

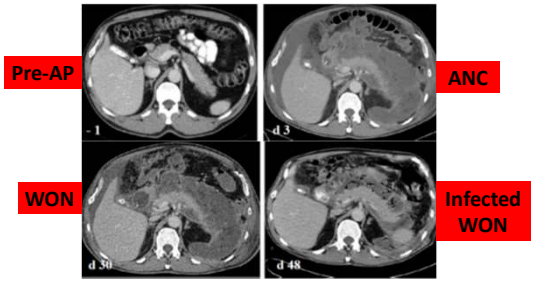
1. Definition of walled-off necrosis (WON)
2. Indications and timing of interventions
3. Compare different therapeutic options for WON
   - Step-up approach: surgical vs. endoscopic
   - Types of stent: double pigtails vs. metallic stents
   - Direct endoscopic necrosectomy
4. Understand the potential complications of interventions
5. Review some advanced adjunctive techniques

Classification of pancreatic fluid collections



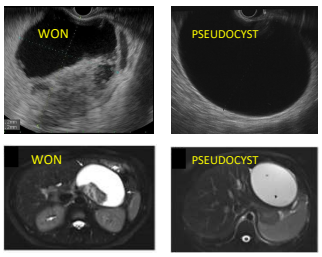
Banks P, et al, Gut 2013

Natural history of necrotizing pancreatitis



Walled-off necrosis (WON)

- Characteristics:
  - Well defined wall or encapsulation
  - Heterogeneous content with mixed/solid density (liquefied necrosis)
  - Intra + extrapancreatic necrosis, rarely extrapancreatic only
- More common than a pure pseudocyst (rare, easier to manage)
- Heterogeneous condition: variable size, composition, location, percent necrosis/fluid, symptoms, duct disruption



Indications for interventions of WON

1. Proven infected necrosis: gas in necrosis or positive culture
   - Societies recommend against FNA - 29% FN, 10% FP, risk of contamination
2. Suspected infected necrosis: sepsis, SIRS, late/prolonged organ failure, in absence of alternative source of infection
   - Potential role of procalcitonin: cutoff 3.5 ng/mL, sensit 90%, specific 89%
3. Symptomatic sterile WON:
   - Luminal obstruction (GOO, intestinal)
   - Biliary obstruction
   - Intractable pain
   - Disconnected pancreatic duct

Freeman ML, et al. Pancreas 2012
Arvanitakis M, et al. Endoscopy 2018
Baron TH, et al. Gastroenterology 2020
Van Baal, et al. Surgery 2014
Yang CJ, et al. Dig Liver Dis 2014

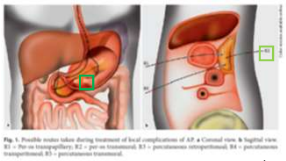
Timing of interventions

- Traditionally, need to delay interventions after 4 weeks of onset
  - Reason: surgical data showed early debridement increased mortality
  - Goal: necrosis to be encapsulated and partially liquefied
- Sometimes, antibiotics alone avoid interventions in infected necrosis
  - Meta-analysis showed conservative approach was successful in 64% patients and reduced mortality. Critique, perc drainage included in conservative group
- Sometimes, interventions are needed earlier than 4 weeks
  - Single US center study (n= 193, 2010-2016), suggested that early interventions don't increase complications and improve organ failure
  - POINTER trial, to compare immediate or postponed drainage, awaiting results

Mouli VP, et al. Gastroenterology 2013
Trikudanathan G. et al. AJG 2018

Terminology of interventions

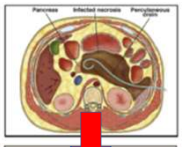
Access	Method	Route	Purpose
Per-oral	Endoscopic	Transpapillary	Drainage
Percutaneous	Radiological	Transmural	Debridement
--	Hybrid	Retroperitoneal	--
--	Open	Transperitoneal	--



Loveday BPT, et al. Pancreatology 2011

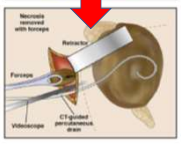
Step-up approach or open surgery?

Perc drain



Vs.

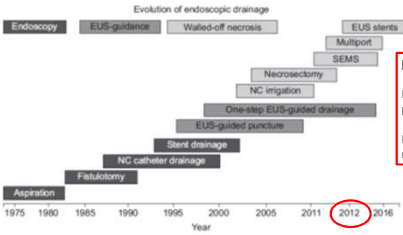
VARD



PANTER trial (n=88)	Step-up (n=43)	Surgery (n=45)
Major complications or death	40%	69%
Death	19%	16%
MOF	12%	42%
Incisional hernia	7%	16%
New onset diabetes	16%	38%

Van Santvoort HC, et al. NEJM 2010

Evolution of endoscopic drainage



Endoscopic vs. surgical necrosectomy

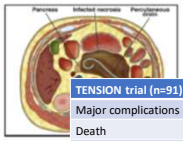
PENGUIN trial, 20 patients with IPN, primary outcome: IL-6 levels

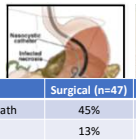
Results: endoscopic necrosectomy reduced IL-6 levels and MOF (0 vs. 50%)

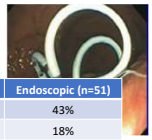
Bakker OJ, et al. JAMA 2012
Yip HC, Teoh A. Gut and Liver 2017

Surgical or endoscopic step-up approach?

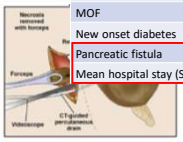
Perc drain

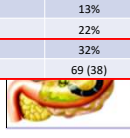


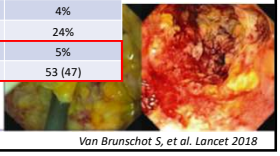




VARD







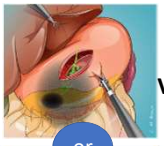
TENSION trial (n=91)	Surgical (n=47)	Endoscopic (n=51)
Major complications or death	45%	43%
Death	13%	18%
MOF	13%	4%
New onset diabetes	22%	24%
Pancreatic fistula	32%	5%
Mean hospital stay (SD)	69 (38)	53 (47)

Endoscopic drainage, with on-demand endoscopic necrosectomy

Van Brunschot S, et al. Lancet 2018

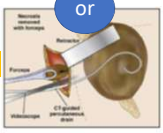
Endoscopic approach reduces complications and costs

Lap cystgast rostomy

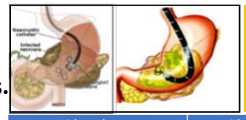


or

VARD



Vs.



Endoscopic drainage, with on-demand endoscopic necrosectomy

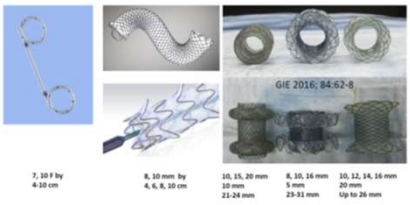
MISER trial (n=66)	Surgical (n=32)	Endoscopic (n=34)
Major complications (including fistula) or death	41%	12%
Death	6%	9%
MOF	9%	6%
Pancreatic fistula	28%	0%
Mean total costs (US $)	117,492	75,830
Physical QOL (95% CI)	--	+ 5.3 (0.3-10.3)

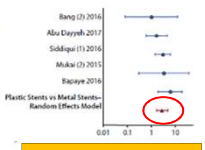
Bang JY, et al. Gastroenterology 2019

Lessons from these pivotal trials

- Endoscopic step-up approach should be preferred over surgical step-up if both techniques are available and are technically feasible
- In patients with collections unsuitable for endoscopic drainage, percutaneous drainage should be the preferred approach
- One third to half of patients recover with either percutaneous or endoscopic drainage alone, without the need of necrosectomy
  - This supports the use of on-demand over upfront necrosectomy
  - Can LAMS reduce the need of necrosectomy compared to double pigtails?

Double pigtail or metal stents?





Systematic review: 41 studies, 2213 patients

Meta-analysis: 5 studies. Resolution of WON was 92% for metal and 81% for plastic stents (OR 2.8, 95% CI 1.7-4.6)

Bazerbachi F, et al. GIE 2018

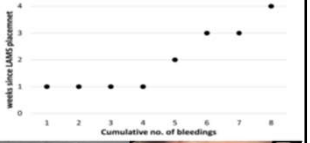
LAMS or double pigtail stents?

- Theoretical advantages of LAMS
  - Easy deployment, less technically challenging, and shorter procedure time
  - Saddle-shaped design with anchoring flanges to prevent leakage
  - Large diameter, which may decrease the need for necrosectomy
  - Easy entry point for endoscopic necrosectomy
- **Single center RCT, 60 pts, compared LAMS (n=31) with pigtails (n=29)**
  - No difference in total number of procedures, treatment success (>90%), AEs (42% LAMS vs. 21% pigtails, p=0.07), LOS, and overall treatment costs
  - Shorter initial procedure duration with LAMS
  - Stent related AEs (32 vs. 6%) and procedure costs ($12K vs. 7K) were higher with LAMS

Bang JY, et al. Gut 2019

LAMS increases the risk of delayed bleeding

- Interim analysis of 21 pts in US RCT (12 LAMS, 9 plastic stents)
  - 6 SAE's in metal stent group
  - Bleeding 3 *(after 3, 5, 5 w)*, buried stent 2 *(after 5, 6 w)*, jaundice 1 *(5w)*
  - *Protocol modification*: CT-scan at 3wks, with removal of stent
- Single center, retrospective study, 249 patients undergoing LAMS (n=97) or double pigtails (n=152)
  - LAMS was associated with higher bleeding events (16 vs. 3%) and pseudoaneurysm bleeding (8 vs. 1%)



Bang JY, et al. Gut 2016; Brimhall B, et al. CGH 2018; Vendeputte D, et al. Gut 2017

Use LAMS with caution

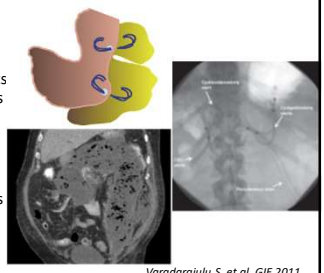
- Remove as early as possible (3-4w)
- Avoid in pseudoaneurysm, disconnected PD, and pts unreliable to f-u
- Consider placement of coaxial pigtail stent through LAMS
  - Single center, retrospective study (n=41), LAMS (n=20) vs. LAMS + double pigtail (n=21)
  - Pigtail group had less AEs (10% vs. 43%, p=0.04).
  - No significant reduction in bleeding (5 vs. 24%, p=0.2)

- Need high quality comparative multicenter RCTs comparing LAMS vs. double pigtail stents (PROMETHEUS, AXIOMA)
- Need cost-effectiveness trials and long-term data
- Consider using double pigtails in pseudocysts

Dhir V, et al. Endoscopy 2018
Puga M, et al. Endoscopy 2018

Other approaches to improve endoscopic drainage

- **Multiple transluminal gateway technique (MTGT)**
  - Creation of multiple transluminal tracts
  - Data: limited to 3 retrospective studies
  - Consider in pts who don't respond to initial drainage and in WON > 12 cm
- **Dual-modality technique (DMT)**
  - Transluminal + percutaneous drainage
  - Data: limited to 5 retrospective studies
  - Consider in patients with WON extending to the paracolic gutters



Varadarajulu S, et al. GIE 2011
Ross AS, et al. GIE 2014

Direct endoscopic necrosectomy (DEN)

Endoscopic passage into WON | Extraction of necrotic debris

Considerations for DEN

- Use general anesthesia: for airway protection of fluid/debris
- Prone position: fluid pool on opposite wall of stent
- Perform initial drainage with EUS
- Puncture site: lesser curvature, 4-6 cm distal of GEJ, to facilitate DEN
- Therapeutic or standard gastroscope for DEN
- Use CO2: reduces risk for air embolism
- Devices: polypectomy snares, stone-removal baskets, nets, tripod forceps, grasping/rat-tooth forceps

Freeman ML, et al. Pancreas 2012
Arvanitakis M, et al. Endoscopy 2018
Baron TH, et al. Gastroenterology 2020

Outcomes and complications of DEN

Systematic review (2014), 14 studies (13 retrospective and 1 RCT)

- Mean of 4 (range 1-23) endoscopic interventions were needed per pt
- Definitive treatment with DEN alone: 81% of pts
- Mortality: 6%
- Complications: 36%
  - Bleeding: 18%
  - Perforation: 4%
  - Pancreatic fistula: 5%
  - Aim embolism: 1%
  - Stent complications not included: stent migration (inward or outward), occlusion, erosion into back-wall, disconnected pancreatic duct syndrome

Van Brunschot S, et al. Surg Endosc 2014

Innovations in DEN – retrospective data

- Nasocystic irrigation
  - May help with double pigtails, unclear if w LAMS
  - Can be used when significant necrosis is present
  - 5-7Fr catheter, continuous 500-1000mL NS daily
  - Safe, potential perforation with vigorous irrigation
- Discontinuation of PPIs
  - Low pH facilitates necrosis liquefaction
  - Stop PPIs when no strong indication to continue
- Hydrogen peroxide
  - Safety concern: air embolus, cardiac arrest
  - Currently not advised

Siddiqui AA, et al. GIE 2013
Powers PC, et al. Endoscopic ultrasound 2019
Boxhoom L, et al. Curr Treat Options Gastro 2018

Indications for open surgery

- Abdominal compartment syndrome
- Ischemic bowel
- Perforation with peritonitis
- Persistent fistula
- Deterioration despite maximal step-up

Summary & take-home messages

- EUS guided step-up drainage of WON is superior to surgical drainage, but step-up surgical drainage with perc drain +/-VARD is acceptable
- LAMS have not shown to be superior to plastic stents in WON and should be used with caution
- On-demand direct endoscopic necrosectomy is recommended when endoscopic drainage alone has failed
- Multidisciplinary teams are essential for best care of these patients

THANK YOU

Endotherapy for Chronic Pancreatitis: When It's a "Go," When It's a "No"

Jeanin E. van Hooft, MD, PhD, MBA
Associate Professor
Chair of the Gastrointestinal Oncological Center Amsterdam
Amsterdam University Medical Center
Gastroenterology & Hepatology
Amsterdam, Netherlands

Amsterdam UMC
University Medical Centers

Endotherapy for Chronic Pancreatitis: When it's a "Go", When it's a "No"

Jeanin E. van Hooft, MD, PhD, MBA
Associate Professor of Gastroenterology

Disclosure statement

- Abbott – Consultancy
- Boston Scientific – Consultancy
- Cook Medical – Research Support, Consultancy
- Medtronic – Consultancy

Learning objectives

- Cite the 4 main treatment options for pain treatment in CP
- Recognize when endotherapy should be the first-line therapy in painfull CP
- Know the indications when surgery is just more effective for painfull CP

Definition

Pancreatology

Recommendations from the United European Gastroenterology evidence-based guidelines for the diagnosis and therapy of chronic pancreatitis

J. Enrique Dominguez-Munoz [1,*], Asbjørn M. Drewes [2], Björn Lindkvist [3], Nils Ewald [4], László Czakó [5], Jonas Rosendahl [6], J. Matthias Löhr [3], on behalf of the HaPanEU/UEG Working Group

Definition and aetiology

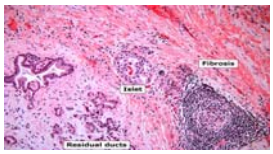
Definition of CP (regardless of the aetiology)

- CP is a disease of the pancreas in which recurrent inflammatory episodes result in replacement of the pancreatic parenchyma by fibrous connective tissue. This fibrotic reorganisation of the pancreas leads to progressive exocrine and endocrine pancreatic insufficiency. *(Strong agreement).*

Definition

- Key elements
  - Recurrent inflammatory episodes
  - Fibrous connective tissue
  - Progressive exo. & endocrine insufficiency

  (Strong agreement)



Dominquez-Munoz E et al., Pancreatology 2018

JAMA | Review December 24/31, 2019 Volume 322, Number 24

Diagnosis and Management of Chronic Pancreatitis
A Review

Vikesh K. Singh, MD, MSc; Dhiraj Yadav, MD, MPH;

Pancreatology

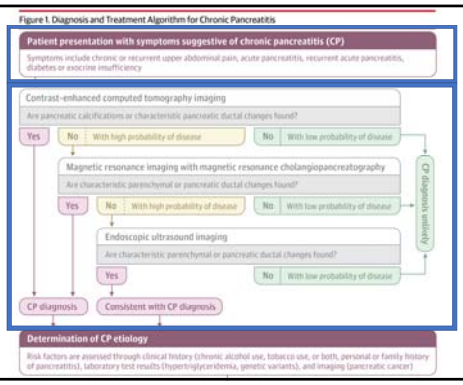
Recommendations from the United European Gastroenterology evidence-based guidelines for the diagnosis and therapy of chronic pancreatitis

J. Enrique Dominguez-Munoz [a,*], Asbjørn M. Drewes [b], Björn Lindkvist [c], Nils Ewald [d], László Czakó [e], Jonas Rosendahl [f], J. Matthias Löhr [g], on behalf of the HaPanEU/UEG Working Group

Endoscopic treatment of chronic pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated August 2018

Jean-Marc Dumonceau[1], Myriam Delhaye[2], Andrea Tringali[3,4], Marianna Arvanitakis[2], Andres Sanchez-Yague[5], Thierry Vaysse[6], Guruprasad P. Aithal[7], Andrea Anderloni[8], Marco Bruno[9], Paolo Cantù[10], Jacques Devière[2], Juan Enrique Dominguez-Muñoz[11], Selma Lekkerkerker[12], Jan-Werner Poley[9], Mohan Ramchandani[13], Nageshwar Reddy[13], Jeanin E. van Hooft[12]

Figure 1. Diagnosis and Treatment Algorithm for Chronic Pancreatitis



3 Choice of treatment and initial work-up

RECOMMENDATION

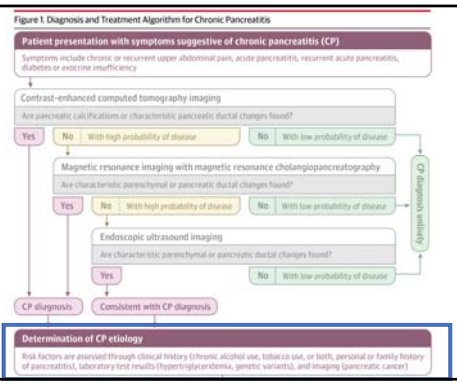
ESGE suggests performing a high quality pancreatic computed tomography (CT) scan and/or magnetic resonance imaging with cholangiopancreatography to reasonably rule out pancreatic cancer and to plan treatment in patients with chronic pancreatitis.

Weak recommendation, low quality evidence.

Initial work-up

- 16 fold increased risk PC
- Dedicated CT or MRI
  - Widely available
  - Can be shown at MDM
- EUS less sensitive in CP
  - Value of elastography and contrast enhanced under investigation
  - Idem for guided FNA/FNB

Kirkegard J et al., Am J Gastroenterol 2017



Etiology

- Etiologic categories:
  - TIGAR-O
    - Toxic, Idiopathic, Genetic, Autoimmune, Recurrent, Obstructive
  - M-ANNHEIM
    - Multiple, Alcohol, Nicotine, Nutrition, Hereditary, Efferent duct factors, Immunological, Misc & Metabolic

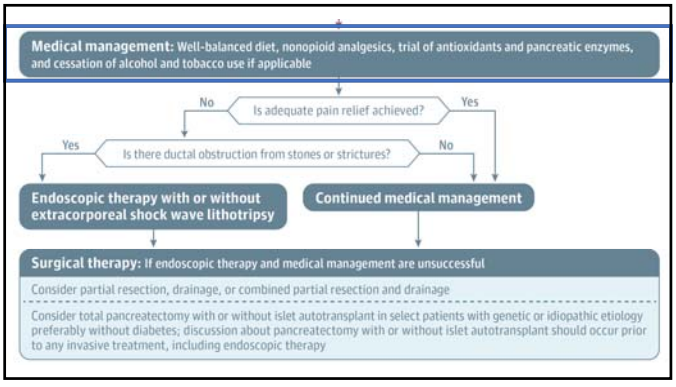
Etemad B et al., Gastroenterology 2001
Schneider A et al., J Gastroenterol. 2007

Etiology

Table 1. TIGAR-O Etiologic Classification of Chronic Pancreatitis

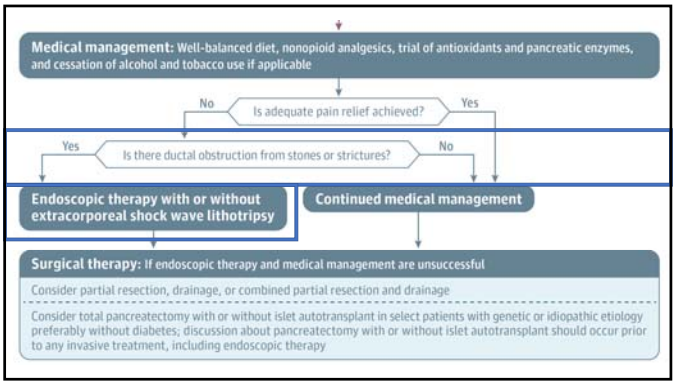
- Toxic metabolic
  - Alcoholic
  - Tobacco smoking
  - Hypercalcemia
  - Hyperlipidemia
  - Chronic renal failure
- Idiopathic
  - Tropical
  - Cause unknown; likely genetic
- Genetic
  - Autosomal dominant
  - Cationic trypsinogen
  - Autosomal-recessive/modifier genes
  - CFTR mutations
  - SPINK1 mutations
  - α-1-antitrypsin deficiency
- Autoimmune
  - Isolated autoimmune chronic pancreatitis
  - Associated with the following:
    - Primary sclerosing cholangitis
    - Sjogren's syndrome
    - Primary biliary disorder
    - Type 1 diabetes mellitus
- Recurrent and severe acute pancreatitis
  - Postnecrotic (severe acute pancreatitis)
  - Vascular diseases/ischemia
  - Postradiation exposure
- Obstructive
  - Pancreas divisum (controversial)
  - Sphincter of Oddi dysfunction (controversial)
  - Duct obstruction (tumors, post-traumatic)

Treatment



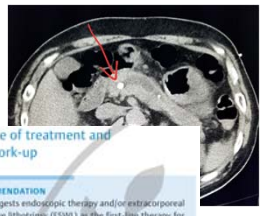
Treatment

- Medication
  - Pancreatic enzymes
  - Step up
    - Acetaminophen (4 x 1000mg) +
    - NSAID (diclofenac 3 x 75mg) +
    - Tramadol (4 x 50-100mg) or
    - Oxycontin (2 x 10mg) + Oxynorm (1 x 5mg if necessary)
  - Neuropathic pain
    - Amitriptyline (25mg → 100mg)
    - Pregabaline (2 x 75mg → 2 x 300mg)



Treatment

- Endotherapy +/- ESWL
  - Painfull PC
  - Obstruction main PD head/body
  - Evaluate respons 6-8 weeks
  - MDM



3 Choice of treatment and initial work-up

RECOMMENDATION

ESGE suggests endoscopic therapy and/or extracorporeal shockwave lithotripsy (ESWL) as the first-line therapy for painful uncomplicated chronic pancreatitis (CP) with an obstructed main pancreatic duct (MPD) in the head/body of the pancreas. The clinical response should be evaluated at 6–8 weeks; if it appears unsatisfactory, the patient's case should be discussed again in a multidisciplinary team and surgical options should be considered. Weak recommendation, low quality evidence.

3 Choice of treatment and initial work-up

RECOMMENDATION

ESGE suggests, for the selection of patients for initial or continued endoscopic therapy and/or ESWL, taking into consideration predictive factors associated with a good long-term outcome. These include, at initial work-up, absence of MPD stricture, a short disease duration, a short disease duration, non-severe pain, absence or cessation of cigarette smoking and of alcohol intake, and, after initial treatment, complete removal of obstructive pancreatic stones and resolution of pancreatic duct stricture with stenting.

Weak recommendation, low quality evidence.

Treatment

ORIGINAL ARTICLE

Endoscopic versus Surgical Drainage of the Pancreatic Duct in Chronic Pancreatitis

	Endoscopy (N=19)	Surgery (N=20)	P-value
Pain (score 0-100, after 24 months)	51 (±23)	25 (±15)	<0.001
Pain relief (after 24 months)	6 (32%)	15 (75%)	0.007

Late phase treatment: **patients with refractory pain and long-term opioid-dependency**

Cahen et al, NEJM 2007

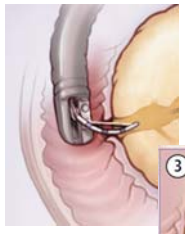
20

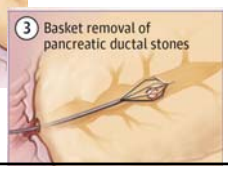
Treatment

- Patient selection
  - Act in the early phase
  - Motivate and support the patient to:
    - Stop alcohol (ab)use
    - Stop smoking

Treatment

- Endotherapy
  - Symptoms +
  - Early phase +
  - Obstructing stone(s)
    - Head/body
    - < 10 mm
    - Max 3





Treatment

- Endothe
  - Sympt
  - Early p
  - Obstru
    - Hea
    - > 5 r
    - Radi

Treatment

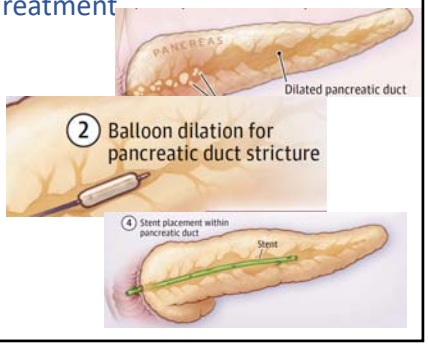
- Endotherapy –alternative to ESWL-

RECOMMENDATION

ESGE suggests considering pancreatoscopy-guided lithotripsy when ESWL is not available or for stones that were not fragmented after adequately performed ESWL. Weak recommendation, low quality evidence.

Treatment

- Endotherapy
  - Symptoms +
  - Early phase +
  - Dilation
    - Facilitate
      - Stones removal
      - Stent placement



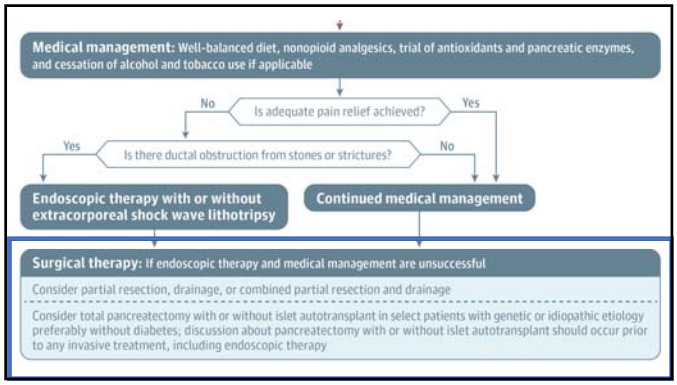
Treatment

- Endotherapy
  - Stent placement transpapillary
    - Gradually upgrading to multiple plastics
    - Fully covered SEMS
  - Stent placement transgastric

RECOMMENDATION
ESGE recommends performance of endosonography-guided access and drainage of the MPD only in tertiary centers after multidisciplinary discussion and preferably in a research setting.
Strong recommendation, low quality evidence.

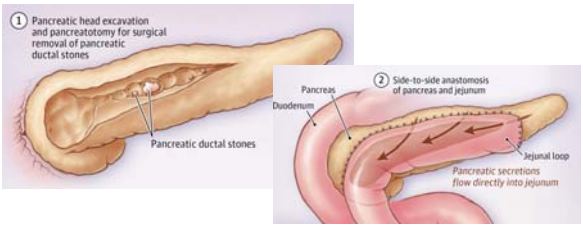
Treatment

- Endotherapy
  - First line
    - Right patients
      - Symptoms?
      - Early phase?
      - Medication tried?
      - Cessation of alcohol?
      - Amendable stone(s)?



Treatment

- Surgery effective alternative



Treatment

JAMA | Original Investigation

JAMA. 2020;323(3):237-247.

Effect of Early Surgery vs Endoscopy-First Approach on Pain in Patients With Chronic Pancreatitis

The ESCAPE Randomized Clinical Trial

IMPORTANCE For patients with painful chronic pancreatitis, surgical treatment is postponed until medical and endoscopic treatment have failed. Observational studies have suggested that earlier surgery could mitigate disease progression, providing better pain control and preserving pancreatic function.

OBJECTIVE To determine whether early surgery is more effective than the endoscopy-first approach in terms of clinical outcomes.

Treatment

- Results

- Conclusion

Meaning Although early surgery resulted in less pain over 18 months, because of study limitations, further research is needed to assess persistence of differences over time, as well as to replicate the study findings.

Treatment

6 Pseudocyst management

RECOMMENDATION

ESGE recommends treating CP-related pseudocysts if they are symptomatic (abdominal pain, gastric outlet obstruction, early satiety, weight loss or jaundice) or present with complications (infection, bleeding, rupture, or fistulization to adjacent hollow structures).
Strong recommendation, low quality evidence.

RECOMMENDATION

ESGE recommends endoscopic drainage over percutaneous or surgical treatment for uncomplicated CP-related pseudocysts that are within endoscopic reach.
Strong recommendation, moderate quality evidence.

7 Biliary strictures

- Wait ≥ 4 weeks if asymptomatic
- Genuine fibrosis vs transient inflammation
- Upscale with plastic or use metal
- Consider surgery after 1 year

RECOMMENDATION
ESGE suggests performance of an ERCP when a CP patient presents with a ≥4-week biliary obstruction (jaundice, asymptomatic elevation of serum alkaline phosphatase [>2 or 3 times the upper limit of normal values] and/or bilirubin) to achieve biliary decompression by means of stent placement. If follow-up shows that the obstruction is caused by a genuine fibrosis rather than transient inflammatory compression, endoscopic stent treatment should be continued in order to dilate the stricture. After 1 year of unsuccessful endotherapy, surgery should be considered.
Weak recommendation, low quality evidence.

7 Biliary strictures

RECOMMENDATION
ESGE recommends maintaining a registry of patients with biliary stents and recalling them for stent removal or exchange.
Strong recommendation, low quality evidence.

CONCLUSION

- Proper work-up for diagnosis
  - Imaging is key
- Be aware of the next step in painfull CP
  - Don't wait too long → re-evaluate
    - Be modest as endoscopist
  - MDM!!
- The role of endotherapy goes beyond pain management in CP

Learning objectives

- Cite the 4 main treatment options for pain treatment in CP
- Recognize when endotherapy should be the first-line therapy in painfull CP
- Know the indications when surgery is just more effective for painfull CP

www.ESGE.com

Surgical Therapy for Chronic Pancreatitis: Pancreas Preservation or Total Pancreatectomy?

Steven Ahrendt, MD
Professor of Surgery, Director of Cytoreductive
Surgery/HIPEC Program
Department of Surgery and Surgical Oncology
University of Colorado Anschutz Medical Campus
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Surgical Therapy for Chronic Pancreatitis: Pancreas Preservation or Total Pancreatectomy?

Steven A. Ahrendt, MD, FACS
Professor, Department of Surgery
Director, Cytoreductive Surgery/HIPEC Program
University of Colorado

The 16th Rocky Mountain Interventional Endoscopy Course
February 8, 2020

UCHealth

Department of Surgery
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Surgery in Chronic Pancreatitis

No disclosures

Surgery in Chronic Pancreatitis

Objectives

- To define the role of surgery in chronic pancreatitis
- To clarify the benefits and limitations of different surgical approaches to chronic pancreatitis
- To identify patients who are good candidates for total pancreatectomy and islet autotransplantation for chronic pancreatitis (TPIAT)

University of Colorado
Anschutz Medical Campus

Surgery in Chronic Pancreatitis

A Prospective, Randomized Trial Comparing Endoscopic and Surgical Therapy for Chronic Pancreatitis

P. Dite, M. Ruzicka, V. Zboril, and I Novotny.

Endoscopy
Volume 35:553-8, 2003

Endoscopic versus Surgical Drainage of the Pancreatic Duct in Chronic Pancreatitis

Djuna L. Cahen, M.D., Dirk J. Gouma, M.D., Ph.D., Yung Nio, M.D., Erik A. J. Rauws, M.D., Ph.D., Marja A. Boermeester, M.D., Ph.D., Olivier R. Busch, M.D., Ph.D., Jaap Stoker, M.D., Ph.D., Johan S. Laméris, M.D., Ph.D., Marcel G.W. Dijkgraaf, Ph.D., Kees Huibregtse, M.D., Ph.D., and Marco J. Bruno, M.D., Ph.D.

N Engl J Med
Volume 356(7):676-684 ,2007

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy

Inclusion Criteria

- Chronic pancreatitis by imaging
- Obstructive form of CP with dilated duct, strictures and/or stones
- Pain
- Failure conservative management
- Clinical disease 5 years
- Intervention indicated and both endoscopic and surgery feasible

Exclusion Criteria

- Suspected malignancy
- Previous interventional therapy

Dite P et al, Endoscopy 2003

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy

Endoscopic Therapy

- Sphincterotomy
- Dilation of strictures
- Stenting if dilation unsuccessful
- Stone extraction+/- lithotripsy
- Stent exchange per protocol, no additional procedures

Surgical Therapy

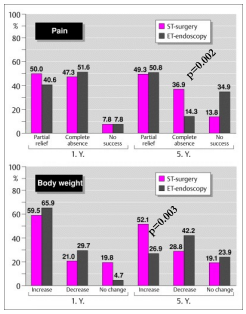
- DPPHR if CP limited to head
- PD if duodenal or biliary tract stricture
- Drainage procedure if duct dilation without pancreatic enlargement

Dite P et al, Endoscopy 2003

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy

140 total patients
72 patients randomized
68 patients not randomized
64 endoscopic treatment
  52% stented (mean 16 mos, 6 exchanges)
  23% stone extraction
  8% complication rate
  97% technical success (mean 2 sessions)
76 surgical treatment
  80% resection
    43% DPPHR
    30% PD
    8% DP
  20% drainage procedure
  8% complication rate
  0% mortality



Dite P et al, Endoscopy 2003

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy

Inclusion Criteria

Chronic pancreatitis by clinical symptoms and imaging; pancreatic insufficiency or both

Obstruction of the pancreatic duct from stenosis, stones or both to the left of the spine; duct >5 mm diameter

Severe, recurrent pain requiring opiates

Exclusion Criteria

Enlargement pancreatic head >4 cm, suspect cancer

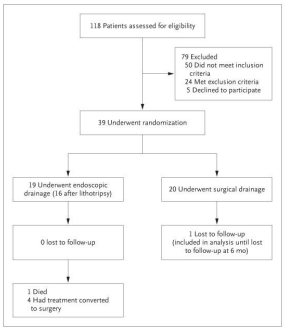
Previous surgical therapy

Either endoscopic or surgical contraindication

Cahen DL et al, NEJM, 2007

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy



Cahen DL et al, NEJM, 2007

Surgery in Chronic Pancreatitis

Table 2. Demographic and Clinical Characteristics of Patients at Randomization.*

Characteristic	Endoscopy (N=19)	Surgery (N=20)	P Value
Age — yr	52±9	46±12	0.07
Male sex — no. (%)	11 (58)	15 (75)	0.26
Cause of pancreatitis — no. (%)			0.43
Alcohol abuse	9 (47)	12 (60)	
Idiopathic	7 (37)	5 (25)	
Hereditary	1 (5)	1 (5)	
Pancreas divisum	2 (11)	0	
Other	0	2 (10)	
Pain pattern — no. (%)			0.61
Continuous	12 (63)	11 (55)	
Intermittent	7 (37)	9 (45)	
Izbicki pain score†	73±12	69±18	0.33
Duration of symptoms — mo	16±14	21±19	0.45
Ongoing alcohol abuse — no. (%)	0	5 (25)	0.05
Current smoker — no. (%)	15 (79)	17 (85)	0.94
SF-36 quality-of-life scores‡			
Physical health component	31±8	35±8	0.11
Mental health component	33±8	37±12	0.43
Exocrine function			
Insufficiency — no. (%)‖	13 (68)	16 (80)	0.65
Fecal elastase — μg/g	125±125	139±145	
Endocrine function			
Insufficiency — no. (%)¶	4 (21)	4 (20)	0.75
Serum glucose — mmol/liter#	6.5±2.5	6.1±2.7	
Glycated hemoglobin — %	6.3±1.2	6.2±1.3	

Cahen DL et al, NEJM, 2007

Surgery in Chronic Pancreatitis

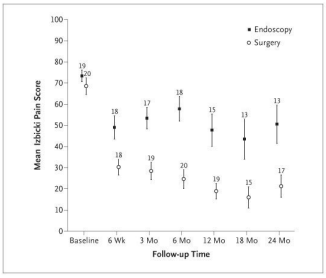
Endoscopic vs Surgical Therapy

Variable	Endoscopy (n=19)	Surgery (n=20)	P value
Izbicki Pain Score	51±23	25±15	<0.001
Pain relief-no(%)	6(32)	15(75)	0.007
Complete	3(16)	8(40)	
Partial	3(16)	7(35)	
No	13(68)	5(25)	
Technical success	10(53)	20(100)	<0.001
Therapeutic Procedures	5(1-11)	1(1-5)	<0.001

Cahen DL et al, NEJM, 2007

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy



Cahen DL et al, NEJM, 2007

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy

Study Overview

- In this randomized trial of 39 patients with chronic pancreatitis and a distal obstruction of the pancreatic duct, surgical drainage was more effective at reducing pain than was endoscopic drainage
- Complete or partial relief of pain was achieved in 32% of patients assigned to endoscopic treatment and 75% of those assigned to surgery

Cahen DL et al, NEJM, 2007

The NEW ENGLAND JOURNAL of MEDICINE

Surgery in Chronic Pancreatitis

Endoscopic vs Surgical Therapy

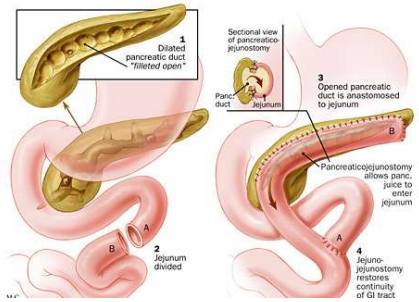
Conclusion

- Surgical drainage of the pancreatic duct was more effective than endoscopic treatment in patients with obstruction of the pancreatic duct due to chronic pancreatitis

Cahen DL et al, NEJM, 2007

Surgery in Chronic Pancreatitis

Surgery-Drainage Procedures



Lateral pancreaticojejunostomy (Puestow procedure)

Surgery in Chronic Pancreatitis

Surgery-Drainage Procedures

Surgery in Chronic Pancreatitis

Surgical Drainage Procedures

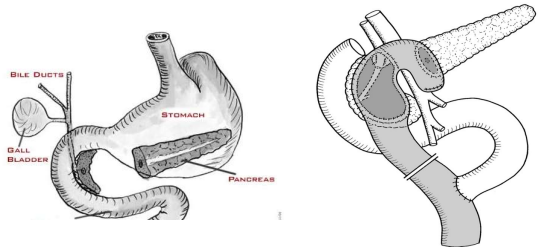
Rationale
- **Pain due to elevated pressure in obstructed duct**

Anatomic consideration
- **Ductal dilation (5 mm) in body and tail without pancreatic head mass**

Advantages
- **Preserves functional pancreatic tissue**
- **Low operative morbidity**
- **80-85% short-term pain relief**

Surgery in Chronic Pancreatitis

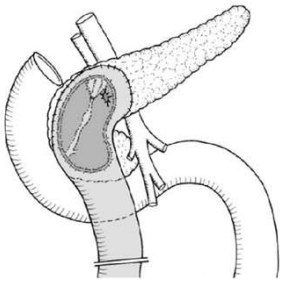
Surgery-Resection Procedures



Duodenum-preserving pancreatic head resection (Beger procedure)

Surgery in Chronic Pancreatitis

Surgery-Resection Procedures



Duodenum-preserving pancreatic head resection (Berne modification)

Surgery in Chronic Pancreatitis

Surgical Resection Procedures

Rationale
- Pacemaker of chronic pancreatitis in head

Anatomic consideration
- Suspected malignancy
- Duodenal or biliary obstruction
- Inflammatory pancreatic head mass

Advantages
- 75-80% long-term pain relief

Disadvantages
- Higher operative morbidity and mortality
- Reduction in exocrine and endocrine function
- Sacrifice non-diseased organs

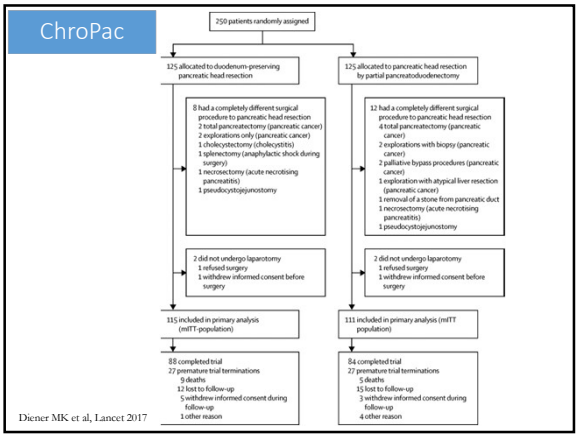
Surgery in Chronic Pancreatitis

Pancreaticoduodenectomy vs DPPHR

- ChroPac Trial-long-term outcomes of resection in CP
- 250 patients randomized to DPPHR (n=125) versus PD (n=125) between 2009 and 2013 at 18 European centers
- Choice of surgery left to surgeon
- Primary endpoint QOL at 24 months
- No significant difference in mortality, EBL, or severe adverse events between DPPHR (64%) and PD (52%)
- Readmissions for CP more common after DPPHR (27% vs 11%)

Diener MK et al, Lancet 2017

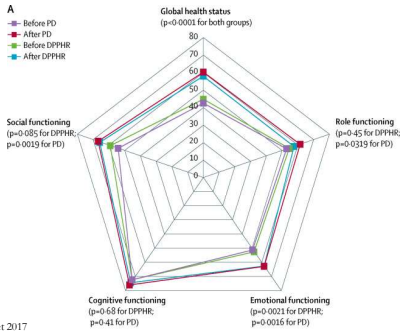
ChroPac



Diener MK et al, Lancet 2017

Surgery in Chronic Pancreatitis

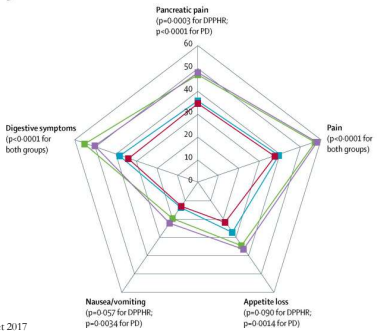
PD vs DPPHR-ChroPac



Diener MK et al, Lancet 2017

Surgery in Chronic Pancreatitis

PD vs DPPHR-ChroPac



Diener MK et al, Lancet 2017

Surgery in Chronic Pancreatitis

ChroPac-Conclusions

- No difference (p=0.28) in overall quality of life within 24 months between DPPHR (73±16) and PD (75±16)
- Both DPPHR and PD effective treatments for CP
- PD more definitive therapy for CP-fewer readmissions for CP and avoids reoperation for pancreatic cancer
- DPPHR preferred if portal vein compression

Diener MK et al, Lancet 2017

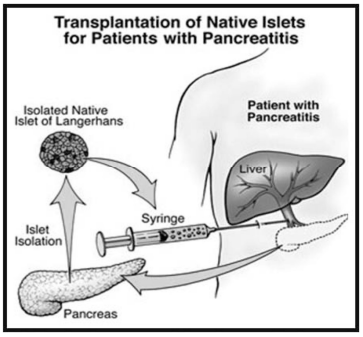
Surgery in Chronic Pancreatitis

Total pancreatectomy and islet cell autotransplantation-TPIAT

- First procedure in 1977 at University of Minnesota
- Limited tertiary centers in the US are performing TPIAT-UMinn, Baylor, UCinn, UChicago, UPitt, Dartmouth, OSU, JHU, MUSC,
- Removing the entire pancreas eliminates pancreatitis, pain, and cancer risk
- Preserving islet cells prevents brittle diabetes with loss of insulin and glucagon

Arce KM et al, Cleveland Clinic J of Med 2016

Surgery in Chronic Pancreatitis



McEachron KR et al, Curr Opin Gastroenterol 2018

Surgery in Chronic Pancreatitis

Criteria for TPIAT

- Chronic pancreatitis with symptoms > 6 months and biopsy or imaging evidence of CP, or hereditary pancreatitis (PRSS1 gene mutation)
- Daily narcotic use or significant QOL impairment
- No reversible cause of pancreatitis
- Failure to respond to maximal medical and endoscopic therapy
- Adequate islet-cell function (nondiabetic or C-peptide positive).

Arce KM et al, Cleveland Clinic J of Med 2016

Surgery in Chronic Pancreatitis

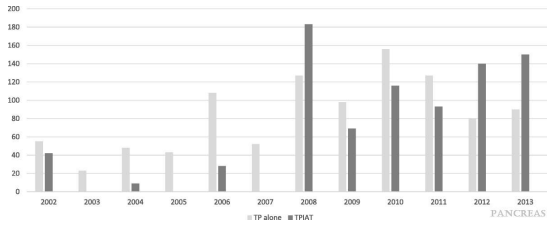
Contraindications for TPIAT

- Active alcoholism
- Pancreatic cancer
- Poorly controlled psychiatric illness
- Illegal drug use
- Type-1 diabetes or C-peptide negative diabetes
- Portal vein thrombosis
- Portal hypertension
- Steatohepatitis
- Prior lateral pancreaticojejunostomy

Arce KM et al, Cleveland Clinic J of Med 2016

Surgery in Chronic Pancreatitis

Prevalence of TPIAT



Lara LF, Pancreas 2019

TPIAT

	Overall (n = 1831)	TP (n = 1006)	TPIAT (n = 825)	P
Age, mean ± SE	46.35 ± 1.17	50.86 ± 1.16	40.86 ± 0.91	<0.001
Sex, n (%)				<0.001
Male	707 (38.63)	450 (44.75)	257 (31.17)	
Female	1124 (61.37)	556 (55.25)	568 (68.83)	
Race, n (%)				<0.001
White	948 (51.78)	584 (58.08)	364 (44.11)	
Black	96 (5.22)	71 (7.03)	25 (3.03)	
Hispanic	46 (2.5)	36 (3.54)	10 (1.22)	
Other	741 (40.49)	315 (31.35)	426 (51.64)	
Income quartile, US $,* n (%)				0.160
First (1–37,999)	365 (20.32)	229 (23.3)	136 (16.74)	
Second (36,000–47,999)	466 (25.92)	226 (23.05)	239 (29.36)	
Third (46,000–63,999)	450 (25.04)	258 (26.31)	192 (23.52)	
Fourth (62,000–64,000+)	516 (28.72)	268 (27.34)	248 (30.39)	
Insurance, n (%)				<0.001
Medicare	372 (21.01)	319 (32.47)	54 (6.79)	
Medicaid	154 (8.71)	126 (12.8)	29 (3.62)	
Private	998 (56.32)	447 (45.55)	551 (69.69)	
Other	247 (13.96)	90 (9.18)	157 (19.9)	
Hospital type, n (%)				†
Rural	20 (1.09)	20 (1.99)	0	
Urban nonteaching	94 (5.16)	94 (9.4)	0	
Urban teaching	1713 (93.75)	888 (88.6)	825 (100)	
Hospital bed size, n (%)				†
Small	13 (0.71)	13 (1.29)	0	
Medium	124 (6.78)	124 (12.36)	0	
Large	1690 (92.51)	865 (86.35)	825 (100)	
Hospital region, n (%)				0.002
Northeast	142 (7.76)	100 (9.9)	42 (5.15)	
Midwest	827 (45.2)	351 (34.87)	477 (57.79)	
South	599 (32.71)	382 (37.95)	217 (26.33)	
West	262 (14.33)	174 (17.28)	89 (10.73)	
Elixhauser comorbidity, n (%)				0.784
<3	996 (54.55)	553 (55.31)	443 (53.64)	
≥3	830 (45.45)	447 (44.69)	382 (46.36)	
Mortality, n (%)	34 (1.85)	34 (3.36)	0	†
LOS, mean ± SE, d	16.24 ± 0.76	17.42 ± 1.23	14.79 ± 0.69	0.055
Cost, mean ± SE, US $	59,613 ± 4243	57,609 ± 5859	61,998 ± 3282	0.389

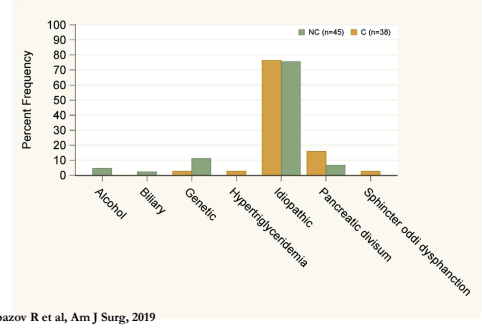
*Quartile ranges vary from 2002 to 2013.
†P values for hospital type, hospital bed size, and mortality purposely missing. Each of the missing P values corresponds with a test involving a 0 cell.
SE indicates standard error; LOS, length of stay.

PANCREAS

Lara LF, Pancreas 2019

Surgery in Chronic Pancreatitis

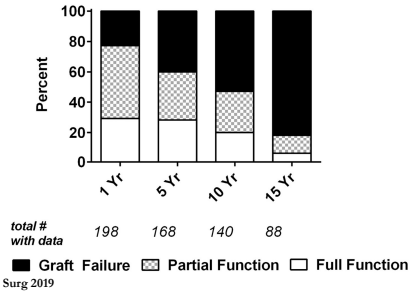
Etiology of CP in TPIAT



Shahbazov R et al, Am J Surg, 2019

Surgery in Chronic Pancreatitis

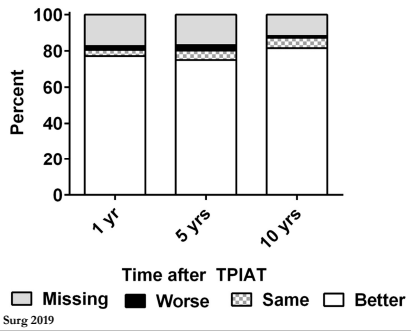
Results of TPIAT



Bellin MD, J Am Coll Surg 2019

Surgery in Chronic Pancreatitis

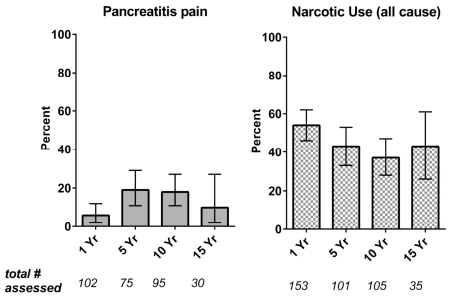
Results of TPIAT



Bellin MD, J Am Coll Surg 2019

Surgery in Chronic Pancreatitis

Results of TPIAT



Bellin MD, J Am Coll Surg 2019

Surgery in Chronic Pancreatitis

Summary

- Surgery provides more durable pain relief in patients with chronic pancreatitis
- Choice of optimal surgical procedure depends on etiology of chronic pancreatitis, local anatomical considerations, and comorbidities including diabetes and liver disease

University of Colorado Anschutz Medical Campus

BILIARY DISORDERS

Optimizing Success to Remove Large Biliary Stones

Rawad Mounzer, MD
Assistant Professor of Medicine
Director of Center for Pancreaticobiliary Disease
Digestive Institute
Banner-University Medical Center
Phoenix, Arizona

Optimizing Success to Remove Large Biliary Stones

Rawad Mounzer MD
Assistant Professor of Medicine
Banner University Medical Center - Phoenix
University of Arizona

RMIE 2020

Outline

- Definition of difficult stones
- Role of abdominal imaging
- ERCP techniques and devices
- EHL and laser lithotripsy
- Altered anatomy
- Case Presentations
- Summary

Not all stones are the same…

Grading of ERCP Difficulty

TABLE 1. Grading scale for ERCP based on difficulty

	Biliary procedures	Pancreatic procedures
Grade 1	Diagnostic cholangiogram Biliary brush cytology Standard sphincterotomy ± removal of stones <10 mm Stricture dilation/ stent/ NBD for extrahepatic stricture or bile leak	Diagnostic pancreatogram Pancreatic cytology
Grade 2	Diagnostic cholangiogram with BII anatomy Removal of CBD stones >10 mm Stricture dilation/ stent/ NBD for hilar tumors or benign intrahepatic strictures	Diagnostic pancreatogram with BII anatomy Minor papilla cannulation
Grade 3	SOM Cholangioscopy Any therapy with BII anatomy Removal of intrahepatic stones or any stones with lithotripsy	SOM Pancreatoscopy All pancreatic therapy, including pseudocyst drainage

Gastrointest Endosc. 2016 Feb;83(2):279-89.

Risk Factors for Difficult Stone Extraction

Table 1
Risk factors for technically complex endoscopic retrograde cholangiopancreatography stone extraction procedure

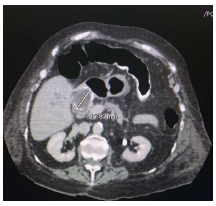
Category	Risk Factor
Clinical	Age >65[a] Gastroenterostomy anatomy (Pancreaticoduodenectomy, Roux-en-Y gastric bypass, Roux choledochoenterostomy)[a]
Stone attributes	Stone size >14 mm Barrel-shaped, elongated stone Periampullary position with or without impaction (<36 mm)[a] Intrahepatic stone(s) Multiple stones
Bile duct morphology	Angulation of the distal common bile duct (<135°)[a] Redundant, capacious common bile duct Distal stricture/primary sclerosing cholangitis Concomitant Mirrizi syndrome

Easler JJ et al. Gastrointest Endosc Clin N Am. 2015.
Kim HJ et al. Gastrointest Endosc 2007.

Imaging

- Stone size, shape and location
- Number of stones
- Bile duct morphology

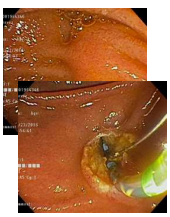
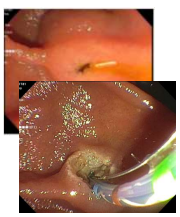
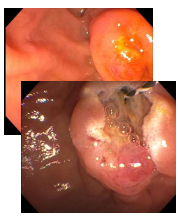




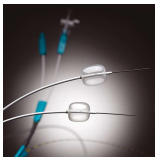
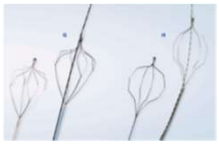
Initial ERCP Steps

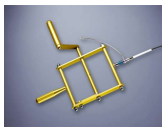
- Cholangiogram
  - Slow injection of contrast (particularly in setting of cholangitis)
  - Visualize bile duct behind the duodenoscope
- Sphincterotomy
  - Generous but safe
  - Extension sphincterotomy
  - Assess size by using bowed sphinctetome or extraction balloon
  - Consider balloon sphincteroplasty

Sphincterotomy

Extraction Devices




Extraction Balloons

- Pros
  - Control size (8.5 mm-18mm)
  - Wire guided (easier access to intrahepatic ducts)
  - Ability to perform occlusion cholangiogram
  - Conforms to shape of the duct
- Cons
  - Balloon rupture

Extraction Baskets

- Pros
  - Different sizes and shapes
  - More durable than balloons
  - Allows for more traction
- Cons
  - Can cause trauma at sphincterotomy site during cannulation
  - Limited ability to perform cholangiogram
  - Difficult to extract small stones
  - Not all are lithotripter compatible and can become impacted

Sphincterotomy and Balloon Sphincteroplasty Meta-analysis

- Meta-analysis of 6 RCTs (835 patients) of sphincterotomy vs sphincterotomy + balloon sphincteroplasty patients with stones >10mm
  - No significant difference in first session stone extraction (OR 1.02, P=0.92)
  - Reduction in need for mechanical lithotripsy (OR 0.26, P=0.02)
  - Fewer overall complications (OR 0.53, P=0.008)
    - Fewer perforations but no significant difference in bleeding, infection or pancreatitis

Yang XM et al, World J Gastroenterol 2013.

Electrohydraulic Lithotripsy

- Bipolar probe and generator
- Spark created at probe tip
- Shock wave generated in surrounding fluid
- Requires stone visualization and continuous saline irrigation

Multicenter Experience with EHL

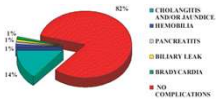
- Retrospective study of 111 patients that underwent cholangioscopy with EHL following failed stone extraction at ERCP

	Number of Patients (Total N = 94)
Stone location	
Common bile duct	53 (56%)
Intrahepatic/common hepatic	19 (20%)
Combination*	11 (12%)
Cystic duct	11 (12%)
Stone number	
1	47 (50%)
2	7 (7%)
3	40 (43%)
EHL indication	
Stone size >2 cm	81 (86%)
Distal narrow duct and stone size <2 cm	13 (14%)

Arya N et al. Am J Gastroenterol 2004.

Multicenter Experience with EHL

	Patients
Stone fragmentation	
Complete	61/93* (66%)
Partial	28/93* (30%)
Failed	4/93* (4%)
EHL sessions	
1	71 (76%)
2	13 (14%)
>2	10 (10%)
Additional therapy	
Mechanical lithotripsy	19 (20%)
ESWL	2 (2%)
Biliary drainage	
None	66 (70%)
Stents	27 (29%)
Nasobiliary/cystic tubes	3 (3%)
Additional ERCP	
None	54 (57%)
1	32 (34%)
2	5 (5%)
>2	4 (4%)



Arya N et al. Am J Gastroenterol 2004.

Intracorporeal Laser Lithotripsy

- Holmium or neodymium:yttrium-aluminum-garnet (YAG) fibers
- Vary in wavelength (nm), power (mJ), laser-pulse duration (µs), cycles (Hz)
- High-power density of laser generates waves that fracture the stone
- Requires stone visualization
- Additional training and is expensive
- Limited data show clearance rates of>90%

Easler JJ et al. Gastrointest Endosc Clin N Am. 2015.
DiSario J, et al. Gastrointest Endosc 2007.

Altered Anatomy

- Significant increase in altered anatomy ERCP in setting of obesity epidemic
- Increase the technical difficulty
- Increasing options for management
  - Enteroscopy-assisted ERCP
  - Laparoscopy-assisted ERCP (LA-ERCP)
  - EUS-directed transgastric ERCP (EDGE)
  - Percutaneous approach

Enteroscopy Assisted ERCP

Number of patients	31
Number of ERCPs	35
Age (years), median (range)	55 (22-75)
Body mass index (kg/m^2), median (range)	29.4 (19.07-50.61)
Sex (n)	
Male	6
Female	25
Postsurgical anatomy (no. of cases)	
Roux-en-Y gastric bypass	28
Roux-en-Y hepaticojejunostomy	4
Gastrectomy with Roux-en-Y reconstruction	3

Indications for ERCP, n (%)	
Choledocholithiasis	14 (40)
Malignant obstruction	6 (17)
Sphincter of Oddi dysfunction	5 (14)
Stent placement	2 (6)
Stent extraction	2 (6)
Biliary pancreatitis	2 (6)
Type III choledochocele	1 (3)
Bile leak	1 (3)
Hepaticojejunostomy stricture	1 (3)
Ampullary stricture after previous sphincterotomy	1 (3)

Ali MF, et al. Gastrointest Endosc 2018.

Enteroscopy Assisted ERCP

- 86% success rate at reaching ampulla
- 100% cannulation rate (85.7% patients had native papilla)
- 100% therapeutic ERCP success
- Median total procedure time 189.5 mins (IQR 131-270 mins)

Conclusion: With allotted time and high operator experience enteroscopy ERCP is a safe and effective modality

Ali MF, et al. Gastrointest Endosc 2018.

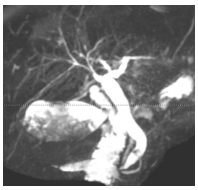
EDGE vs. LA-ERCP

Clinical Characteristics	EDGE	LA-ERCP	*P*
Technical success of achieving excluded stomach access [n/N (%)]	28/29 (96.5)	43/43 (100)	0.40
Technical success of achieving therapeutic ERCP [n/N (%)]	28/29 (96.5)	42/43 (97.7)	1.0
Total number of ERCP	1.2 (1-3)	1.04 (1-2)	0.0544
Adverse events [n/N (%)]	7/29 (24.1)	8/43 (18.6)	0.57
Cumulative procedure time (min)	**73 (24-230)**	**184 (55-393)**	**0.00001**
Total hospital stay (d)	**0.8 (0-5)**	**2.65 (1-12)**	**0.00008**

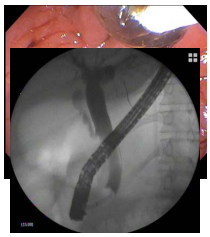
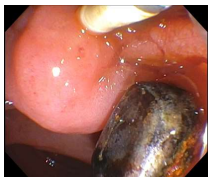
Kedia P, et al. J Clinical Gastroenterol 2019.

Case 1

- 31 y.o. healthy female presenting with RUQ pain, nausea, vomiting and jaundice.



Case 1

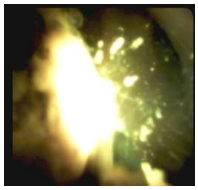




Case 2

- 60 y.o. female s/p RYGB presenting with fever, jaundice and abdominal pain.
- MRCP showed large CBD stones

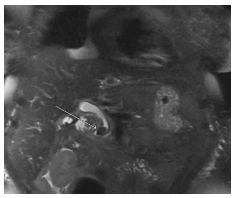
Case 2





Case 3

- 58 y.o. female with h/o morbid obesity s/p RYGB with large ventral abdominal hernia presenting with abdominal pain and jaundice.

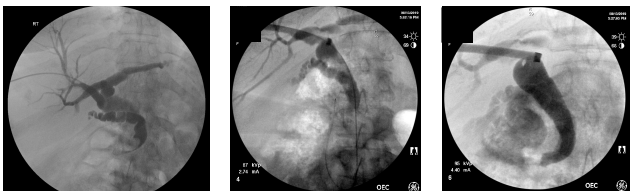
Case 3

- What approach would you pursue in this patient for stone extraction?
  a) Enteroscopy assisted ERCP
  b) LA-ERCP
  c) EDGE
  d) Percutaneous approach
  e) Consult surgeons for bile duct exploration

Case 3

- What approach would you pursue in this patient for stone extraction?
  a) Enteroscopy assisted ERCP
  b) LA-ERCP
  c) EDGE
  d) Percutaneous approach
  e) Consult surgeons for bile duct exploration

Case 3



Summary

- Biliary stone extraction can pose significant technical challenges
- Review imaging and know the patient's anatomy
- Be familiar with the equipment
- Consider all options and discuss them with the patient

Thank You

Minimizing Post-ERCP Pancreatitis Risk in 2020

James L. Buxbaum, MD, MS
Associate Professor of Clinical Medicine
Chief of Endoscopy and Gastroenterology,
Los Angeles County Hospital
University of Southern California
Gastroenterology and Internal Medicine
Los Angeles, California

Minimizing Post-ERCP Pancreatitis Risk in 2020

James Buxbaum MD
Associate Professor of Clinical Medicine
University of Southern California
Keck School of Medicine

Burden of Post ERCP Pancreatitis

- Recognized shortly after introduction of ERCP
- Occurs in 8.3% of average risk patients
  - 14.7% of high risk patients
  - Mortality 0.2%
- Cost: 200 million dollars in USA annually

Kochar, Gastrointest Endosc 2015; 81: 143-149, Miller, Gut 1976; 17: 439-443.

Diagnosis of Post ERCP Pancreatitis

- Consensus Definition
  - Diagnosis
    - New onset upper abdominal pain
    - Amylase>3X normal at >24 hours after procedure
    - Admission or prolongation of hospitalization ≥2 nights
  - Severity
    - Mild 2-3 days duration
    - Moderate 4-10 days
    - Severe 10 days or necrosis, pseudocyst, or requirement for invasive procedure

Cotton Gastrointest Endosc 1991; 37: 383-393, Elmunzer 2012| 366(15): 1414-22.

Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome

- Another new disease recognized late 1970's-early 1980's
- First challenge
  - Identification of risk factors
    - Behavior modification
    - Define patients who benefit most from treatment

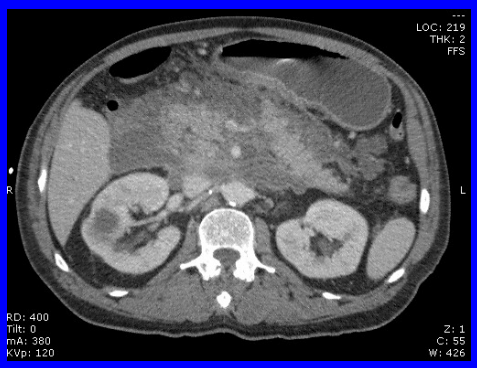
Frequency

Report & County	Years	Total Cohort (N)	PEP Total	% PEP Moderate to Severe	Suspected SOD Indication
Freeman et al, NEJM1996 USA-Multicenter	1992-1994	2347	5.4%	59%	12%
Vandervoort, GIE 2002 USA-Brigham	1997-2000	1223	7.2%	32%	7%
Cheng et al, Am J Gastro 2006 USA-Midwest PB	2001-2002	1115	15.1%	33%	33%
Wang et al, Am J Gastro 2009 China	2006-2007	3178	4.3%	19%	5%

Patient Risk Factors

Risk Factor	OR
Suspected Sphincter of Oddi dysfunction	1.9-5.0
History of post-ERCP pancreatitis	2.6-8.7
Female gender	1.8-2.5
Young age	1.6-2.1*
Normal serum bilirubin (≤1.0 mg/dL)	1.5-1.9

Testoni, Am J Gastroenterol 2010; 105: 1753-1761, Wang, Am J Gastroenterol 2009; 104(31): 31-40, Colton, Gastrointest Endosc 2009; 70(1): 80-88, Christensen, Gastrointest Endosc 2004(5): 721-731, Masci, Endoscopy 2003; 35(10): 830-834, Vandervoort, Gastrointest Endosc 2002; 56: 652-6, Freeman, Gastrointest Endosc 54(2): 425-433, 2001Loperfido, Gastrointest Endosc 1998; 48(1): 1-9, Freeman, N Eng J Med 1996; 335(13): 909-918



Appropriate Patient Selection

- Avoid SOD III
  - High risk of PEP
  - EPISOD Trial showed no benefit of ERCP
- MRI and endoscopic ultrasound (EUS) for diagnostic evaluation
  - EUS prior to ERCP indeterminate bile duct stones >3 fold decrease PEP

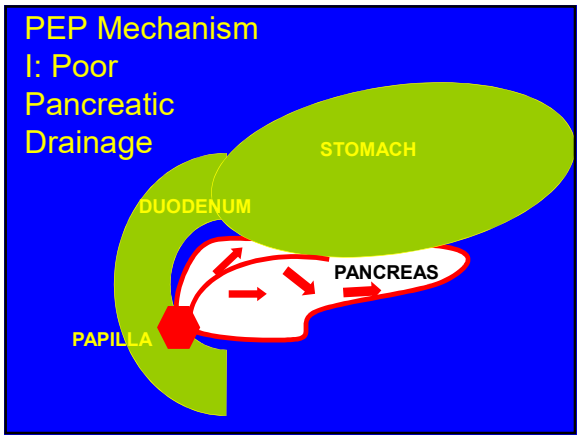
Type	RUQ Pain	Abnormal LFT's	Abnormal Imaging
I Definite	Yes	Yes	Yes
II Probable	Yes	Either of these	
III Possible	Yes	None of these	

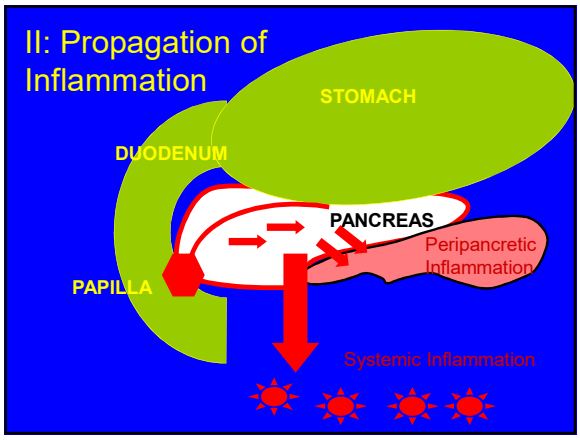
Cotton, JAMA 2014; 311(20): 2101-2019, Polkowski, Endoscopy 2007; 39(4): 296-303

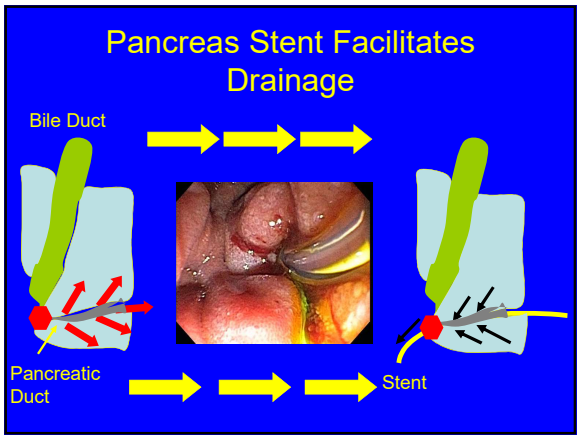
Technical Risk Factors

Risk Factor	OR
Difficult cannulation	1.5-14.9
Precut sphincterotomy	*1.9-4.3*
Pancreatic duct contrast injections	1.5-3.5
Pancreatic sphincterotomy	1.7-3.1
Minor papillotomy	1.9-3.8
Biliary balloon sphincter dilation without sphincterotomy	4.5

Testoni, Am J Gastroenterol 2010; 105: 1753-1761, Wang, Am J Gastroenterol 2009; 104(31): 31-40, Colton, Gastrointest Endosc 2009; 70(1): 80-88, Christensen, Gastrointest Endosc 2004(5): 721-731, Masci, Endoscopy 2003; 35(10): 830-834, Vandervoort, Gastrointest Endosc 2002; 56: 652-6, Freeman, Gastrointest Endosc 54(2): 425-433, 2001Loperfido, Gastrointest Endosc 1998; 48(1): 1-9, Freeman, N Eng J Med 1996; 335(13): 909-918


PEP Mechanism
I: Poor
Pancreatic
Drainage
STOMACH
DUODENUM
PANCREAS
PAPILLA


II: Propagation of
Inflammation
STOMACH
DUODENUM
PANCREAS
Peripancretic
Inflammation
PAPILLA
Systemic Inflammation


Pancreas Stent Facilitates
Drainage
Bile Duct
Pancreatic
Duct
Stent

Pancreas Stents

- Confirmed pancreatic SOD (n=80)
  - Pancreas stents reduced PEP following biliary sphincterotomy from 26 to 7%
- Meta-analysis (n=656)
  - Odd ratio 0.2(0.12-0.38) for PEP for pancreas stent in high risk patients
  - Number needed to treat (NNT) = 8
- Complications of pancreas stent
  - Failed pancreas stent attempt 34.7% PEP
  - Guidewire perforation

Tarnasky, Gastroenterology 1998; 115: 1518-1524, Choudhary, Gastrointest Endosc 2011; 73: 273-275, Choksi, Gastrointest Endosc 2015; 81: 150-5 , Mazaki, J Gastroenterol 2014;49(323-355).

Technical Risk Factors→Difficult Cannulation

Risk Factor	OR
Difficult cannulation	**1.5-14.9**
Precut sphincterotomy	**1.9-4.3**
Pancreatic duct contrast injections	**1.5-3.5**
Pancreatic sphincterotomy	1.7-3.1
Minor papillotomy	1.9-3.8
Biliary balloon sphincter dilation without sphincterotomy	4.5

Prakalathan, Clin Gastroenterol Hepatol; 2015; 13: 1722-1729

Difficult Cannulation and Pancreatic Duct Opacification

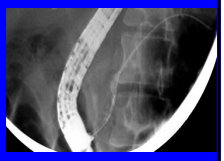
Cannulation Attempts	PEP(%)
1	0.6%
2	3.1%
3-4	6.1%
>5	11.9%
Cannulation Time	PEP(%)
<5 minutes	2.6%
>5 minutes	11.8%

Extent of Injection	None	Head	Body	Tail
PEP (%)	0.8	3.6	4.5	8.6

Cheon, Gastrointest Endosc 2007; 65(3); Halttunen, Scand J Gastroenterol 2014; 49: 752-758

Wire-Guided Cannulation

- Wire is advanced rather than contrast injected to confirm biliary versus pancreatic duct access
- Meta-analysis 7 RCT wire versus contrast guided
  - Decreased PEP (N=377), OR 0.19 (0.06, 0.58) NNT=18
- Difficult cases combine wire guided cannulation with pancreas stents



Cheung, GastrointestEndosc 2009; 70(6): 1211-1219.

Endoscopist versus Assistant Controlled Wire

- Development of novel cannulation systems enabled endoscopist controlled guidewire
- Randomized patients with native papilla undergoing ERCP for standard biliary indications to endoscopist versus assistant controlled guidewire wire
  - Halted at interim analysis for difference in safety outcomes
- Decreased PEP for endoscopist controlled wire likely due to decreased trauma related to tactile feedback

	Endoscopist (N=109)	Assistant (N=107)	P
Post-ERCP Pancreatitis	2.8	9.3	0.049
Endoscopic Complications	2.8	11.2	0.012

Bunbaum, Am J Gastroenterol 2016; 111: 1841-1847

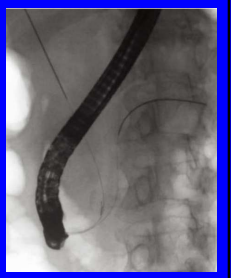
Early Precut

- Randomized trials (N=523) of early precut for difficult cannulation (5-12 minutes)
  - Cannulation OR 1.3 (1.1-1.7)
  - PEP OR 0.3 (0.1-0.9) attending endoscopists
    - OR 1.1 (0.5-2.6) if trainees

Sundaralingam, Clin Gastroenterol and Hepatol 2015; 13: 1722-1729

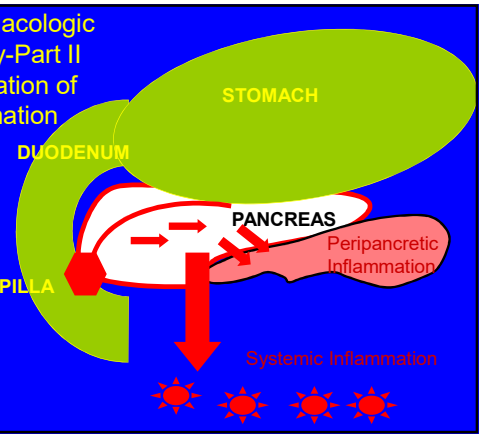
Technical Interventions with Mixed Results

- Dual wire cannulation
- Pure cut current for sphincterotomy
- Low osmolality contrast media



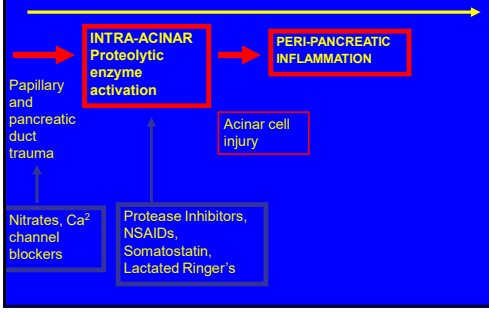
Tse, Cochrane Database Syst Review 2016; 5: 1-61, Xinopoulos, World J Gastroenterol 2011

I Pharmacologic Therapy-Part II Propagation of Inflammation



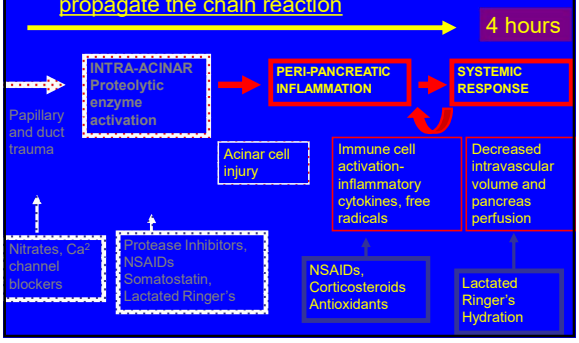
Pharmacologic Therapy

- Activated proteases and inflammatory mediators propagate the chain reaction



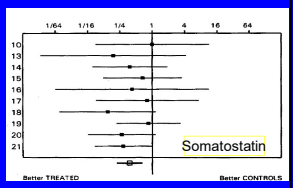
Pharmacologic Therapy

- Activated proteases and inflammatory mediators propagate the chain reaction



Somatostatin/Octreotide

- Inhibits enzymatic activity of pancreas
- Octreotide-not effective
  - 22 RCT of 2179 patients
- Somatostatin infusions
  - Conflicting studies and meta-analyses
  - Bolus dose appears more promising



	Placebo	Somatostatin
N	395	351
PEP N(%)	19 (4.8%)	22 (6.3%)

Akshintala, Aliment Pharmacol Ther 2013; 38: 1325-1337, Omata, J Gastroenterol 2010; 45: 885-895, Andriulli Gastrointest Endosc 2007; 65: 982-7, Andriulli, Clin Gastroenterol Hepatol 2004; 2: 713-718, Andriulli, Gastrointest Endosc 2002 56(4): 488-95, Poon, Gut 2003; 52: 1768-1773

Protease Inhibitors

- Inhibit trypsin and other proteases
- Gabexate and ulnistatin
  - Early trials suggest they decreased PEP
  - Later high quality studies showed no benefit
  - Nafamostat has greater half life and potency
    - Favorable preliminary studies
    - Expensive, long infusions
    - Primarily available in Asia

Yuhara, J Gastroenterol (2014) 49: 388-399, Kubiliun, Clin Gastroenterol Hepatol 2015; 13: 1231-1239, Seta, Gastrointest Endosc 2011; 73(4): 700-706

Pharmacologic Agents with Mixed Results

- Free radical injury
  - Allopurinol, N-acetylcysteine
- Inflammatory Cascade
  - Prednisone, Anti-IL-10, C1 esterase inhibitor concentrate
- Decrease Sphincter of Oddi pressure
  - Calcium channel blockers, nitrates, lidocaine, and botox

Yuhara, J Gastroenterol 2014; 49: 388-399; Kubiliun, Clin Gastroenterol Hepatol 2015; 13: 1231-1239, Messman Gut 1998; 40: 80-85, Sherman, Gastrointest Endosc 2003; 58: 23-9

Topical Ephinephrine

- Network meta-analysis suggested topical epinephrine was most efficacious agent
- Decrease papillary edema

	Luo, Clin Gastroenterol Hepatol 2019		Kamal, Am J Gastroenterol 2019	
	Epi Spray*	Placebo Spray*	Epi Spray*	Placebo Spray*
	Native papilla		High risk patients	
N	**576**	**582**	477	482
PEP	**8.3%**	**5.3%**	6.7%	6.4%

*Indomethacin given in all groups

Akshintala, Aliment Pharmacol Ther 2013; 38: 1325-1337, Luo, Clin Gastroenterol Hepatol 2019; 17: 1597-1606, Kamal, Kamal, Am J Gastroenterol 2019; 114: 339-47

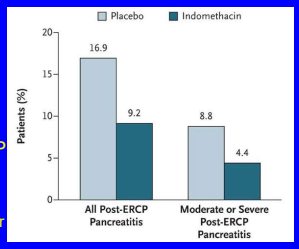
Non Steroidal Anti-Inflammatory Drugs (NSAIDs)

- Phospholipase A2 is critical for the inflammatory cascade
  - Inhibited by NSAIDS
- Murray et al, randomized trial of diclofenac suppository following high risk ERCP (n=220)
  - PEP 15% placebo
  - PEP 6% diclofenac
- Meta-analysis of initial NSAID trials
  - Summary OR 0.51 (0.35-0.74)

Murray, Gastroenterology 2003;144: 1786-1791, Elmunzer, Gut 2008; 57: 1262-1267,

Rectal Indomethacin

- Indomethacin more potent than diclofenac
- Multicenter trial of100mg rectal indomethacin versus placebo following ERCP
- High risk cohort
  - 82% suspected sphincter of Oddi dysfunction
- NNT=13



Elmunzer, N Eng J Med 2012; 366(15): 1414-1422

NSAIDS for all ERCP

- CON-Levenick et al
- Single center double blind RCT (n=449) average risk ERCP
  - Indomethacin vs placebo
- PEP
  - 7.2% indomethacin
  - 4.9% placebo
- Stopped for futility (p=0.33)

- PRO-Luo et al
- Multicenter RCT (n=2600) ERCP
- Universal: Pre procedure indomethacin for all patients 1297/1297 VERSUS
- Risk Stratified: Indomethacin after ERCP for high risk patients 281/1303
- PEP
  - Universal 4%
  - Risk Stratified 8%
  - Benefit in average and high risk subgroups

Levenick, Gastroenterology 2016; 150(4): 911-917, Luo, Lancet 2016; 387: 2293-2307

HIV Treatment

PRIOR 2005

"Conservative Threshold"

CD4 Count <350/mm3

Current HHS Panel Guidelines (since 2012)

Panel's Recommendations

- Antiretroviral therapy (ART) is recommended for all HIV-infected individuals, regardless of CD4 T lymphocyte cell count, to reduce the morbidity and mortality associated with HIV infection **(AI)**.

Lundgren, N Eng J Med 2015; 373(9):795-80, Danel, N Eng J Med 2015 ; 373(9):808-22,Gallant, JAMA 2000; 293: 1329,
https://aidsinfo.nih.gov/guidelines

NSAID versus Pancreas Stent

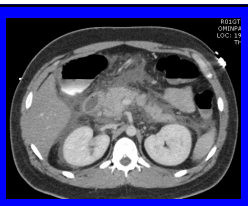
- Need for pancreas stents
  - Post-hoc analysis
    - After adjusting for risk factors PEP 7.8% indomethacin versus 9.4% indomethacin + pancreas stent
  - Network meta-analysis
    - OR PEP 0.5 (0.3-0.9) rectal NSAID versus pancreatic duct stents alone
- **Stent vs Indomethacin (SVI) Trial**
  - **Ongoing RCT high risk patients**
  - **Pancreas stent + rectal indomethacin versus indomethacin alone (NCT02476279)**

Rustagi, Pancreas 2015; 44(6): 859-867, Bhatia, J Clin Gastroentero 2011; 45(2): 170-176. Elmunzer, Am J Gastroenterol 2013; 108(3): 410-415, Akbar, Clin Gastroenterol Hepatol; 2013; 11: 778-783,

Aggressive Lactated Ringer's Infusion to Prevent PEP

Fluids Theory

- Animal models
  - Pancreatic blood flow decreases in the setting of pancreatitis
  - Regions of hypoperfusion correlate with more severe histologic inflammation
- Cohort studies
  - Early aggressive hydration may prevent progression to organ failure/severe pancreatitis

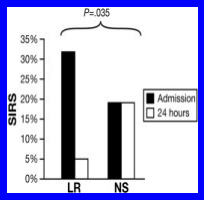


AGGRESSIVE HYDRATION

Foltzik, Dig Dis Sci 1995;40:2184-8 Kusterer K. Am J Physiol 1991;260:G346-51, Warndorf MG. Clin Gastroenterol Hepatol 2011;9:705-9

Lactated Ringer's

- Lactated Ringer's solution (LR) and acute pancreatitis
  - Less SIRS following resuscitation with LR compared to saline
  - LR raises pH, slows trypsinogen activation
  - Lactate stimulates anti-inflammatory immune response



Wu BU et al. Clin Gastroenterol Hepatol 2011;9:710-717, Seyama Y et al. Pancreas 2003;26:15-7, Kellum JA et al. Am Physiol Regul Integr Comp Physiol 2004;286: 686-92.

Randomized Trial of Aggressive Hydration to Prevent Post ERCP Pancreatitis

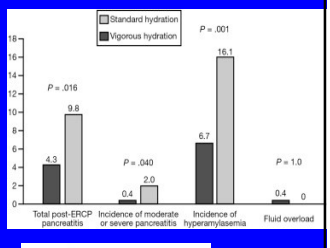
- 62 patients randomized (2:1 concealed allocation) to aggressive versus moderate hydration with LR during and after ERCP
  - 3.0cc/kg/min during procedure and 8 hours afterward
  - 20cc/kg bolus immediately after ERCP
  - 1.5cc/kg/min in control

	Standard Fluids	Aggressive Fluids	p
Total fluids (24hr)	2.2 L	3.8 L	<0.001
PEP	4/23 (17%)	0/39 (0%)	0.016

Buxbaum Clin Gastroenterol Hepatol 2014; 12: 303-307

Aggressive Hydration

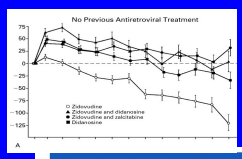
- Choi et al,
  - aggressive versus moderate hydration with lactated ringer's solution during and after ERC
  - multicenter double blind RCT (N=510)
- **FLUYT Trial: multicenter Dutch trial comparing aggressive hydration with lactated ringer's solution versus maintenance saline after ERCP**
  - **Rectal indomethacin given to both groups**
  - **COMPLETED enrollment 826 patients**

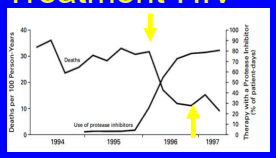


FLUYT

Choi, Clin Gastroenterol Hepatol 2017; 15: 86-92

Combination Treatment-HIV





Panel's Recommendations

- An antiretroviral (ARV) regimen for a treatment-naive patient generally consists of two nucleoside reverse transcriptase inhibitors (NRTIs) in combination with a third active ARV drug from one of three drug classes: an integrase strand transfer inhibitor (INSTI), a non-nucleoside reverse transcriptase inhibitor (NNRTI), or a protease inhibitor (PI) with a pharmacokinetic (PK) enhancer (booster) (cobicistat or ritonavir).

Hammer, N Eng J Med 1996; 10(335):1081-8, Palella, N Eng J Med 1998; 338(13): 853-860, https://aidsinfo.nih.gov/guidelines

Combination Therapy

	Combination	PEP	Comparator	PEP
Katsinelos Endoscopy, 2012	Diclofenac + Somatostatin	4.6%	Placebo	10.4%
Mok GIE, 2016	Lactated Ringer's + Indomethacin	6%	Placebo + Normal Saline	21%

Mok, Gastrointest Endosc 2007; 85(5):1005-1013 ; Sotoudehmanesh, Am J Gastroenterol 2014; 109: 903-909, Katsinelos, Endoscopy 2012; 44: 53-59

Sublingual nitrates + NSAIDs

	Sotoudehmanesh AJG, 2014		Tomoda Gastroenterology, 2019	
	Combination	Comparator	Combination	Comparator
	Isosorbide dinitrate+ Indomethacin	Indomethacin	Isosorbide dinitrate + Diclofenac	Diclofenac
N	150	150	444	442
PEP	6.3%	15.3%	5.6%	9.5%
Mod/Severe PEP	1.3%	2.7%	0.9%	2.3%
Hypotension			7.9%	2.3%
Other Rx	5.7% prophylactic pancreas stents		All received ulnistatin & 15% prophylactic pancreas stents	

Tomoda, Gastroenterology 2019; 156: 1753-1760, Sotoudehmanesh, American J Gastroenterol 2014; 109: 903-909

Combination Therapy

- Combination therapy already being done!
  - Wire guided cannulation + pancreas stent & rectal indomethacin (high risk) + *aggressive hydration*
- Survey of post ERCP pancreatitis prophylaxis techniques among advanced endoscopists
  - All use pancreatic stents
  - 98% use rectal indomethacin
  - 83% routinely use aggressive hydration

Avila, Gastrointest Endoscopy 2019

Conclusions

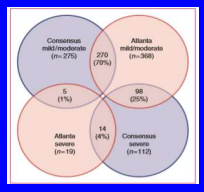
- Understand the risk factors for PEP
  - Perform ERCP for appropriate indications
  - Identify candidates for preventive measures
- Technical maneuvers
  - Pancreas stents for high risk cases
  - Wire guided cannulation to avoid PEP
- Pharmacologic therapy
  - Rectal indomethacin prevents PEP in high risk patients
    - Consider for average risk patients given favorable risk benefit ratio
    - *Might preclude need for pancreas stents*
  - *Aggressive hydration is promising*
  - *Sublingual nitrates ?+*
- Wire guided cannulation, NSAIDS & pancreas stents (high risk) +/- aggressive fluids, nitrates

Slides for Questions and Answers

Revised Atlanta Criteria versus Cotton Consensus for PEP

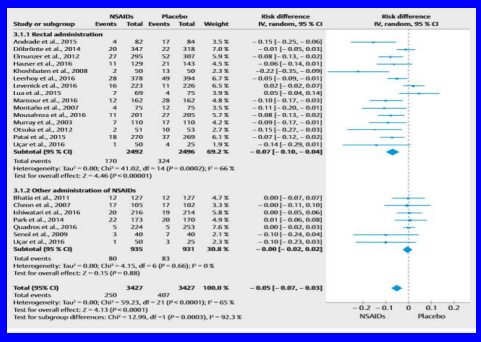
- Observational study of 387 patients with PEP among 13,384 ERCP at 7 centers
- Stronger correlation RAC than Consensus
  - Mortality
  - Severity

	Consensus	Revised Atlanta
Sensitivity	55%	100%
Specificity	72%	98%
Positive predictive value	5%	58%
Negative predictive value	98%	100%



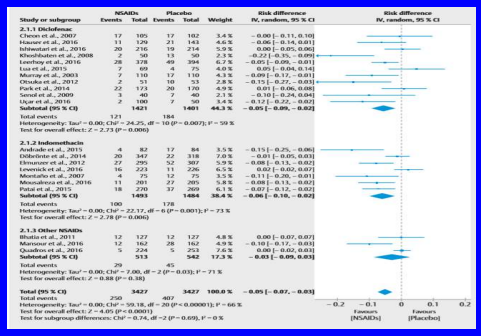
Smeets X, Bouhouch N, Buxbaum J, UEGJ 2019; 7(5): 557-564

Route of NSAIDs



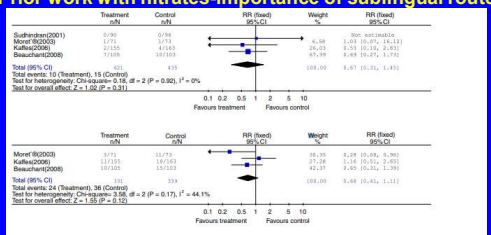
Serrano, Endosc Int Open J 2019; 07: E477-486

Type of NSAIDs



Serrano, Endosc Int Open J 2019; 07: E477-488

Prior work with nitrates-importance of sublingual route



	Subgroup (N)	Peto OR (CI)	Z	P Value	Heterogeneity		
					x^2	P	I^2, %
Transdermal route	3 articles (n = 1268)	0.64 (0.41, 1.00)	1.95	0.05	3.74	0.15	46
Topical route	2 articles (n = 184)	1.00 (0.24, 4.20)	0.00	1.00	1.15	0.28	13
Sublingual route	2 articles (n = 260)	0.37 (0.18, 0.74)	2.78	0.005	0.23	0.63	0
Low incidences of PEP	3 articles (n = 1,228)	0.78 (0.48, 1.26)	1.02	0.31	2.69	0.26	26
High incidences of PEP	5 articles (n = 692)	0.44 (0.28, 0.70)	3.48	0.0005	2.08	0.72	0

Bai, Endoscopy 2009; 41: 690-695, Shao, Dig Dis Sci 2010; 55: 1-7

American (ASGE) Guidelines

- Biliary endoscopists should be facile with wire guided cannulation and pancreas stent use
- Recommend early precut sphincterotomy for difficult cannulation if expertise available
- Recommend rectal NSAIDsfor high risk individuals
- Recommend against balloon dilation without sphincterotomy
- Suggest rectal indomethacin may reduce PEP in average risk individuals
- Suggest peri-procedural intravenous hydration with lactated ringers when feasible
- Insufficient evidence whether combination of NSAIDs and pancreas stent improves outcome

Chandresekhara, Gastrointest Endosc 2017; 85(1): 32-46

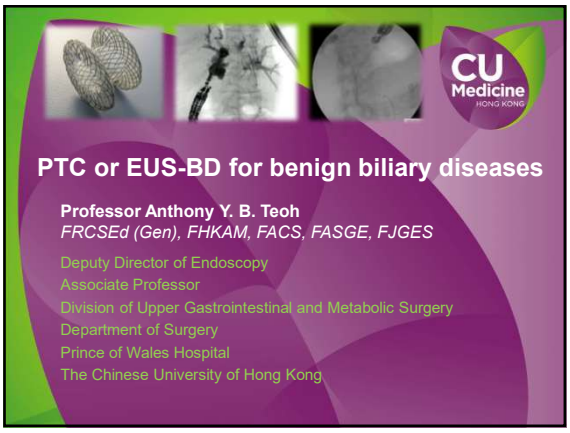
European (ESGE) Guidelines

- Recommend pancreatic stenting in selected patients at high risk for PEP
- Recommend routine rectal administration of 100mg of diclofenac or indomethacin before ERCP in all patients without contraindications
- Recommend aggressive hydration with lactated Ringer's solution in patients with contraindications to NSAIDs if not at risk of fluid overload and who have not had pancreatic stent
- Suggest administration of sublingual glyceryl trinitrate in patient with contraindication to NSAIDs and aggressive hydration
- Do not suggest combination of rectal NSAIDs with other measures*

Dumonceau, Endoscopy 2019 (Dec); epub ahead of print

PTC or Interventional EUS for Benign Biliary Diseases?

Anthony Teoh, FRCSEd, FACS, FASGE
Associate Professor of Surgery
Deputy Director of Endoscopy,
The Chinese University of Hong Kong
Department of Surgery
Hong Kong, China



Disclosures

- Consultant for Taewoong, Cook, Boston Scientific and Microtech Medical Corporations

Indications for EUS-BD

1. Failed deep cannulation
   - Benign
     - Tortuous common channel
   - Malignant
     - Tumor obstruction
2. Inaccessible papilla
   - Altered GI anatomy
   - Malignant duodenal obstruction
   - Prior duodenal metallic stenting

Problems with percutaneous drainage

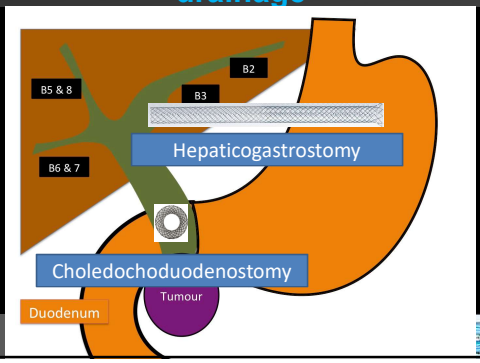
Procedural Complications
- Intrahepatic hemorrhage
- Pneumothorax
- Biliary peritonitis
- Pneumonia

Tube related problems
- Bile leakage
- Tube dislodgement
- Blockage
- Discomfort and pain

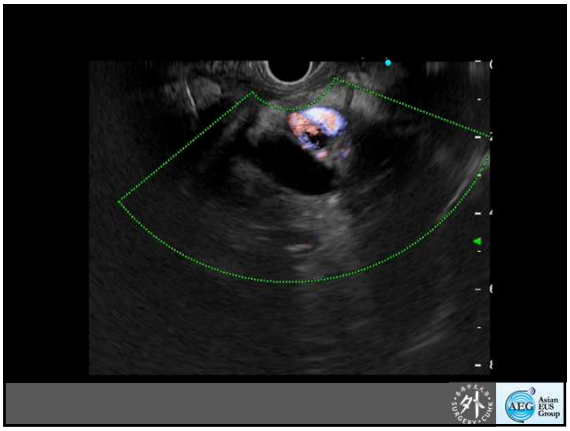
EUS-HPB drainage
Methods of drainage

1. Bile duct
   - Transpapillary
     - Rendezvous
     - Antegrade
   - Transmural
     - Choledochoduodenostomy (CDS)
     - Hepaticogastrostomy (HGS)
2. Pancreaticogastrostomy
3. Cholecystogastro/duodenostomy

EUS guided transmural biliary drainage

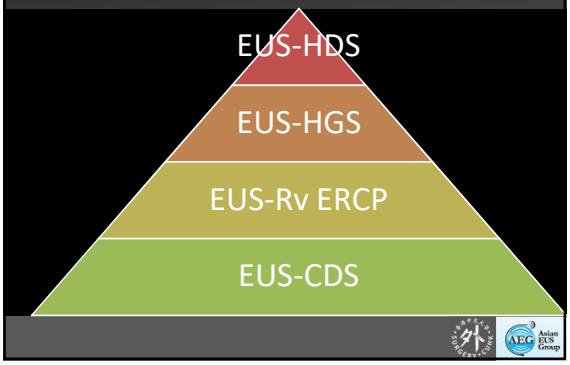


EUS rendezvous forward viewing



EUS-HGS with onestep antimigratory stent

Difficulty of EUS-BD



Meta-analysis EUS-BD vs PTBD

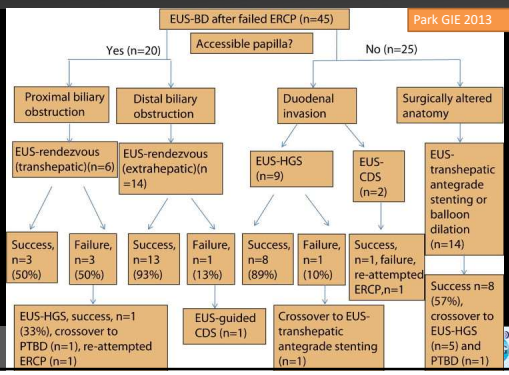
- Better clinical success P = 0.02
- Reduced adverse events P < 0.001
- Reduced intervention rates P < 0.001

Avoidance of tube related problems!!

EUS-BD should be preferred over PTBD

Sharaiha GIE 2017

Algorithm for EUS biliary drainage



EUS-BD: Considerations

Etiology?
- Benign vs Malignant

Papilla accessible?
- EUS-Rv vs other procedures

Outcomes?
1. Adverse events
2. Patency

How to achieve drainage?
1. Transpapillary
   - Rendezvous
   - Antegrade
2. Transmura
   - Choledochoduodenostomy
   - Hepaticogastrostomy
   - Choledochogastrostomy

Role of EUS-BD in benign biliary diseases

1. Bile duct access
   - Difficult cannulation
   - Anticipated difficult ERCP
2. Temporary biliary drainage
3. Access to bile duct

EUS-rendezvous ERCP

Indication
- Benign conditions with failed CBD access by ERCP

Pros
- Reduce risk of advanced ERCP techniques
- Single session procedure
- Reduced hospital stay and cost
- No alternation in anatomy
- Lower risk of complications
  - Pneumoperitoneum
  - Bile leak

Cons
- Difficult wire manipulation

EUS guided rendezvous ERCP Technical considerations

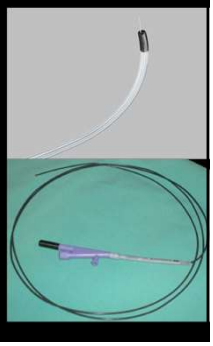
- Aim to puncture bile duct and manipulate GW across papilla to guide ERCP

Issues

- How to choose site of puncture?
- What accessories to use for GW manipulation
- How to catch the wire

EUS Rv – Technical considerations

- Type of needle
  - 19G nitinol
- Guidewire
  - 0.025" or 0.035"
  - Angle tipped
- Track dilation
  - Cystotome 6Fr
  - Balloon
- Wire retrieval
  - Snare
  - Microforceps
  - Hinch cannula



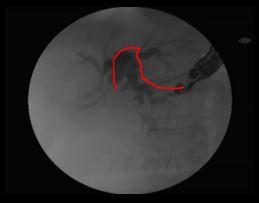
How to choose the site of puncture?

CBD access – Left IHD

- B2
  - Requires dilated IHD
  - More direct passage to papilla
  - Puncture close to OGJ
  - Smaller duct diameter

CBD access – Left IHD

- B3
  - Requires dilated IHD
  - More tortuous passage to papilla
  - Puncture at lesser curve
  - Larger diameter

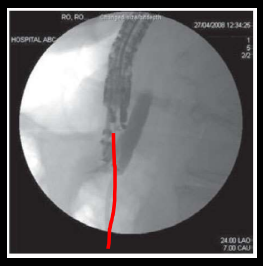


CBD access – Mid CBD

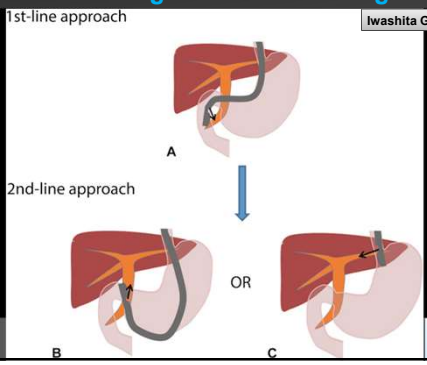
- D1
  - Direct puncture at CBD
  - Possible even in normal sized ducts
  - Long scope position
  - Difficult manipulation of GW
  - Risk of GW shearing

CBD access – Distal CBD

- D1/2
  - Direct puncture distal CBD
  - Short scope position
  - Unstable position
  - Size of bile duct small



EUS-guided rendezvous for difficult biliary cannulation using a standardized algorithm:



Guidewire retrieval

Hinch catheter

Nakai Endoscopy 2017

Outcomes

- 30 EUS-RVs
- Technical success 93.3%,
- 2 failures (one bile duct puncture and one guidewire insertion).
- Cannulation
  - Over-the-wire (n=13), along-the-wire (n=4) or hitch-and-ride (n=11) method.
- Time to cannulation was shorter with the hitch-and-ride method (4 minutes) than with over-the-wire and along-the-wire methods (9 and 13 minutes, respectively).
- The adverse event rate of EUS-RV was 23.3%.

Nakai Endoscopy 2017

Author	Years	N	EHBD success %	IHBD success %	Overall success %	Complication rate %
Kahaleh	2006	23	70 (7/10)	85 (11/13)	78 (18/23)	17 (4/23)
Maranki	2009	49	57 (8/14)	69 (24/35)	65 (32/49)	16 (8/49)
Iwashita	2012	40	81 (25/31)	44 (4/9)	73 (29/40)	13 (5/40)
Park	2013	20	93 (13/14)	50 (3/6)	80 (16/20)	10 (2/20)
Dhir	2013	35	100 (18/18)	94 (16/17)	97 (34/35)	23 (8/35)
Dhir	2014	20	NA	NA	100 (20/20)	15 (3/20)
Iwashita	2015	20	80 (16/20)	-	80 (16/20)	15 (3/20)
Overall		**382**	**85 (187/220)**	**76 (70/92)**	**82 (314/382)**	**13 (48/382)**

Major complications bleeding, bile leakage, peritonitis, pneumoperitoneum, and pancreatitis

Other questions

1. EUS-RV vs advanced techniques
2. Intrahepatic access vs extrahepatic access

EUS-RV vs precut sphincterotomy

Dhir V et al. GIE March 2012

	Precut n = 144	EUS n = 58	P value
Median age (IQR range)	48 (42-62)	49 (41-64)	0.81
Ampullary cancer	9	4	0.86
Malignant biliary strictures	110	39	0.18
Benign biliary stricture	10	7	0.26
CBD stone	15	8	0.49
First session success	130 (90.3%)	57 (98.3%)	0.038
Overall success	138 (95.8%)	57 (98.3%)	0.35
Overall complications	10 (6.9%)	2 (3.4%)	0.27
Pancreatitis	4 (2.8%)	0	0.25
Bleeding	6 (4.2%)	0	0.12
Contrast medium leak	-	2 (3.4%)	-

Transhepatic vs extrahepatic access for EUS-RV in distal CBD obstruction

	Transhepatic (n = 17)	Extrahepatic (n = 18)	P-value
Success	16 (94.1)	18 (100)	0.485
Pain	7 (41.1)	1	0.017
Bile leak	2 (11.7)	0	0.228
Air under diaphragm	2 (11.7)	0	0.228
Length of hospital stay (days)	2.52 ± 2.25	0.17 ± 0.73	0.015
Procedure time (mins)	34.41 ± 8.45	25.71 ± 3.75	0.0004

Dhir United European Gastroenterol J. 2013

EUS-BD as a portal for bile duct access

Reconstitution of HJ stricture with HGS

Teoh et al DDW ASGE Plenary 2017

Conclusions

- EUS-BD is an attractive option over percutaneous drainage with reduced risk of adverse events
- Dedicated expertise and devices are required for good outcomes
- Can provide a portal for future interventions


AEG
ASIAN EUS CONGRESS 2021
Convergence of International Expertise
Date: 16 – 18 April, 2021
Secretariat
CUHK Jockey Club Minimally Invasive Surgical Skills Centre
3/F Li Ka Shing Specialist Clinic (North Wing)
Prince of Wales Hospital, Hong Kong
Email: phoebeman@surgery.cuhk.edu.hk
Tel: +852 3505 2644 Fax: +852 3505 4708
http://asianeus2021.org

Managing Symptomatic Primary Sclerosing Cholangitis

Whitney E. Jackson, MD
Assistant Professor of Medicine
Medical Director of Living Donor Liver Transplantation
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

COLONIC CONTROVERSIES

Colon Cancer Screening: Timing, Techniques, and Technologies

Swati G. Patel, MD, MS
Assistant Professor of Medicine
Director, Gastrointestinal Cancer Risk and Prevention Center
University of Colorado, Rocky Mountain Regional
Veterans Affairs Medical Center
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Colorectal Cancer Screening: Timing, Techniques & Technologies

Swati G. Patel, MD MS
Assistant Professor of Medicine
Division of Gastroenterology & Hepatology
Director, Gastrointestinal Cancer Risk and Prevention Center
University of Colorado Anschutz Medical Center
Rocky Mountain Regional Veterans Affairs Medical Center

Disclosures

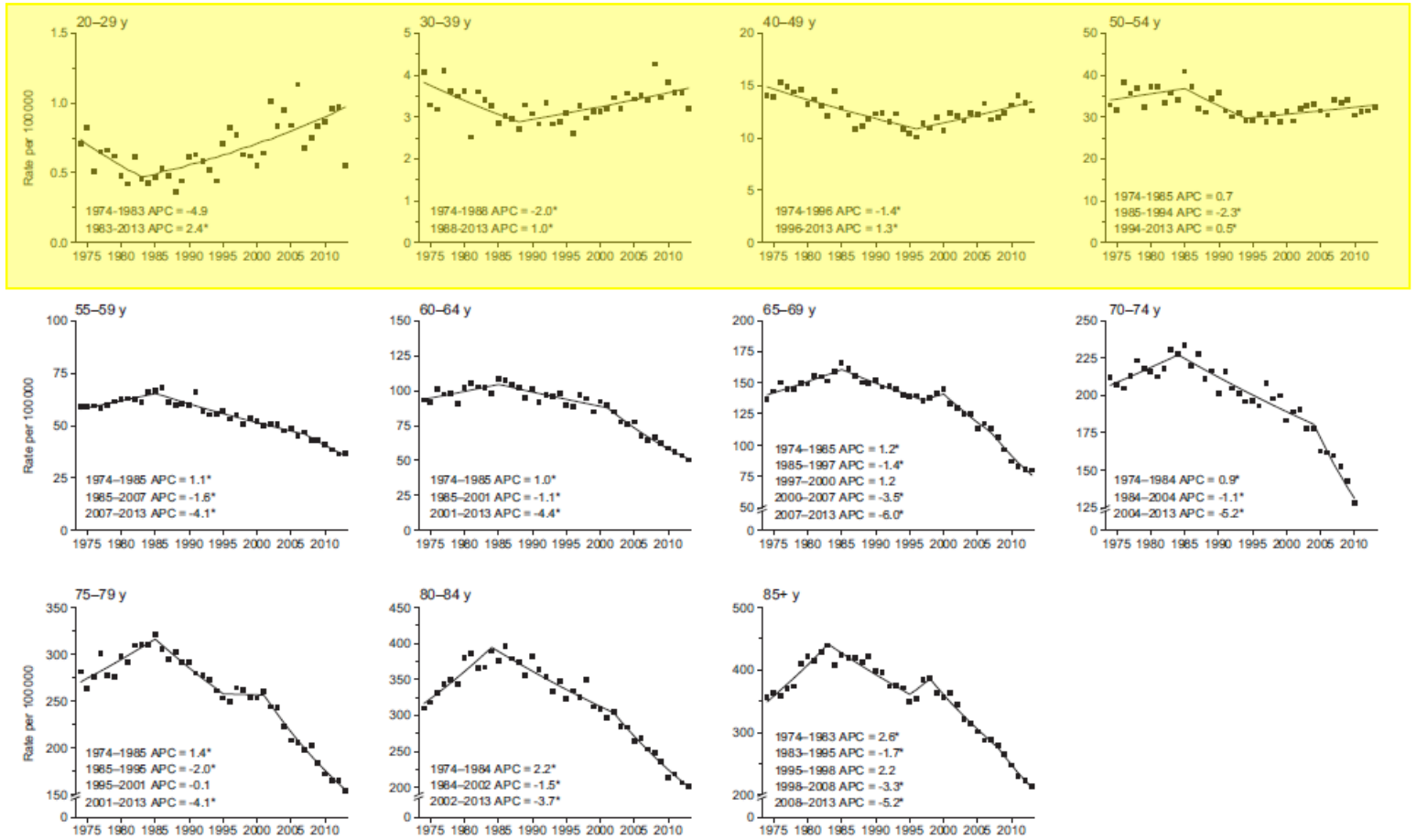
- None

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Objectives

- Timing of CRC screening
- Techniques to optimize quality
- Technologies to optimize quality

Colorectal Cancer Incidence Patterns in the United States, 1974–2013

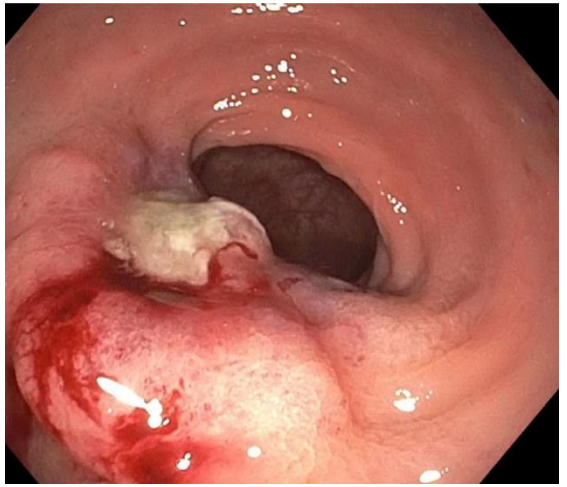


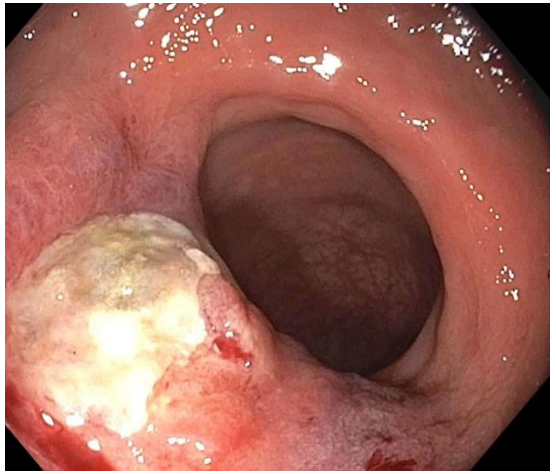
Siegel et al. J Natl Cancer Inst. 2017;109(8):1-6.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

S.K.

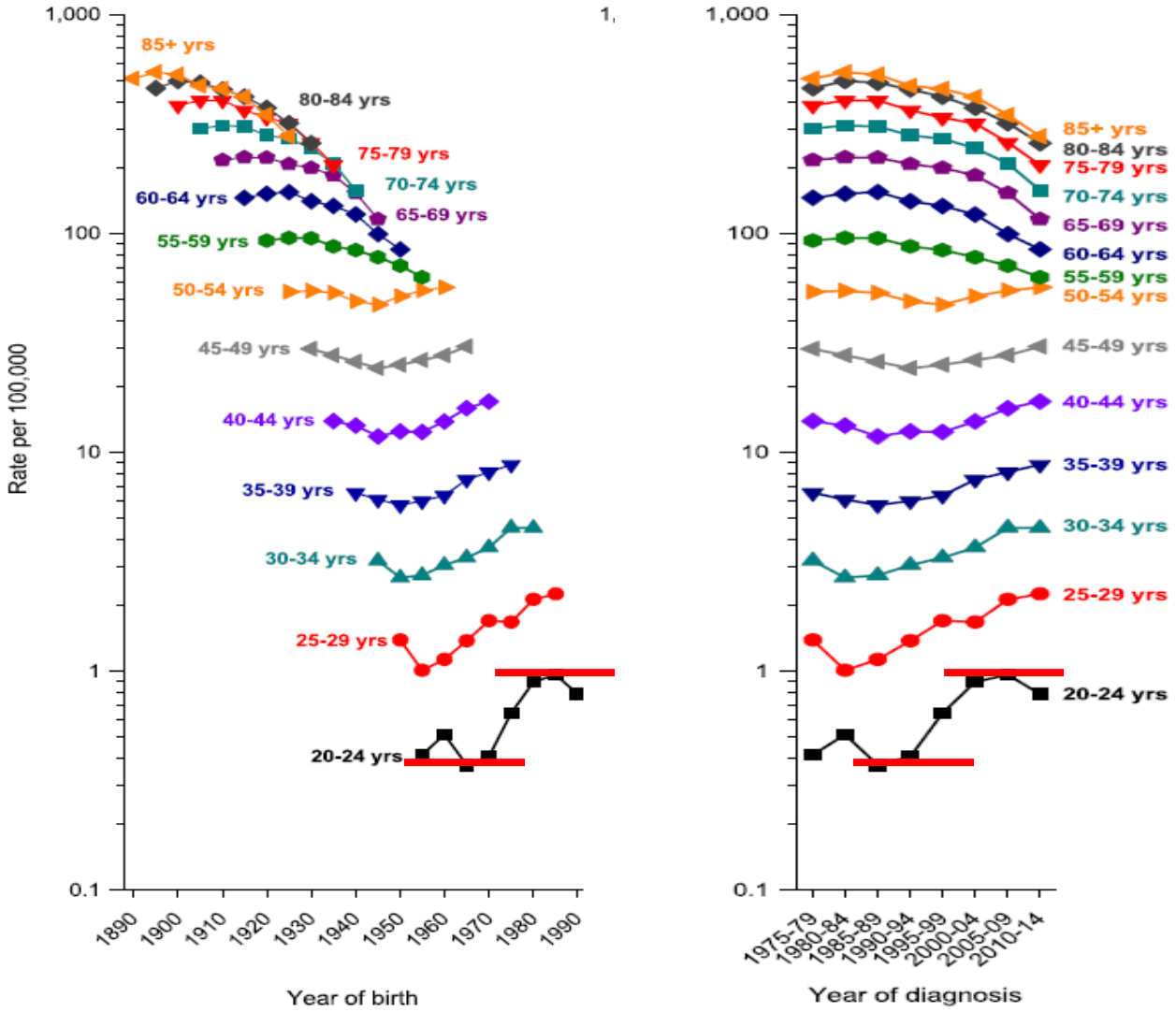
- 40 y/o healthy male firefighter, former Navy Seal with rectal bleeding for 1 month
- PCP performed anoscopy and saw “internal hemorrhoids”
- Symptoms progress, patient bypasses PCP and self-refers for colonoscopy





University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Trends in CRC Incidence

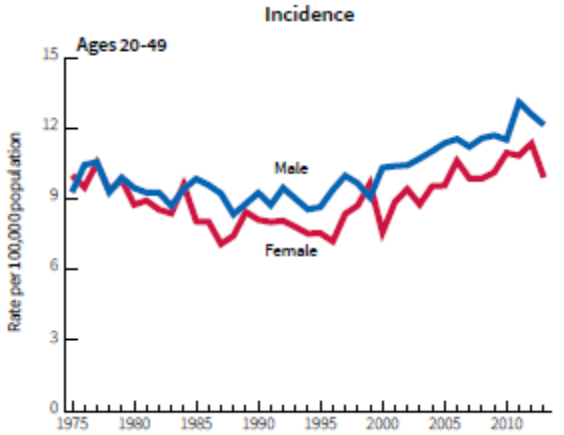


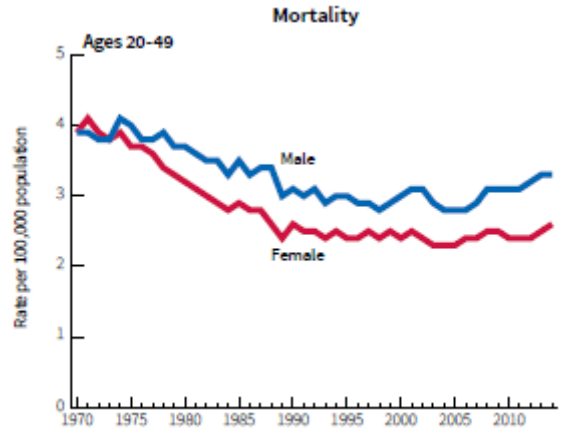
Wolf et al. CA Cancer J Clin 2018.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Early Onset CRC Epidemiology

- 2nd most common cancer, 3rd leading cause of cancer-related death
  - Incidence: F 10%; M 11%
  - Mortality: F 6%; M 7%
- 51% increase in incidence 1994-2014
- 11% increase in mortality 2005-2015
- AA>Non-Hispanic whites
  - Incidence: 7.9/100K vs 6.7/100K
    - 16% vs 9% of all CRCs
  - Cancer specific mortality: HR 1.35 (1.26-1.45)
  - 5y survival: 54.9% vs 68.1%
- 75-90% occur between ages 40-49
- For those age < 55 from 1989-1990 vs 2012-2013
  - Colon: 11.6%→16.6%
  - Rectal: 14.6%→29.2%

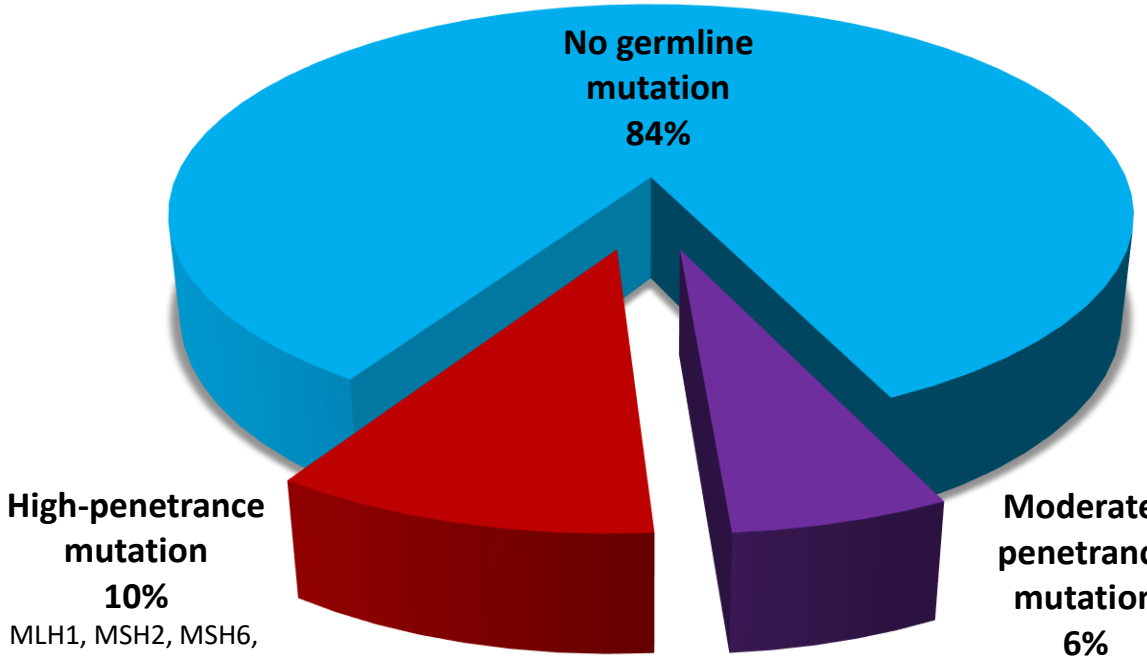




Seigel et al. Cancer 2017.
Bhandari et al. J Inv Med 2016.
Bailey et al. JAMA Surg 2015;150:17-22.
Fairley et al. Cancer 2006; 107(1):153-61.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Early Onset CRC



Pearlman et al. JAMA Oncology 2017. 3(4):464-71.

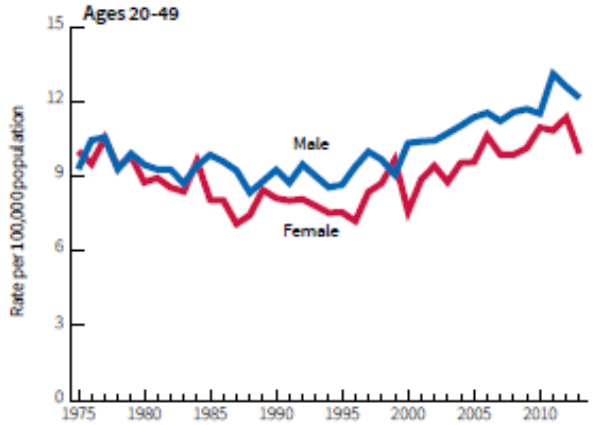
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Obesity

Regional environmental exposures

Diabetes/ Metabolic Syndrome

Radiation exposure



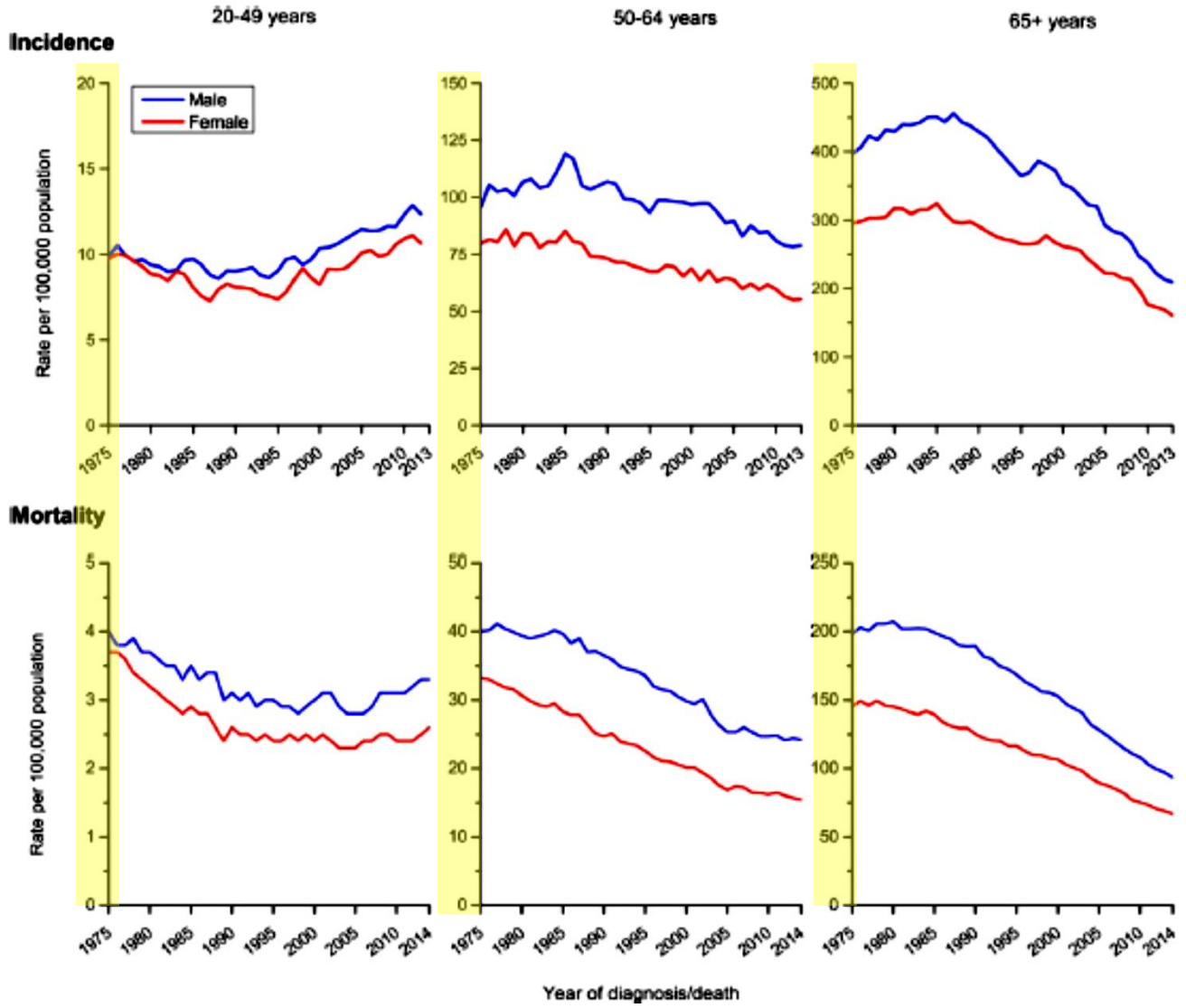
Childhood antibiotics

Inflammation/atopy

Industrialization of food industry

Antibiotics in food chain

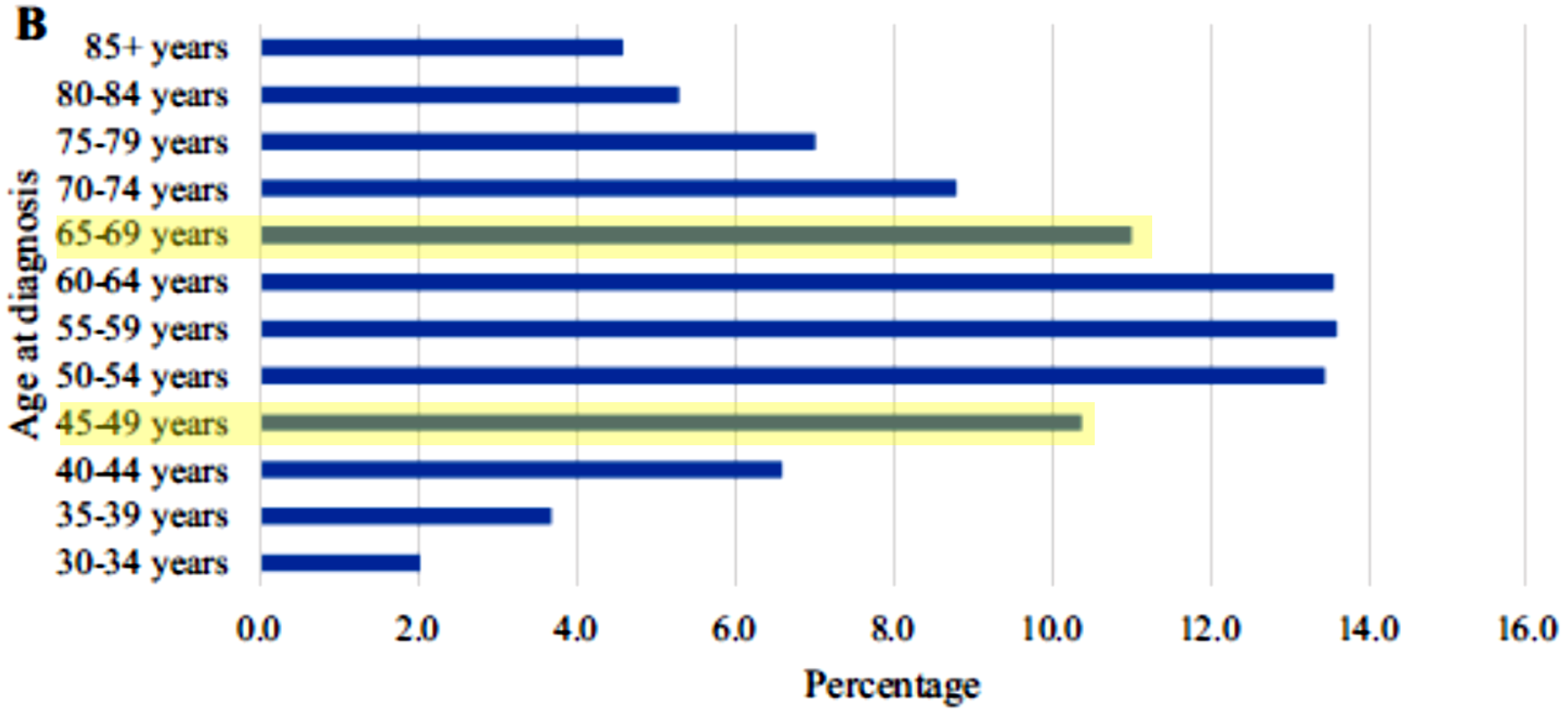
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS



Siegel et al. CA Cancer J Clin 2017;67:177-93.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Person Years of Life Lost



Wolf et al. CA Cancer J Clin 2018.
SEER 9 Registry.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Society	Date Published	Age	Modality
USPSTF	1/2016	50-75 (A) Consider stopping: 76-85 (C)	Colonoscopy q10y HS-FOBT or FIT q1y FIT-DNA q3y FS q5-10y CTC q5y
NCCN	8/2019	50-75 (2A)	Colonoscopy q10y HS-FOBT or FIT q1y FIT-DNA q3y FS q5-10y CTC q5y
US-MSTF	6/2017	50 (strong) 45 for AA (weak) Consider stopping: 76 if up to date, 85 otherwise (weak)	Tier 1: Colonoscopy q10y FIT q1y Tier 2: CTC q5y FIT-DNA q3y FS q 5-10y Tier 3: Capsule Colo q5y
ACS	5/2018	50 (strong) 45 (qualified) Individualized 76-85 (qualified) Discourage screening >85 (qual)	Colonoscopy q10y HS-FOBT or FIT q1y FIT-DNA q3y FS q5y CTC q5y

50 vs 45

	Deaths averted	Fewer cases	Life years gained	Additional colonoscopies
Colonoscopy	1	3	25	**810**
FIT	1	2	26	**296**
FIT-DNA	2	3	26	**309**

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Cost-Effectiveness and National Effects of Initiating Colorectal Cancer Screening for Average-Risk Persons at Age 45 Years Instead of 50 Years

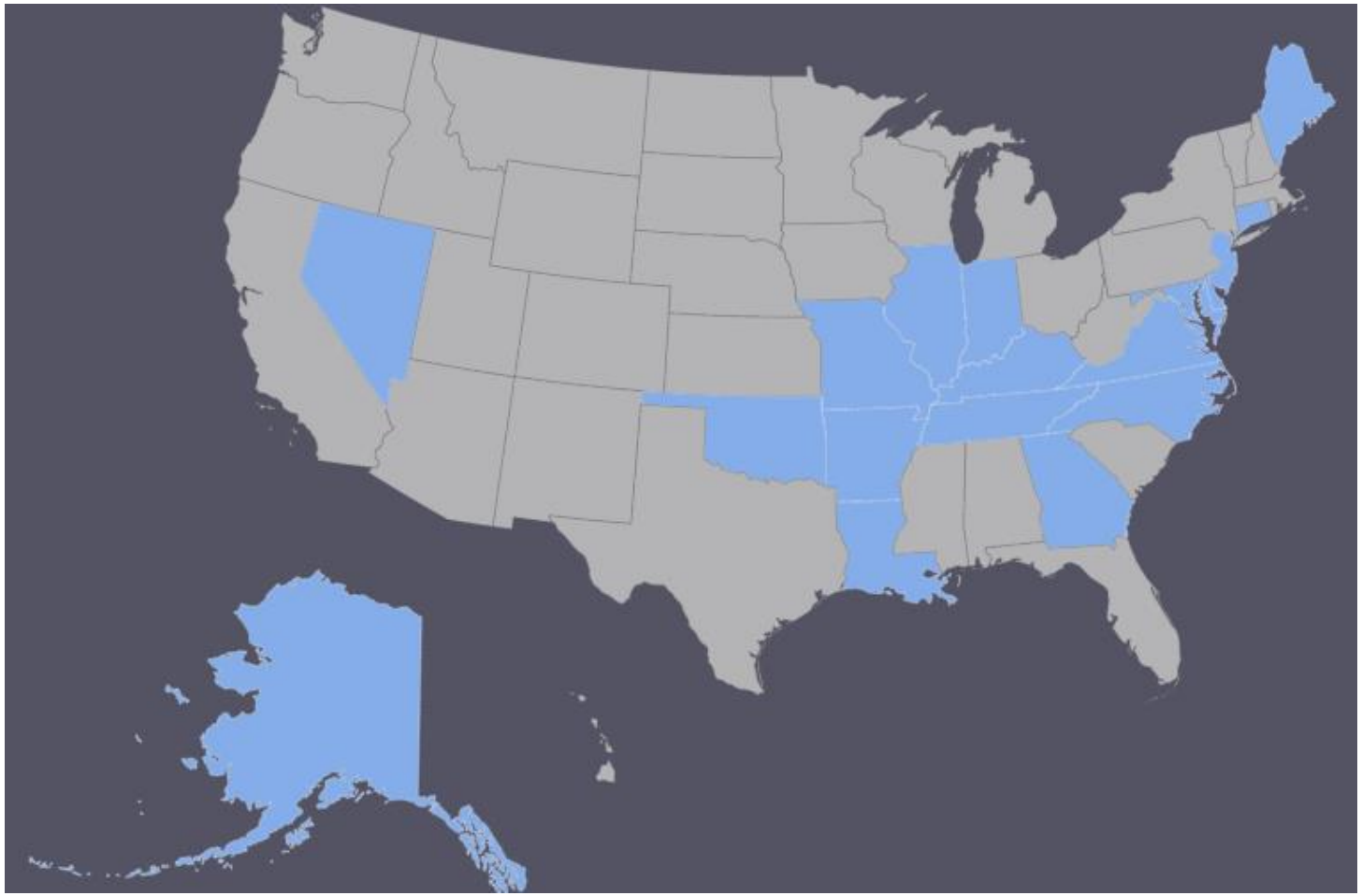
Uri Ladabaum,[1] Ajitha Mannalithara,[1] Reinier G. S. Meester,[1] Samir Gupta,[2] and Robert E. Schoen[3]

- Colonoscopy: $33,900 per QALY
- FIT: $7,700 per QALY

- Annual Mammogram 50-69: $46,500 per QALY

Ladabaum et al. Gastroenterol. 2019. 157:137-48.
Salzman et al. Ann Internal Medicine. 1997. 127:955-65.

What about coverage…?



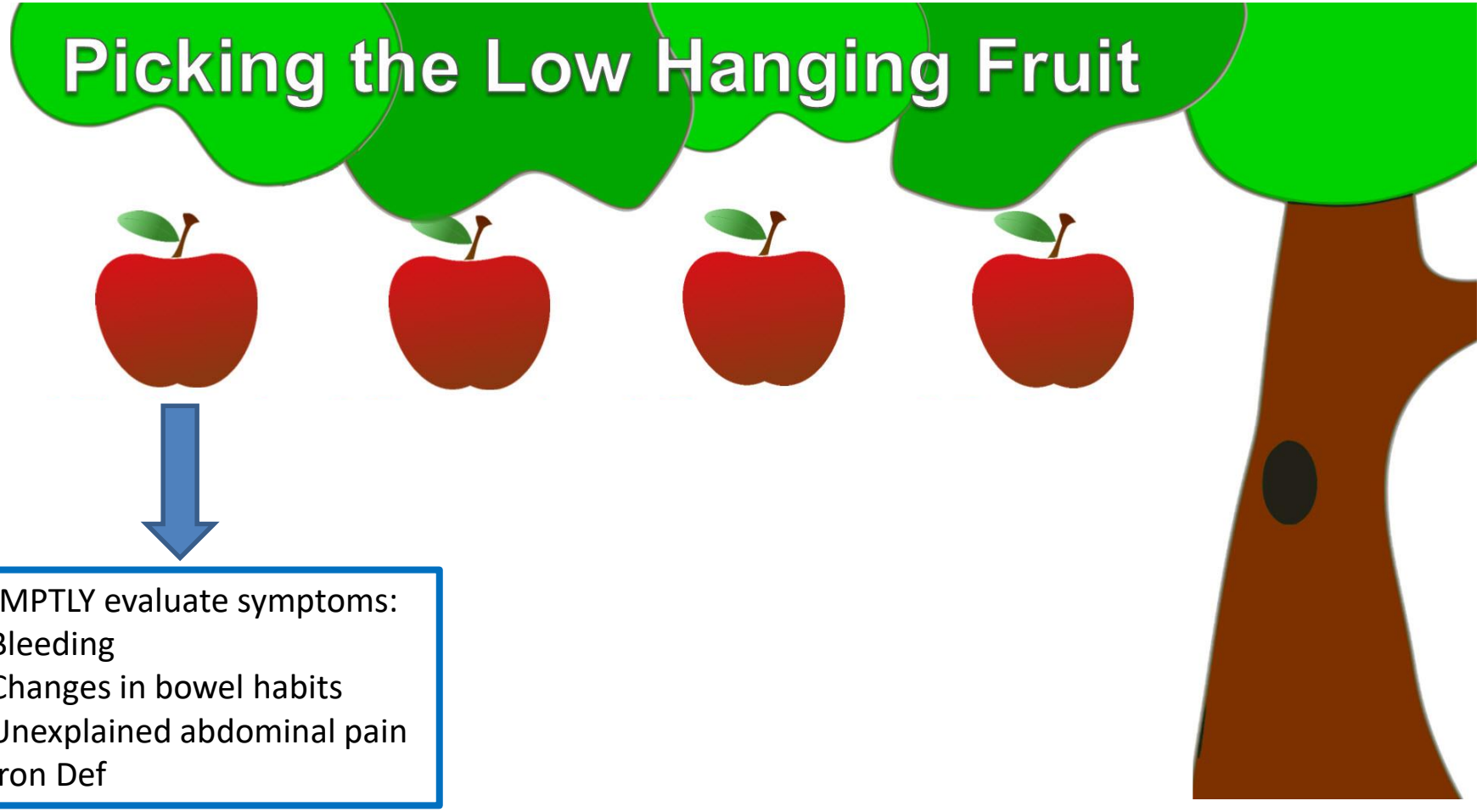
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Questions that remain…

- Concerns
  - Recommendations based on modeling
  - May exacerbate existing disparities, strain resources/capacity
  - Cost, insurance coverage

- Areas ripe for research and future work
  - Nuanced approach to symptom evaluation
  - Improved interventions to identify high-risk patients
  - Epidemiology, risk factors
    - Risk-based screening approach
  - Best approach to screening
  - Advocacy for support of earlier screening

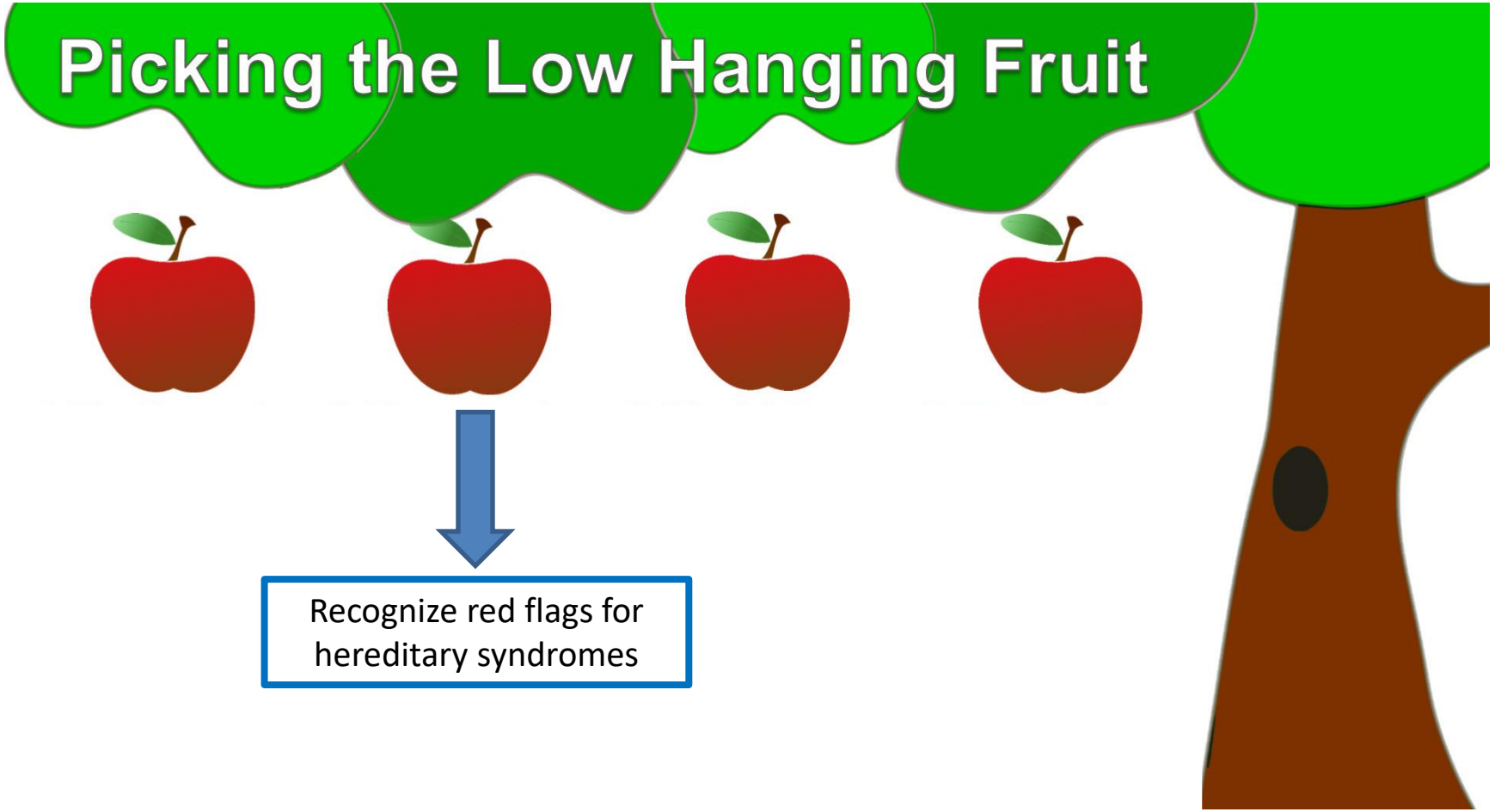
Picking the Low Hanging Fruit



PROMPTLY evaluate symptoms:

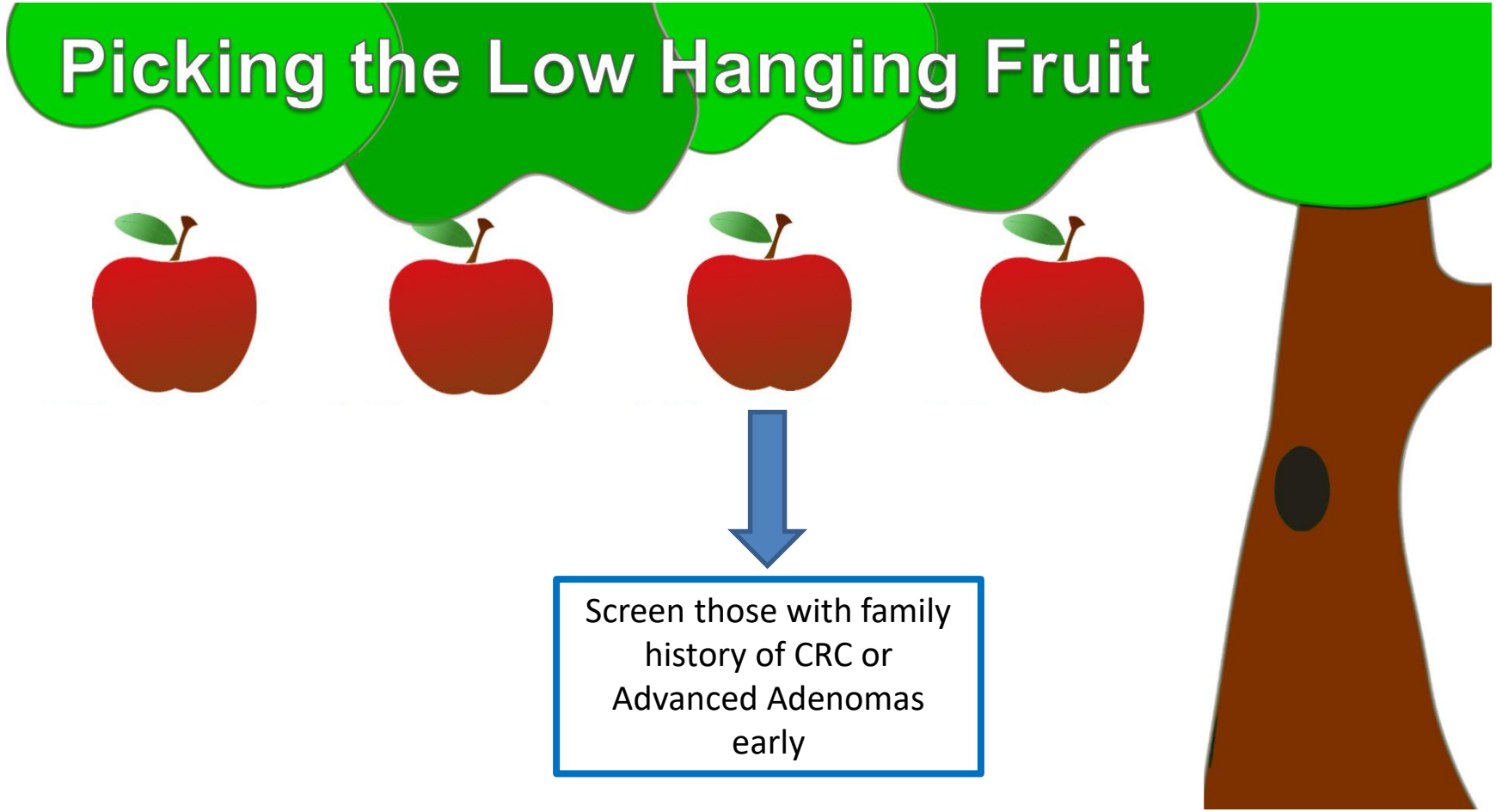
- Bleeding
- Changes in bowel habits
- Unexplained abdominal pain
- Iron Def

Picking the Low Hanging Fruit



Recognize red flags for hereditary syndromes

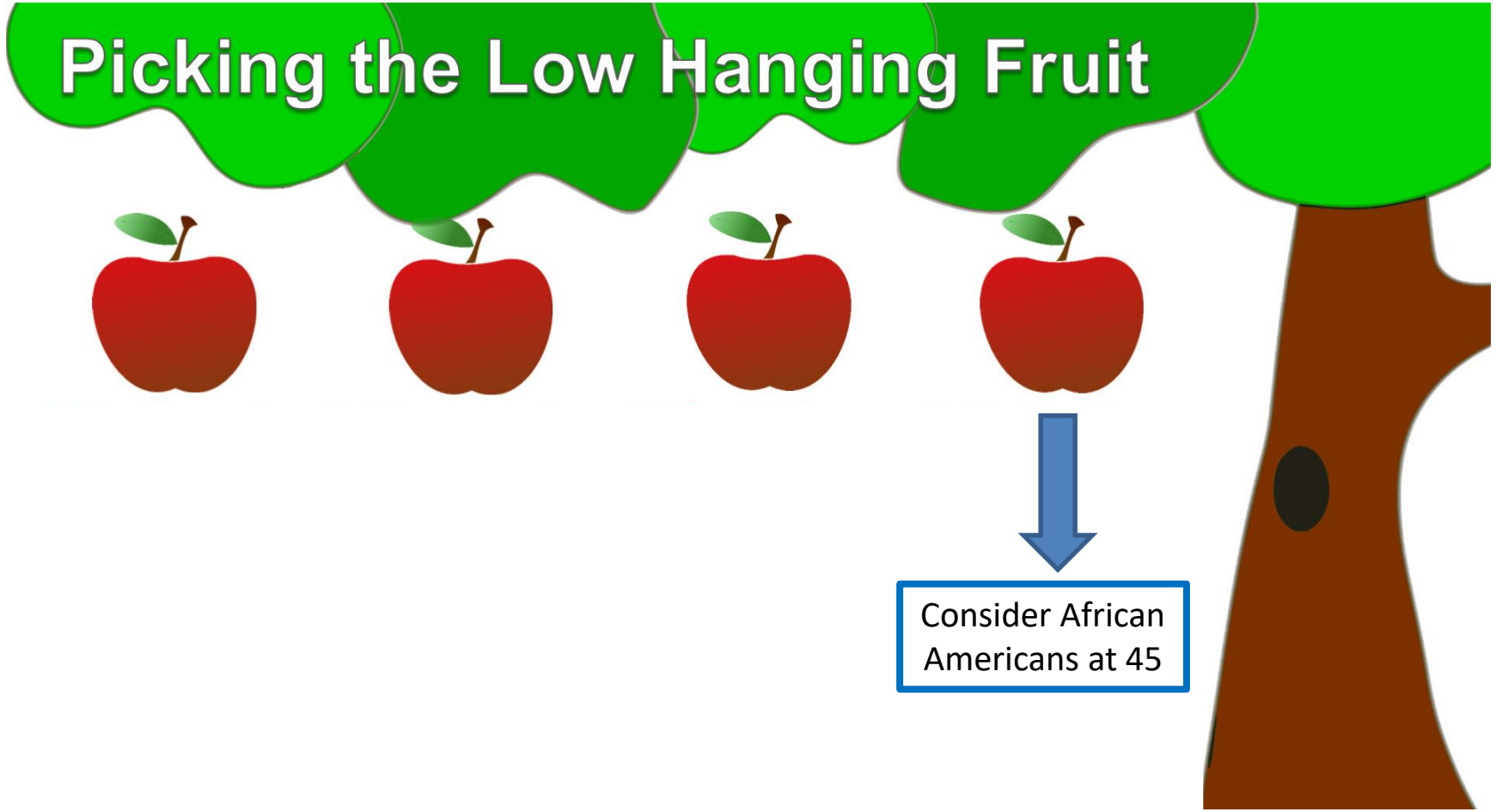
Picking the Low Hanging Fruit



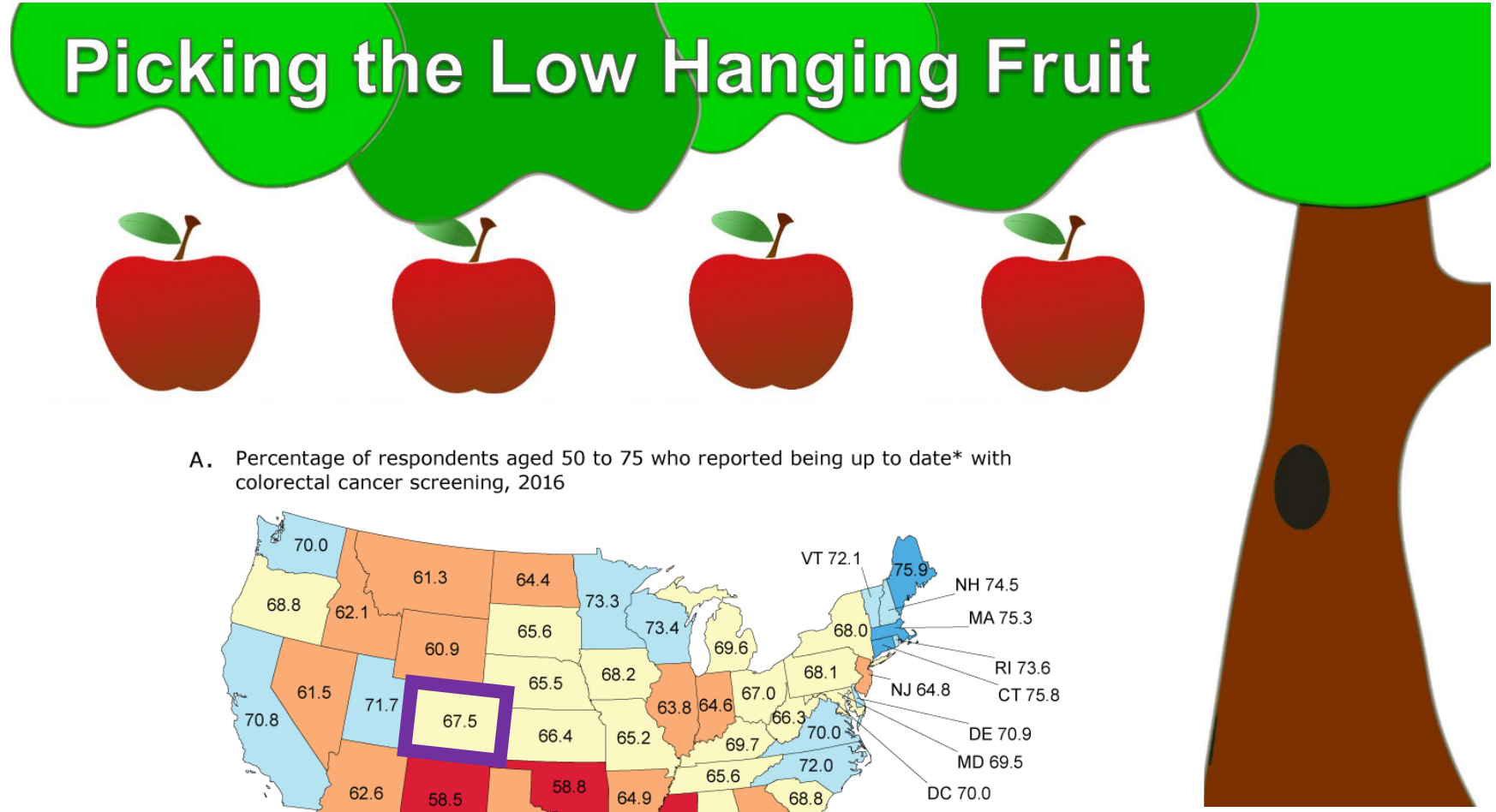
Screen those with family history of CRC or Advanced Adenomas early

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

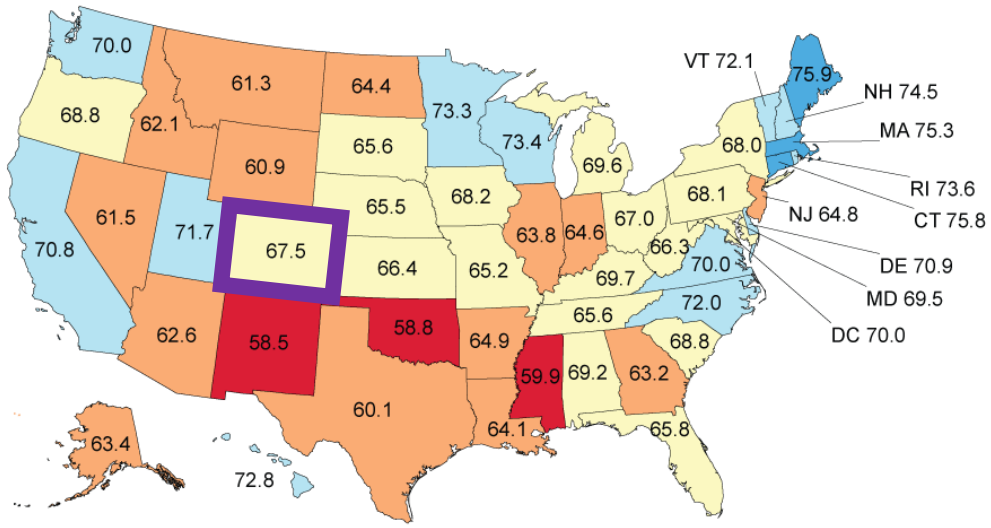
Picking the Low Hanging Fruit



Picking the Low Hanging Fruit



A. Percentage of respondents aged 50 to 75 who reported being up to date* with colorectal cancer screening, 2016



*Up to date = fecal occult blood test (FOBT) within 1 year, or sigmoidoscopy within 5 years with FOBT within 3 years, or colonoscopy within 10 years.

Percentage Change

55.0–59.9 | 60.0–64.9 | 65.0–69.9 | 70.0–74.9 | ≥75.0

Joseph DA, King JB, Richards TB, Thomas CC, Richardson LC. Use of Colorectal Cancer Screening Tests by State. Prev Chronic Dis 2018;15:170535.
DOI: http://dx.doi.org/10.5888/pcd15.170535.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Post-Colonoscopy Cancer

- "Interval Cancer" or Post-colonoscopy cancer
  - Cancer after a colonoscopy that occurs before next due surveillance
  - Literature 6-36 months

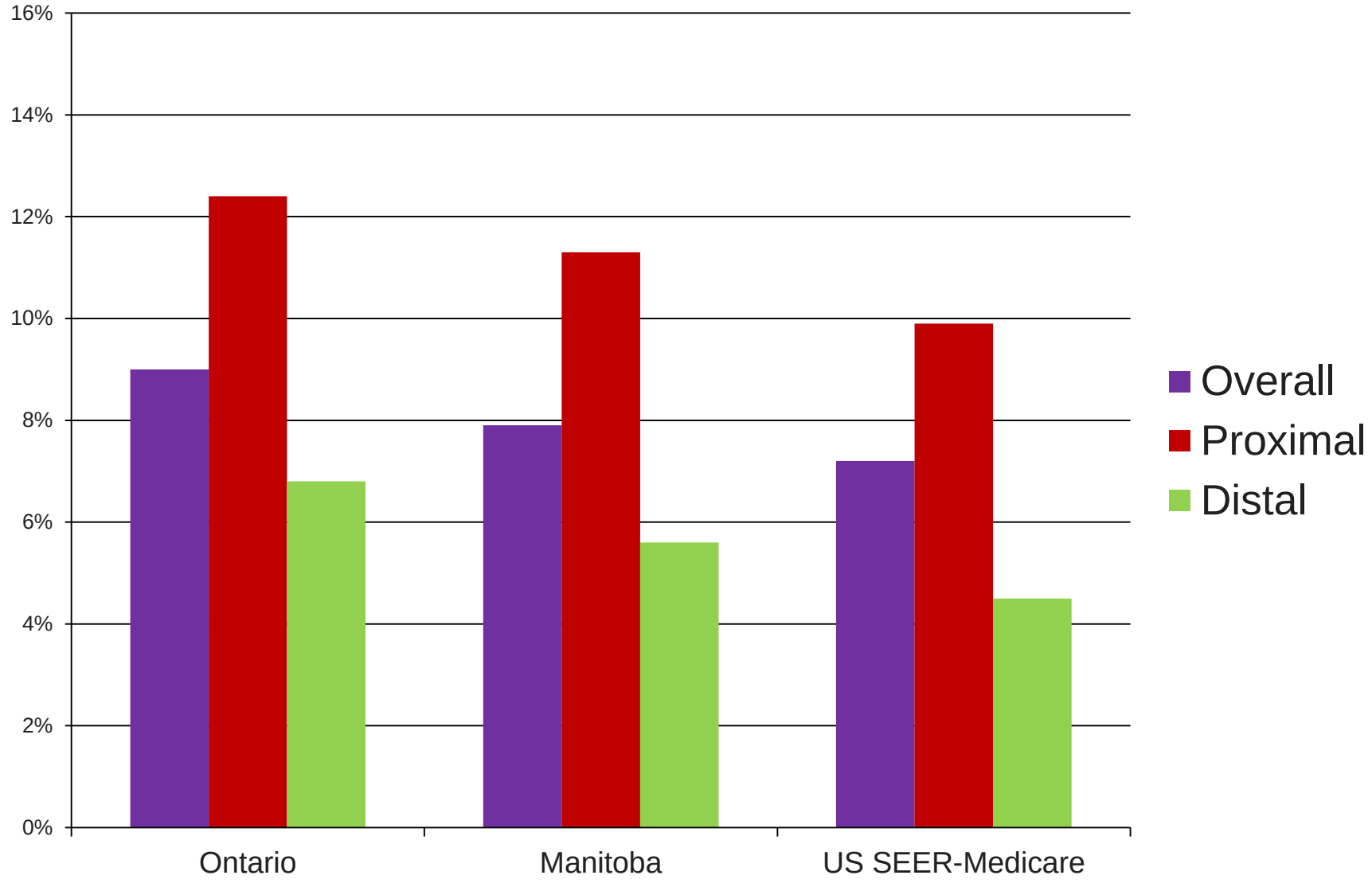
- Accounts for 2-9% of all CRCs

- Varies based on clinical setting

Clinical Setting	Interval CRC/ 1,000 pt yrs
Post screening colonoscopy	0.02-0.3
Post colonoscopy	0.2-1
Post polypectomy	1.5-3

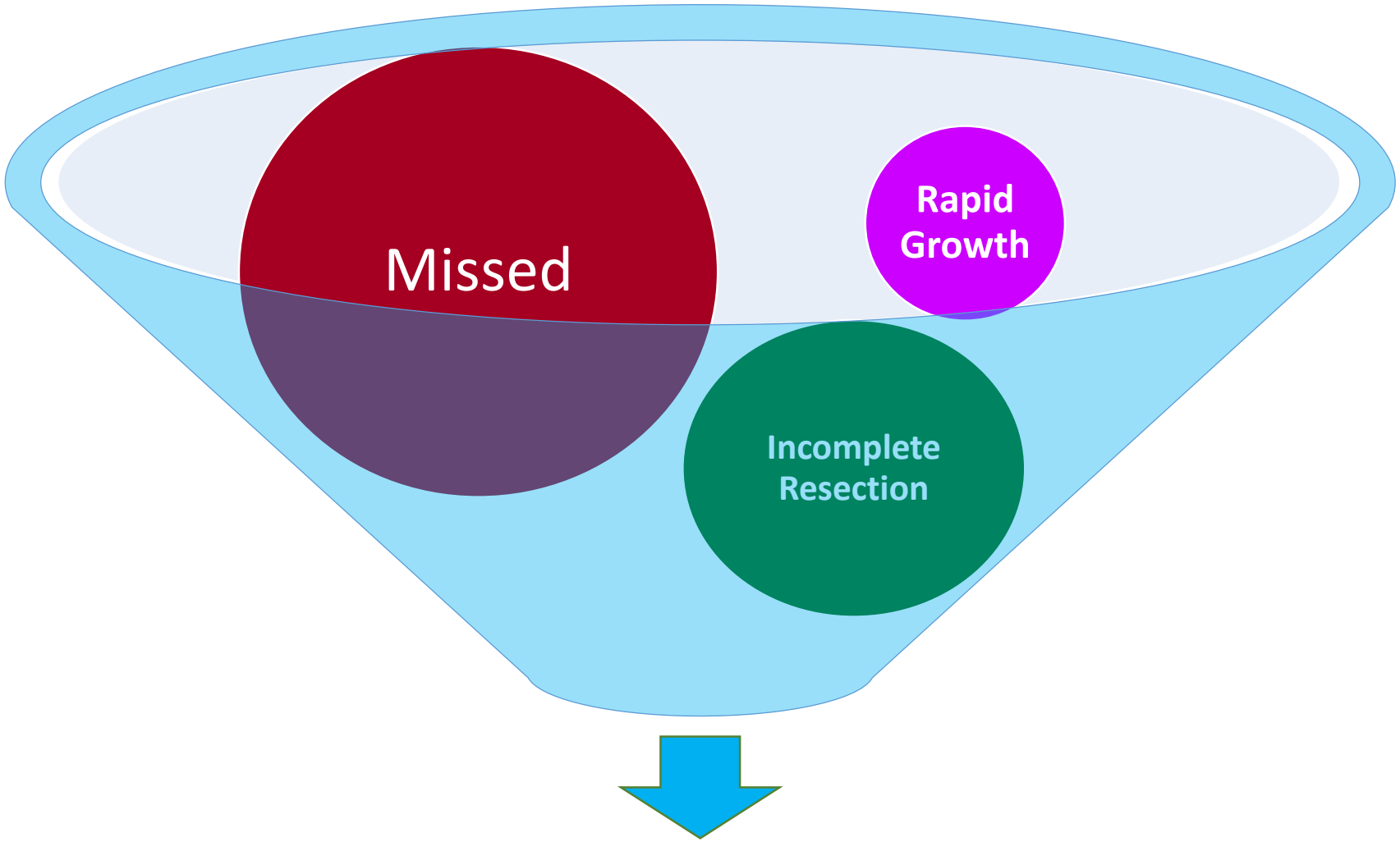
Patel SG & Ahnen DJ. Clin Gastroenterol & Hepatol 2014. 12(1):7-15.

Interval CRC Rates by Location



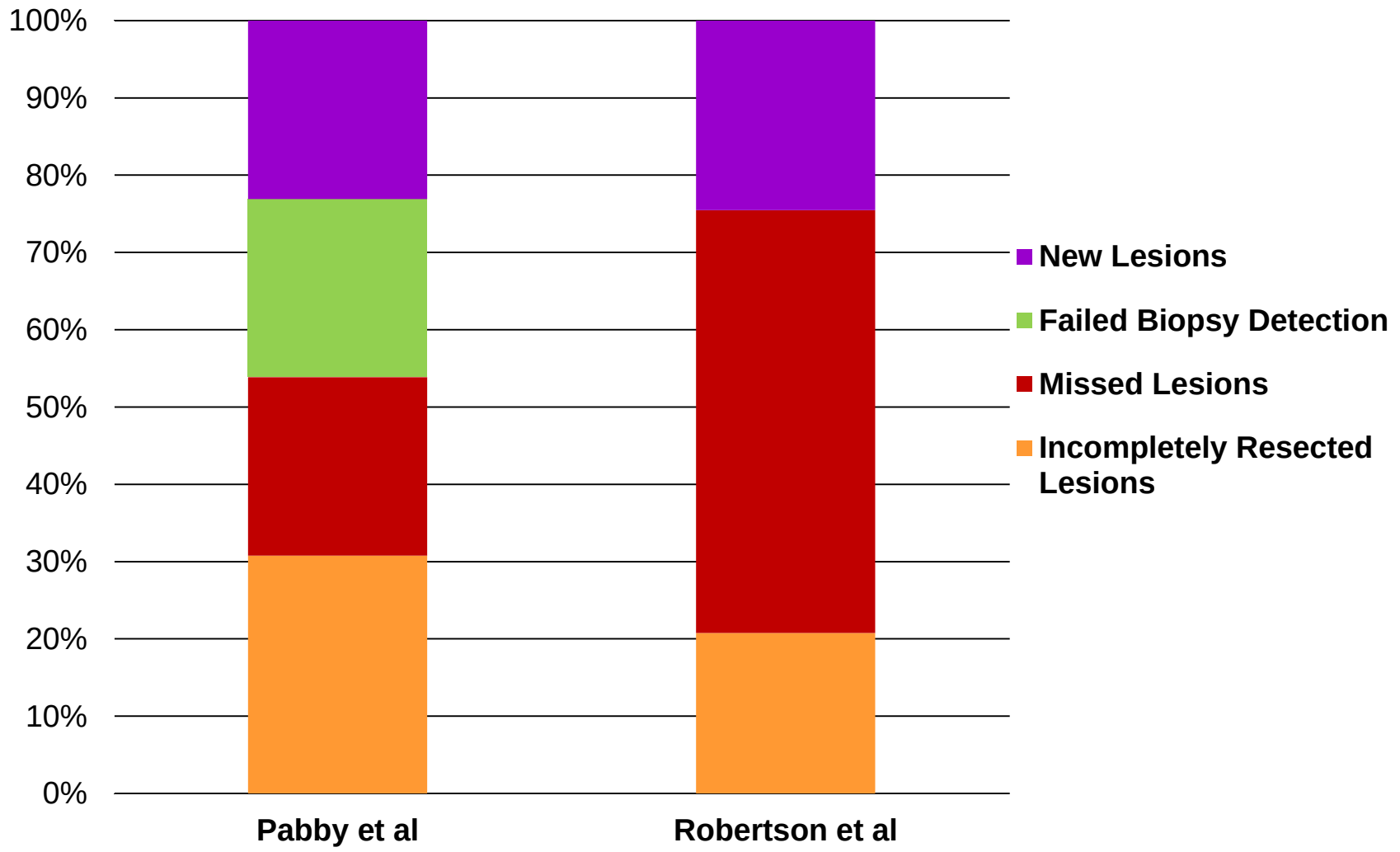
Patel SG & Ahnen DJ. Clinical Gastroenterol & Hepatol 2014. 12(1):7-15.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS



Interval CRC

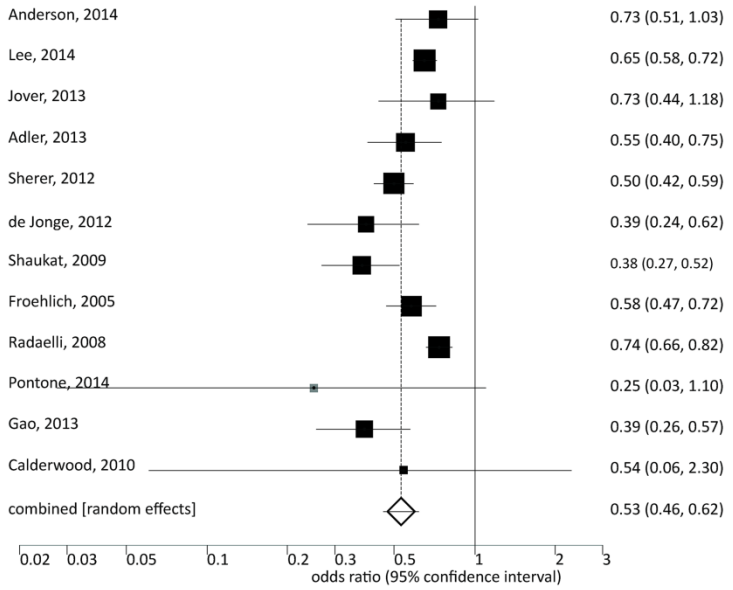
Interval CRC Etiology

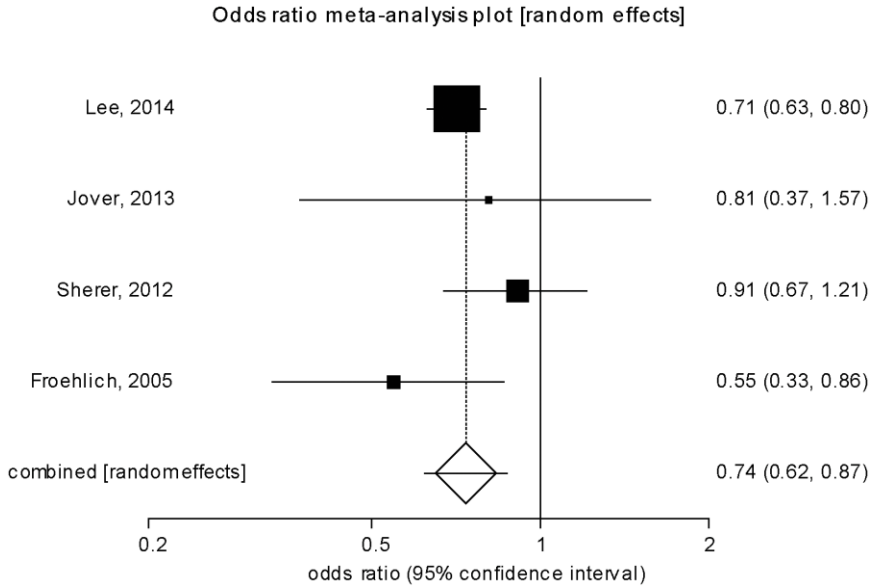


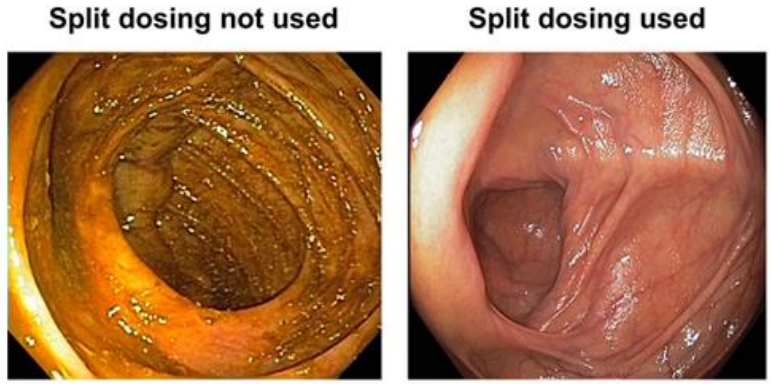
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

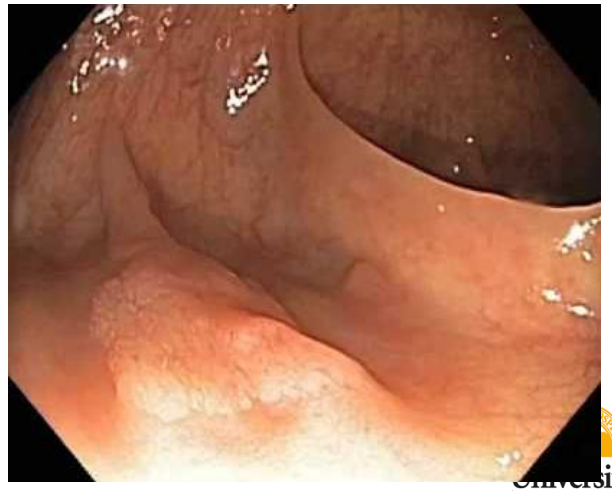
Bowel Preparation

Bowel preparation quality is associated with ADR and Advanced ADR







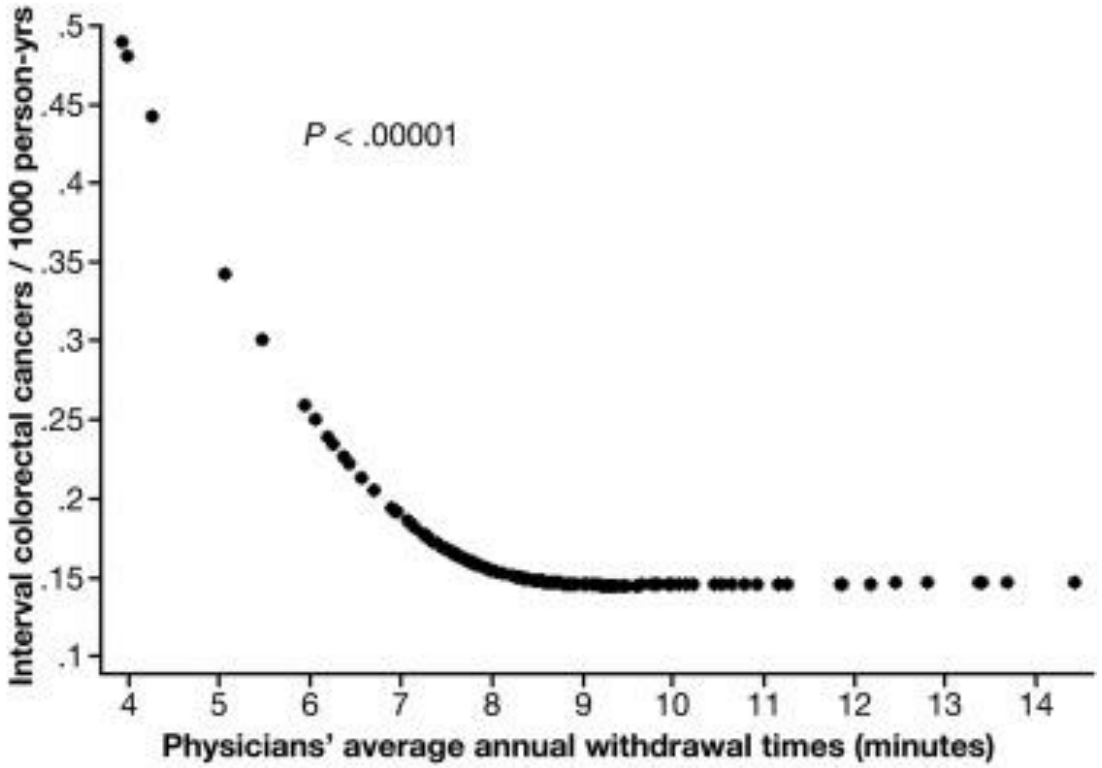


Sulz et al. PLoS ONE. 2016. 11(6):e0154149.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Inspection Technique

Time!

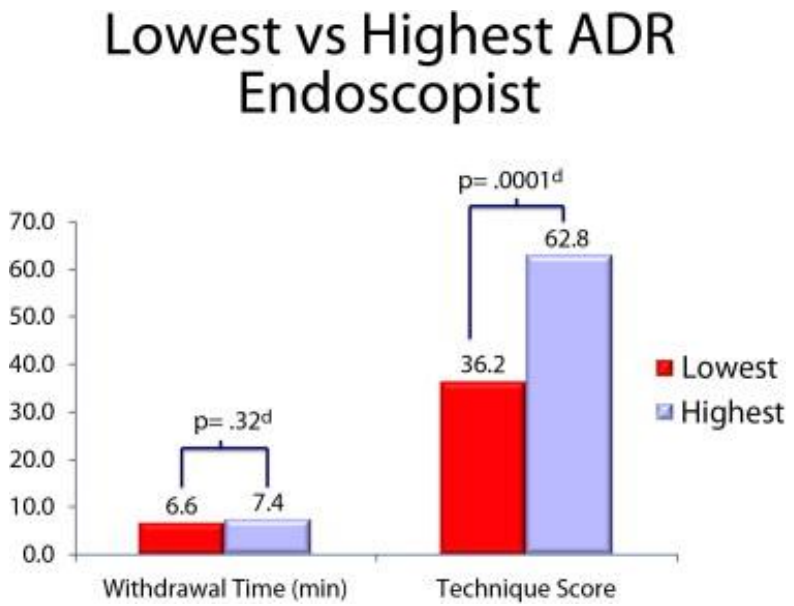


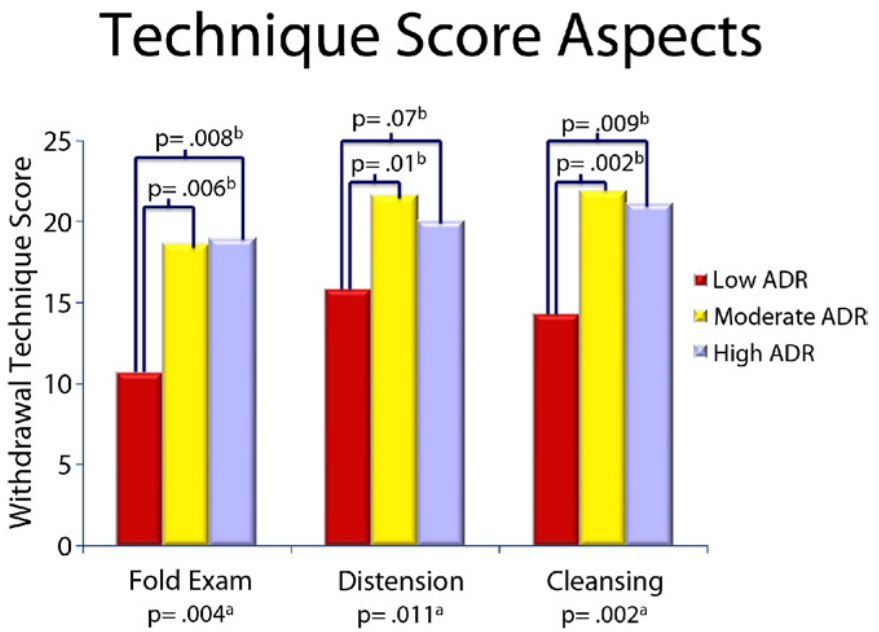
Shaukat et al. Gastroenterol. 2015. 149:952-57.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Inspection Technique

Technique matters more than time



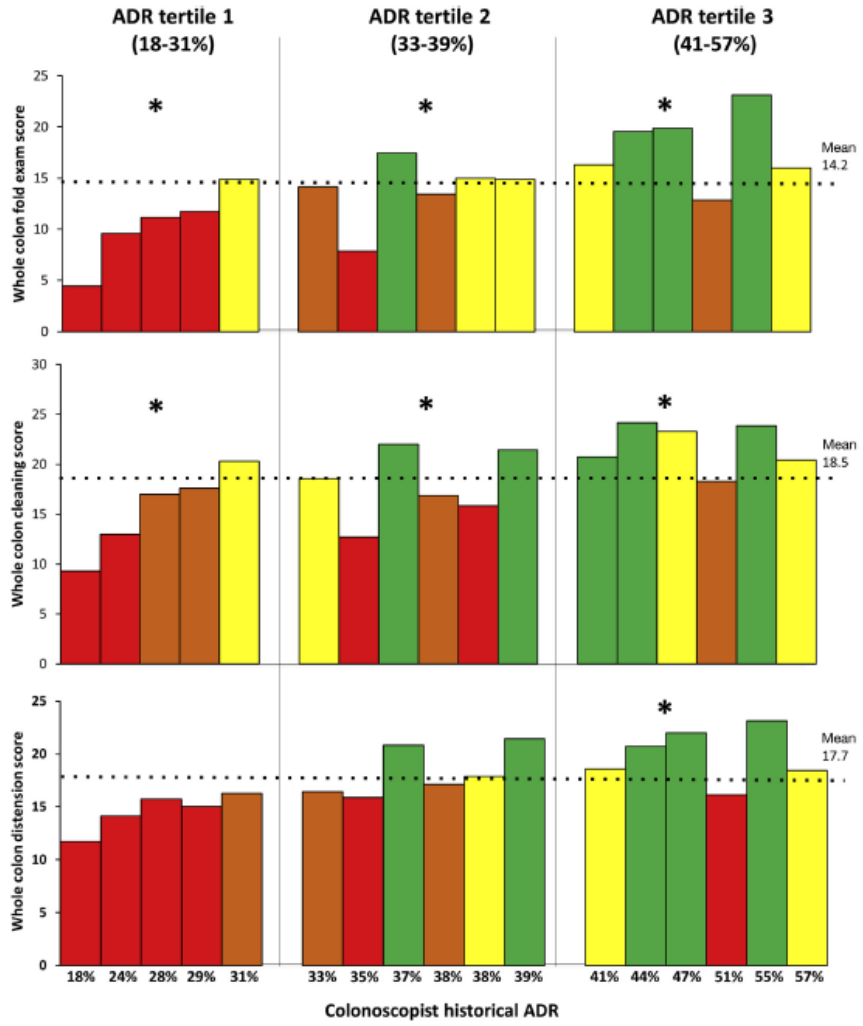


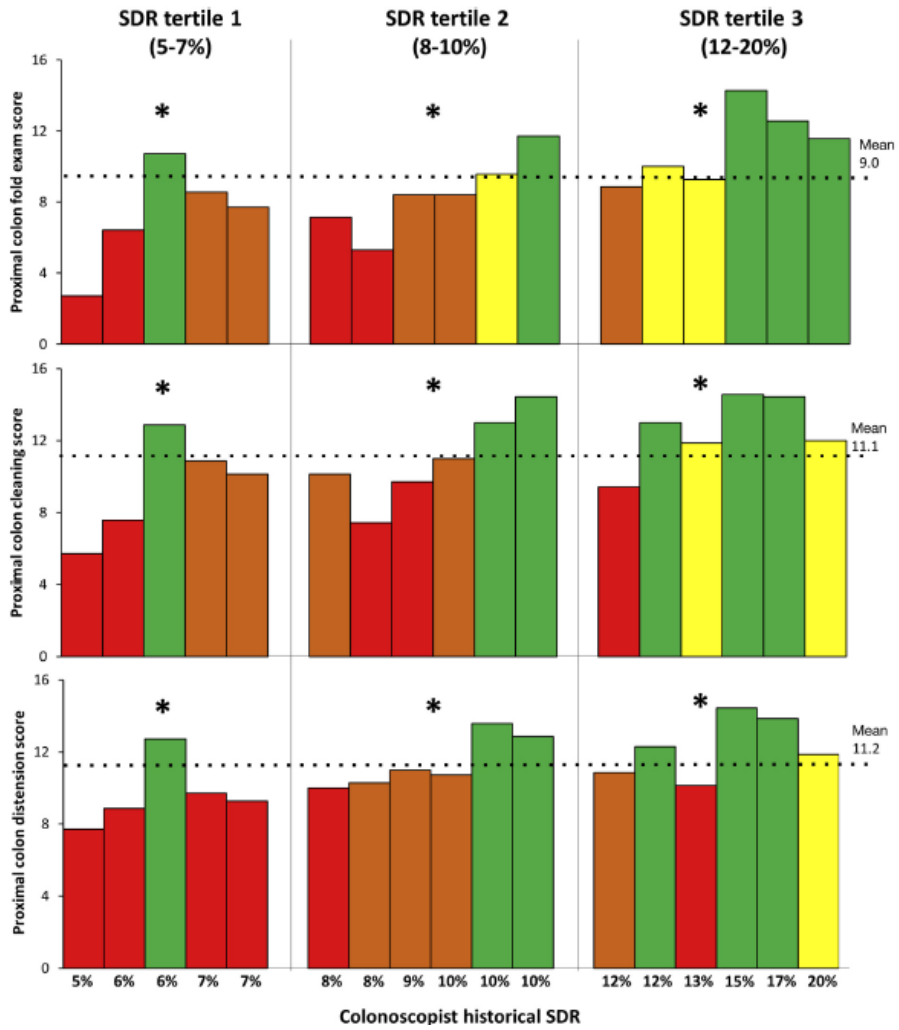
Lee et al. Gastrointestinal Endoscopy. 2011. 74(1):128-34.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Inspection Technique



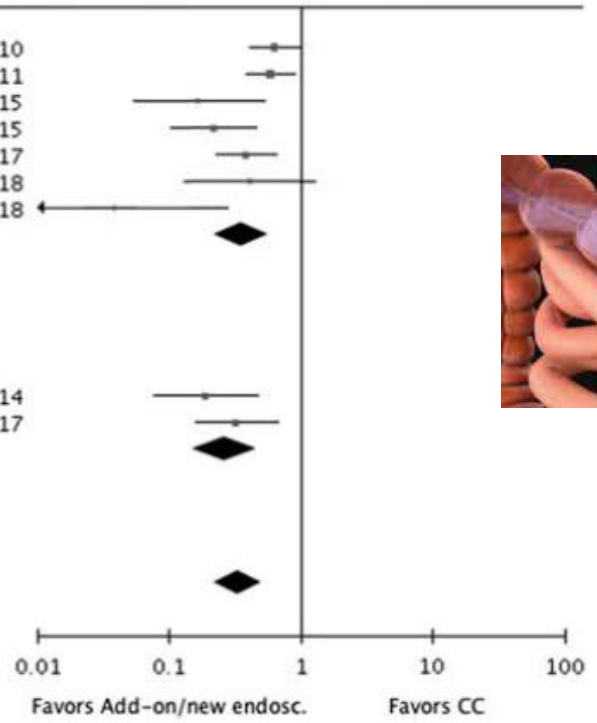


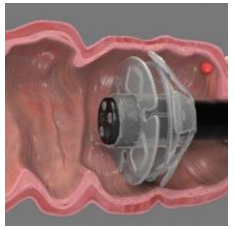
Duloy et al. Gastrointestinal Endoscopy. 2019. 17:691-700.

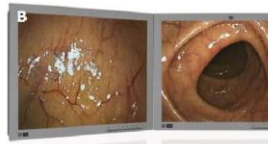
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Add-on Devices

Study or Subgroup	Add-on/new endoscopes 1st Events	Total	CC 1st Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
1.1.1 Add-on devices							
CAP-Hewett 2010	22	105	44	133	16.1%	0.63 [0.41, 0.99]	2010
TER-Leufkens 2011	26	141	49	156	16.5%	0.59 [0.39, 0.89]	2011
G-EYE-Halpern 2015	3	40	17	38	7.6%	0.17 [0.05, 0.53]	2015
ENDORINGS-Dik 2015	7	67	28	58	11.8%	0.22 [0.10, 0.46]	2015
ENDOCUFF-Triantafyllou 2017	16	109	33	86	14.9%	0.38 [0.23, 0.65]	2017
G-EYE-Rey 2018	3	18	9	22	7.6%	0.41 [0.13, 1.28]	2018
ENDOCUFF-De Palma 2018	1	87	30	101	3.4%	0.04 [0.01, 0.28]	2018
Subtotal (95% CI)		**567**		**594**	**77.9%**	**0.35 [0.22, 0.57]**	
Total events	78		210				
Heterogeneity: $Tau^2 = 0.23$; $Chi^2 = 18.12$, df = 6 (P = 0.006); $I^2 = 67\%$							
Test for overall effect: Z = 4.34 (P < 0.0001)							
1.1.2 New endoscopes							
FUSE-Gralnek 2014	5	65	20	49	9.9%	0.19 [0.08, 0.47]	2014
FUSE-Papanikolaou 2017	8	73	27	80	12.2%	0.32 [0.16, 0.67]	2017
Subtotal (95% CI)		**138**		**129**	**22.1%**	**0.26 [0.15, 0.46]**	
Total events	13		47				
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.85$, df = 1 (P = 0.36); $I^2 = 0\%$							
Test for overall effect: Z = 4.63 (P < 0.00001)							
Total (95% CI)		**705**		**723**	**100.0%**	**0.33 [0.22, 0.50]**	
Total events	91		257				
Heterogeneity: $Tau^2 = 0.21$; $Chi^2 = 21.81$, df = 8 (P = 0.005); $I^2 = 63\%$							
Test for overall effect: Z = 5.39 (P < 0.00001)							
Test for subgroup differences: $Chi^2 = 0.63$, df = 1 (P = 0.43), $I^2 = 0\%$							







University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

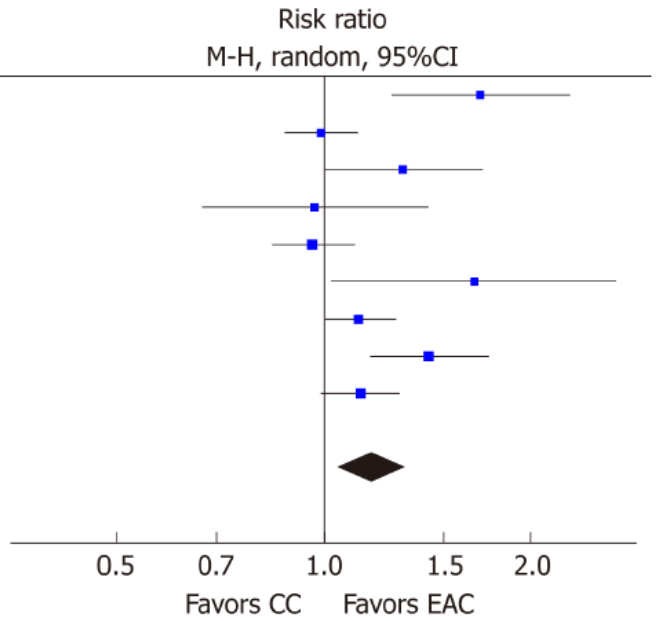
Gkolfakis et al. Eur J Gastroenterol & Hepatol. 2018. 30:1482-90.

Add-on Devices

Study or subgroup	EAC Events	EAC Total	CC Events	CC Total	Weight	Risk ratio M-H, random, 95%CI
Floer 2014	87	249	50	243	8.1%	1.70 [1.26, 2.29]
van Doorn 2015	275	530	278	533	15.4%	0.99 [0.89, 1.12]
Biecker 2015	87	240	69	249	9.4%	1.31 [1.01, 1.70]
De Palma 2017	38	137	39	137	6.1%	0.97 [0.67, 1.42]
Bhattacharyya 2017	162	266	167	265	14.6%	0.97 [0.85, 1.10]
González-Fernández 2017	39	174	22	163	4.4%	1.66 [1.03, 2.68]
Ngu 2018	363	888	320	884	15.3%	1.13 [1.00, 1.27]
Wada 2018	132	235	93	237	12.0%	1.43 [1.18, 1.74]
Rex 2018	191	299	166	295	14.7%	1.14 [0.99, 1.30]
Total (95%CI)		3018		3006	100.0%	1.18 [1.05, 1.32]
Total events	1374		1204			

Heterogeneity: $Tau^2 = 0.02$; $Chi^2 = 27.38$, df = 8 ($P = 0.0006$); $I^2 = 71\%$

Test for overall effect: Z = 2.79 ($P = 0.005$)



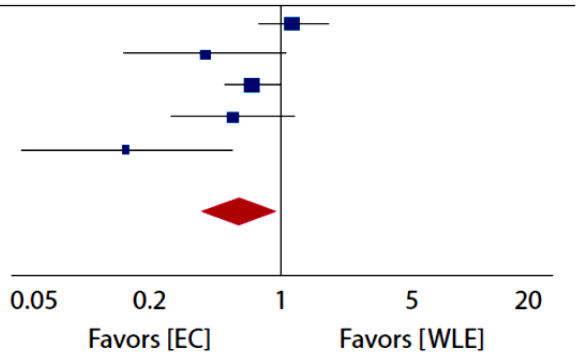
Triantafyllou et al. W J Gastroenterol. 2019. 25(9): 1158-70.

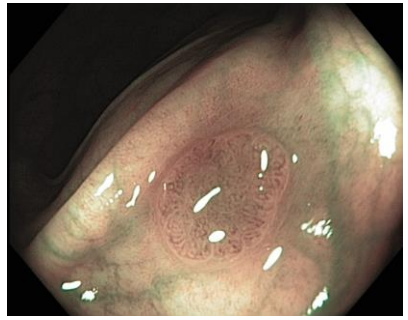
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Chromoendoscopy

Study or subgroup	EC Events	EC Total	WLE Events	WLE Total	Weight	Odds ratio M - H, random, 95% CI
Chung 2014	57	249	53	255	27.2%	1.13 [0.74, 1.73]
Gross 2011	9	33	19	39	14.1%	0.39 [0.15, 1.06]
Ikematsu 2012	83	389	119	429	29.8%	0.71 [0.51, 0.97]
Min 2017	12	128	22	138	18.9%	0.55 [0.26, 1.15]
Shimoda 2017	3	182	12	120	10.0%	0.15 [0.04, 0.55]
Total (95% CI)		981		981	100.0%	0.60 [0.37, 0.98]
Total events	164		225			

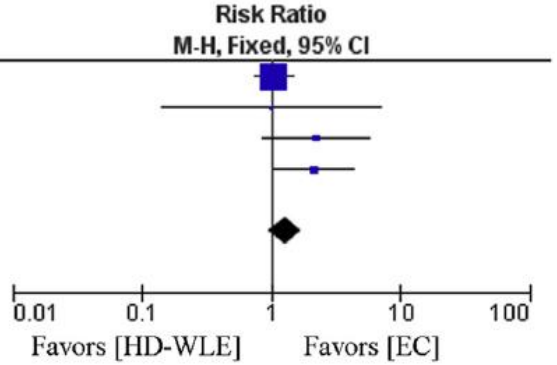
Heterogeneity: $\tau^2 = 0.18$; $\chi^2 = 12.01$, df = 4 ($p = 0.02$); $I^2 = 67\%$
Test for overall effect: Z = 2.04 ($p = 0.04$)





Study or Subgroup	EC Colonoscopy Events	EC Colonoscopy Total	HD-WLE Colonoscopy Events	HD-WLE Colonoscopy Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Kidambi 2018	55	357	53	358	74.9%	1.04 [0.74-1.47]
Rastogi 2011	2	210	2	210	2.8%	1.00 [0.14-7.03]
Singh 2017	13	495	6	511	8.4%	2.24 [0.86-5.84]
Visovan 2017	19	226	11	279	13.9%	2.13 [1.04-4.39]
Total (95% CI)		**1288**		**1358**	**100.0%**	**1.29 [0.97-1.73]**
Total events	89		72			

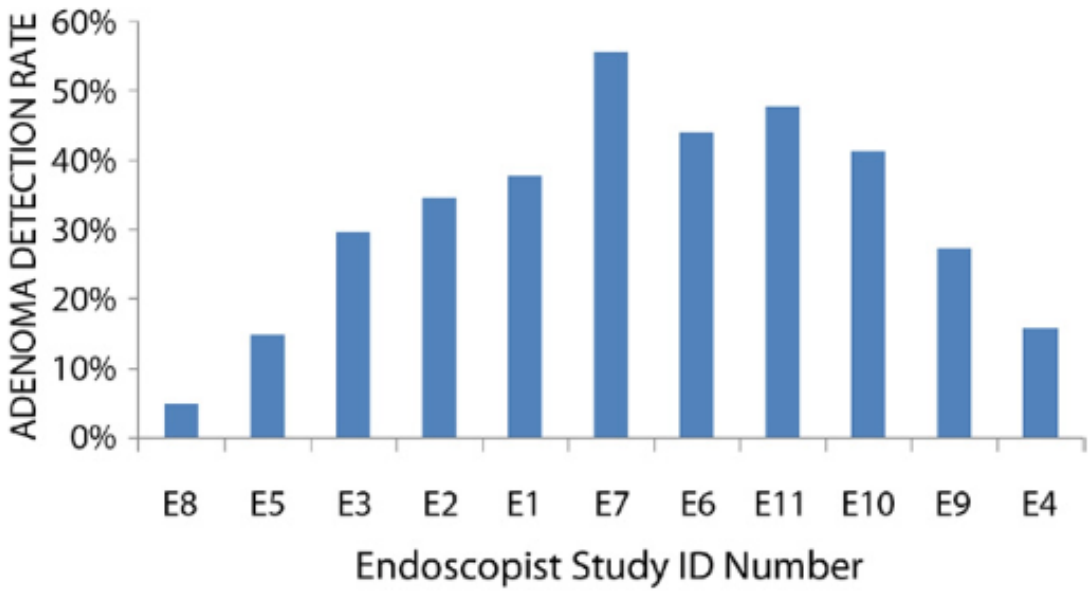
Heterogeneity: Chi² = 4.66, df = 3 (P = .20); I² = 36%
Test for overall effect: Z = 1.72 (P = .09)

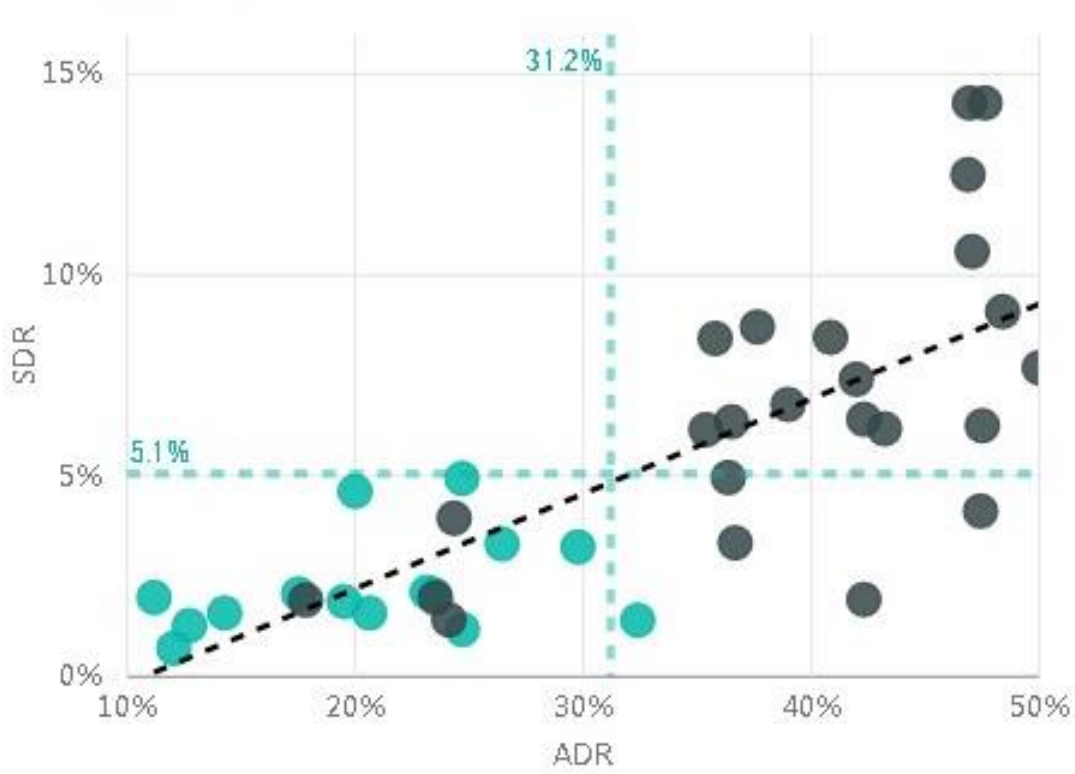


Desai et al. Dis Colon Rectum. 2019. 62: 1124-34.
Aziz et al. Gastrointestal Endoscopy. 2019. 90: 721-31.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Variability in ADR



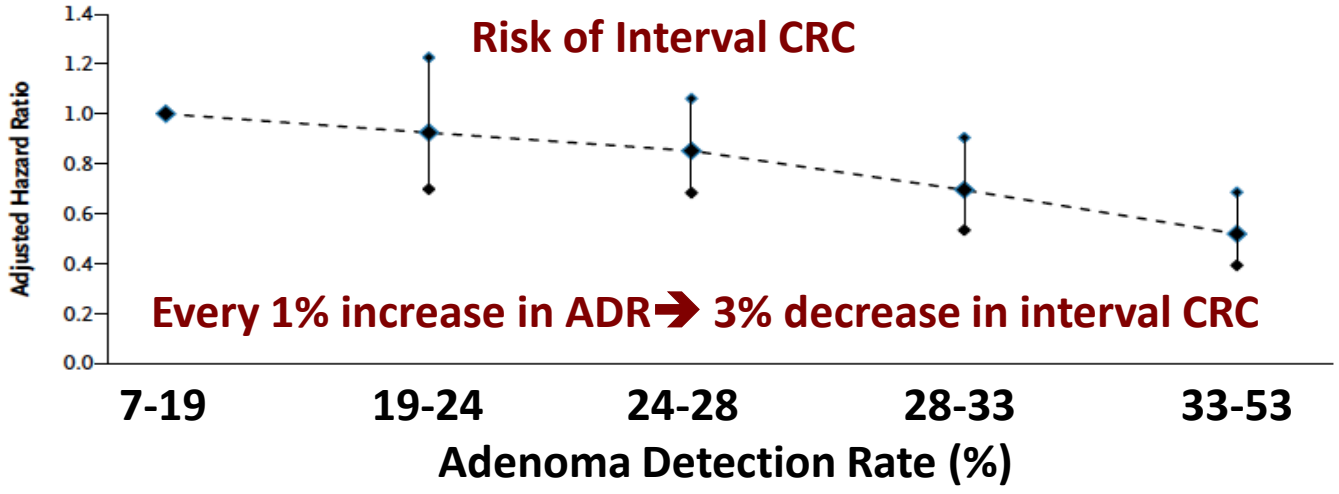


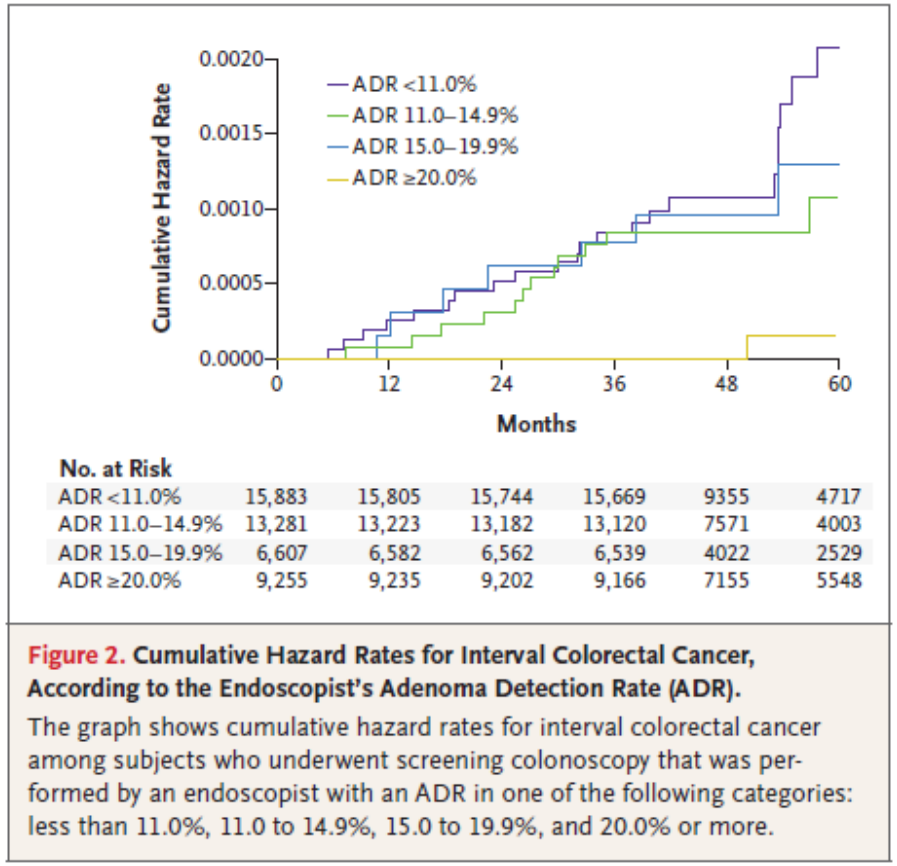
Lee RH et al. Gastrointestinal Endoscopy. 2011. 74:128-34.
Lee GJ et al. American J Gastroenterol. 2017. 112: S120-1.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

ADR is associated with Interval CRC

- Polish Colonoscopy Screening Program
  - 186 endoscopists; 45,026 patients, 52 mo f/u
  - ADR < 20%: 17 fold higher interval CRC rate
- Kaiser
  - 136 endoscopists; 314,872 patients, 35 mo f/u





No. at Risk						
ADR <11.0%	15,883	15,805	15,744	15,669	9355	4717
ADR 11.0–14.9%	13,281	13,223	13,182	13,120	7571	4003
ADR 15.0–19.9%	6,607	6,582	6,562	6,539	4022	2529
ADR ≥20.0%	9,255	9,235	9,202	9,166	7155	5548

Figure 2. Cumulative Hazard Rates for Interval Colorectal Cancer, According to the Endoscopist's Adenoma Detection Rate (ADR).

The graph shows cumulative hazard rates for interval colorectal cancer among subjects who underwent screening colonoscopy that was performed by an endoscopist with an ADR in one of the following categories: less than 11.0%, 11.0 to 14.9%, 15.0 to 19.9%, and 20.0% or more.

Kaminski et al. N Engl J Med. 2010. 362:1795-83.
Corley et al. N Engl J Med. 2014. 370:1298-306.

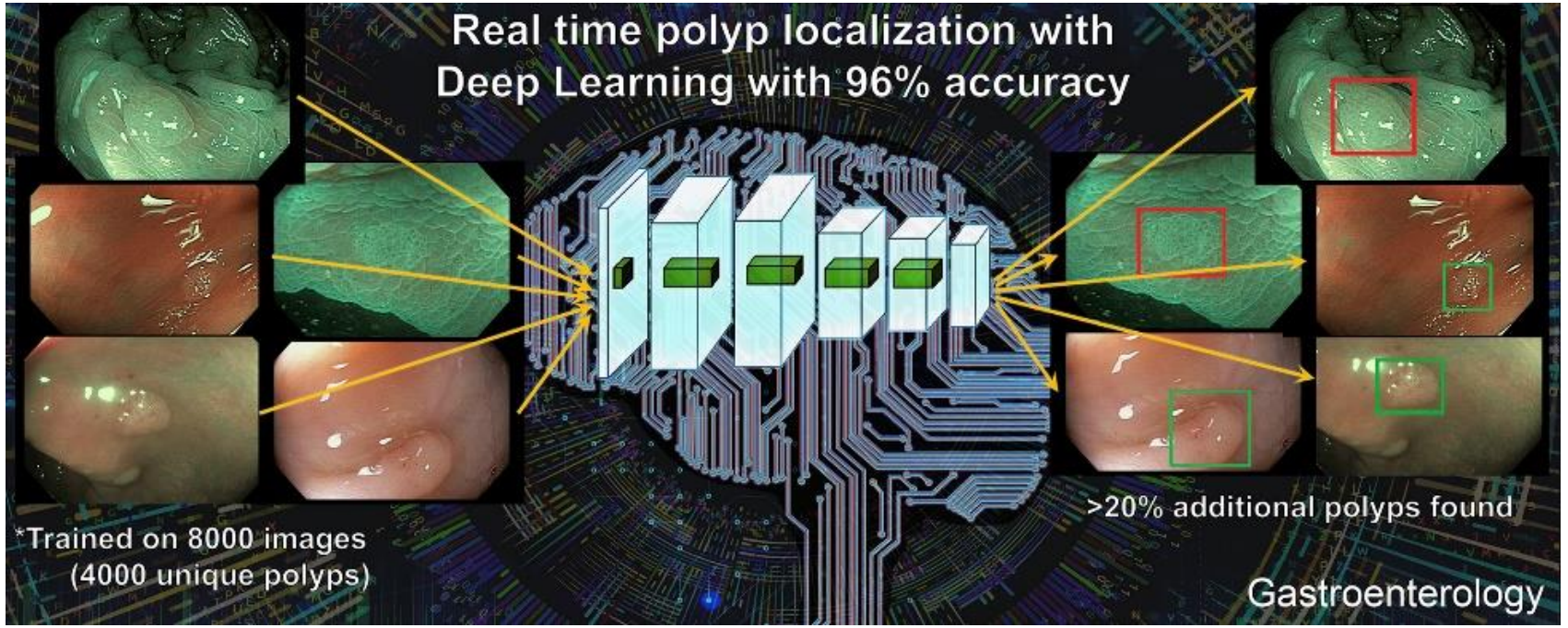
University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Artificial Intelligence

- Polyp detection
- Polyp characterization

Polyp Detection

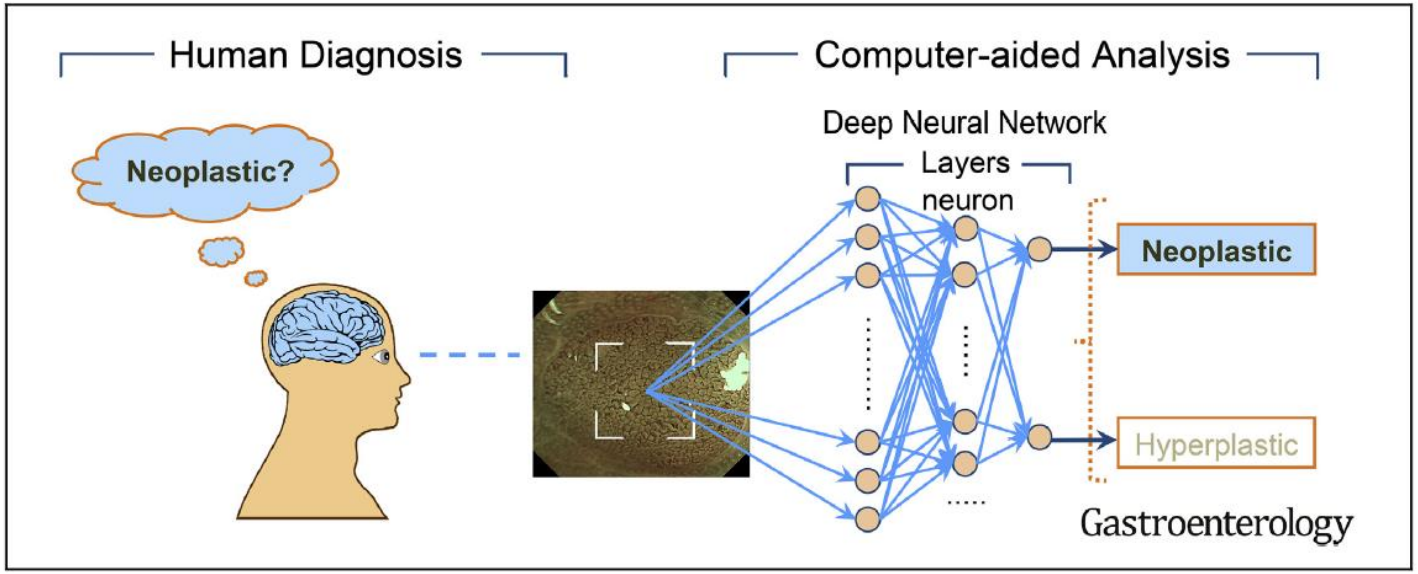
Model	Initial weights	Accuracy	AUC	Sensitivity at 5% FPR	Sensitivity at 1% FPR
NPI-CNN1	—	91.9 ± 0.2%	0.970 ± 0.002	88.1%	65.4%
NPI-CNN2	—	91.0 ± 0.4%	0.966 ± 0.002	86.2%	60.6%
PI-CNN1	VGG16	95.9 ± 0.3%	0.990 ± 0.001	96.9%	87.8%
PI-CNN2	VGG19	96.4 ± 0.3%	0.991 ± 0.001	96.9%	88.1%
PI-CNN3	ResNet50	96.1 ± 0.1%	0.990 ± 0.001	96.8%	88.0%



Urban et al. Gastroenterol. 2018. 155: 1169-78.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Polyp Characterization



	Sensitivity n (%)	Specificity n (%)	Accuracy n (%)	PPV n (%)	NPV n (%)	Diagnostic time Seconds
DNN-CAD	181/188 (96.3)	75/96 (78.1)	256/284 (90.1)	181/202 (89.6)	75/82 (91.5)	0.45 ± 0.07
Expert 1	183/188 (97.3)	74/96 (77.1)	183/284 (90.5)	183/205 (89.3)	74/79 (93.7)	1.68 ± 1.35[a]
Expert 2	184/188 (97.9)	63/96 (65.6)[a]	247/284 (87.0)	184/217 (84.8)	63/67 (94.0)	1.39 ± 1.24[a]
Novice 1	183/188 (97.3)	67/96 (69.8)	250/284 (88.0)	183/212 (86.3)	67/72 (93.1)	1.54 ± 1.07[a]
Novice 2	176/188 (93.6)	63/96 (65.6)[a]	239/284 (84.2)[a]	176/209 (84.2)	63/75 (84.0)	2.09 ± 1.95[a]
Novice 3	154/188 (81.9)[a]	74/96 (77.1)	228/284 (80.3)[a]	154/176 (87.5)	74/108 (68.5)	2.04 ± 1.20[a]
Novice 4	158/188 (84.0)[a]	85/96 (88.5)	74/284 (85.6)	158/169 (93.5)	85/115 (73.9)	1.42 ± 0.90[a]

Chen et al. Gastroenterol. 2018. 154: 568-75.

University of Colorado Hospital
ANSCHUTZ MEDICAL CAMPUS

Work to be done…

- Validation
  - Real-world conditions mimicking clinical care
    - Institutions/patient populations, image/bowel prep quality, endoscopist speed/steadiness/exam technique
  - High-risk sub-groups
    - Right colon/flexures, advanced lesions, SSPs, Paris IIa/b/c
  - Requires massive annotated datasets
- Need data by location of colon (sens in r vs l)
- Head to head randomized controlled trials with outcomes of importance (advanced lesions, etc)
- Dissemination
- Integration into fast-past clinical care
- Cost

Conclusions

- EOCRC is an increasing burden to society
- High quality inspection technique is critical to mitigating risk of post-colonoscopy cancer
- Artificial intelligence technology is promising, yet to be seen if will be truly disruptive vs incremental improvement in colonoscopy quality

SAVE THE DATE

Saturday, September 19, 2020

Course Directors

Hazem Hammad, MD
Advanced Therapeutic Endoscopy

Swati G. Patel, MD, MS
Director, GI Cancer Risk and Prevention

Amanda Weiland, MD, MSc
Transplant Hepatology
Co-Director, Fatty Liver Clinic

Presented by:
The University of Colorado Anschutz Medical Campus

Gastroenterology & Hepatology
SCHOOL OF MEDICINE
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

Join our outstanding faculty from the University of Colorado for updates in Hepatology, Therapeutic Endoscopy, and Luminal Gastroenterology.

Rocky Mountain

Highlights

in Gastroenterology and Hepatology

Hyatt Regency Aurora-Denver Conference Center
Saturday, September 19, 2020
8 AM – 3:30 PM

Don't miss this stellar hands-on opportunity!
CME and CNE credit information coming soon!

Contact kristie.click@cuanschutz.edu for more information.

Colon Polyp Resection: When to Cold, Hold, Or Burn?

Louis M. Wong Kee Song,
MD, FASGE
Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Rochester, Minnesota

Colon Polyp Resection: When to Hold, Cold, or Burn?

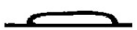
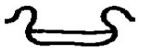
Louis M. Wong Kee Song, M.D.

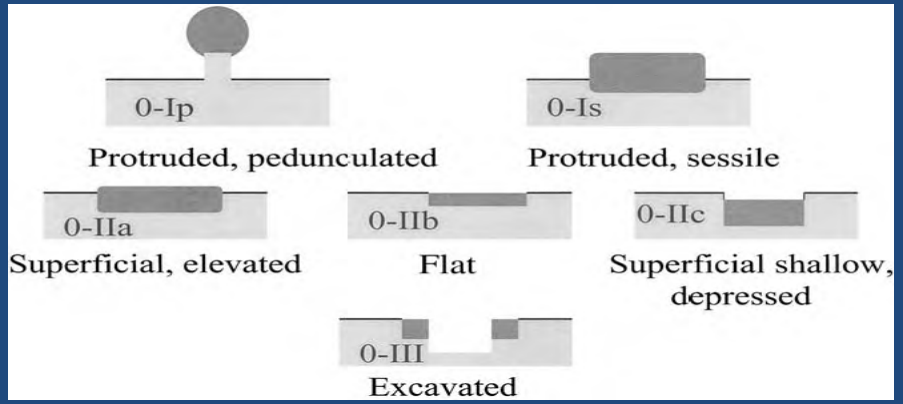
Mayo Clinic
Rochester, MN

Learning Objectives

- Identify colonic lesions that are not suitable for endoscopic resection
- Highlight cold resection techniques for small and large lesions
- Highlight the indications and techniques that utilize electrosurgery for removal of colonic lesions

Paris Classification

Endoscopic appearance	Paris class		Description
Protruded lesions	Ip		Pedunculated polyps
	Ips		Subpedunculated polyps
	Is		Sessile polyps
Flat elevated lesions	0-IIa		Flat elevation of mucosa
	0-IIa/c		Flat elevation with central depression
Flat lesions	0-IIb		Flat mucosal change
	0-IIc		Mucosal depression
	0-IIc/IIa		Mucosal depression with raised edge

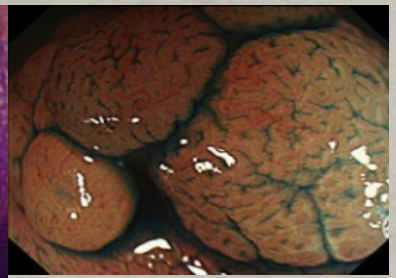


Paris Workshop, GIE 2003;58:S3

Pit Pattern Classification（Kudo）

Type I

Type II

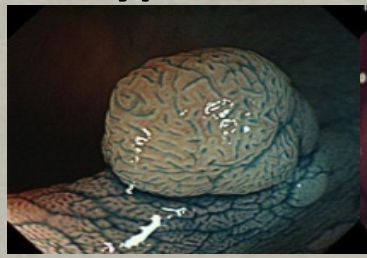


Type I : Normal

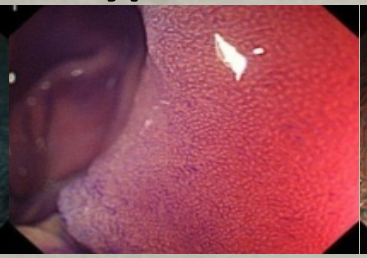
Type II : Hyperplastic

} Non-neoplastic

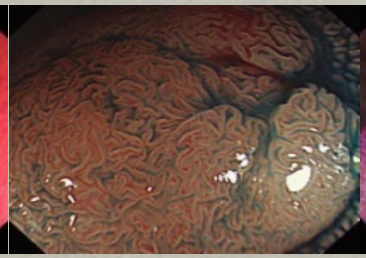
Type IIIL



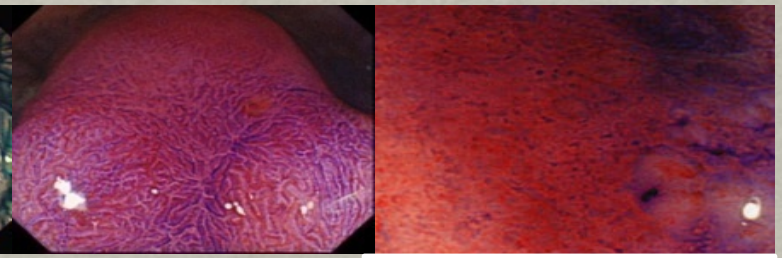
Type IIIs



Type IV



Type V



Adenoma～M～SM slight | SM deep

Courtesy of Y. Saito, MD

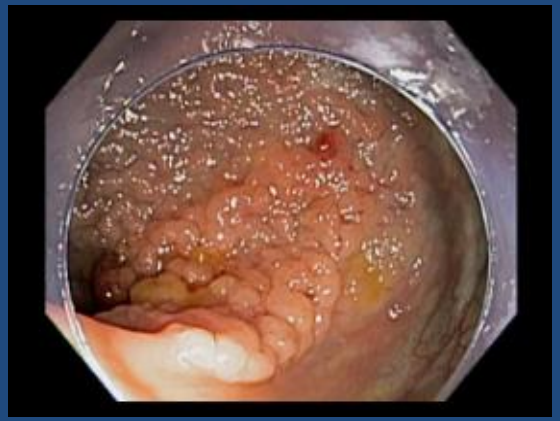
International NBI Classification (NICE)

	Type 1	Type 2	Type 3
Color	Same or lighter than background	Browner relative to background	Brown to dark brown relative to background; sometimes patchy whiter areas
Vessels	None, or isolated lacy vessels may be present coursing across the lesion	Thick brown vessels surrounding white structures	Has areas with markedly distorted or missing vessels
Surface Pattern	Dark spots surrounded by white	Oval, tubular or branched white structures surrounded by brown vessels	Distortion or absence of pattern
Most likely pathology	Hyperplastic or sessile serrated polyp (adenoma)	Adenoma	Deep submucosal invasive cancer

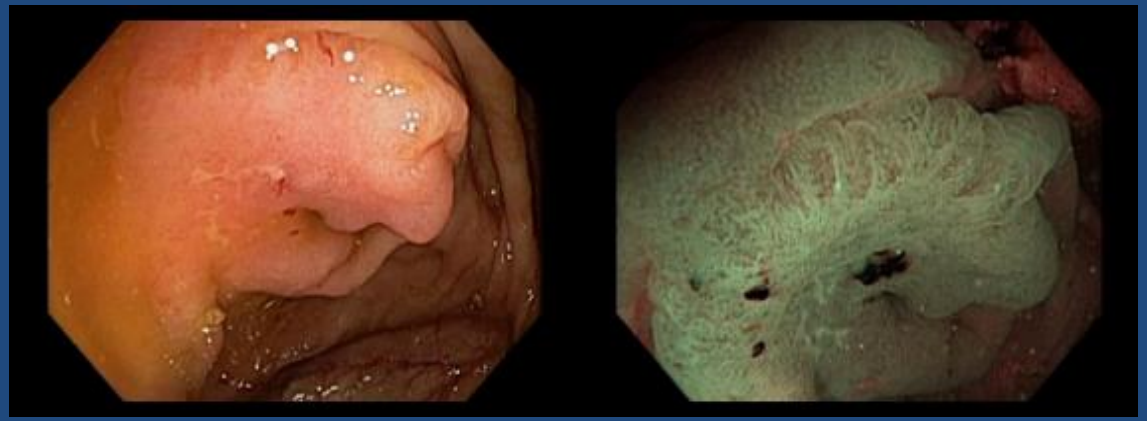
Laterally Spreading Lesions (LSLs)

Spreading Flat Lesions ≥10 mm

Granular



Non-granular

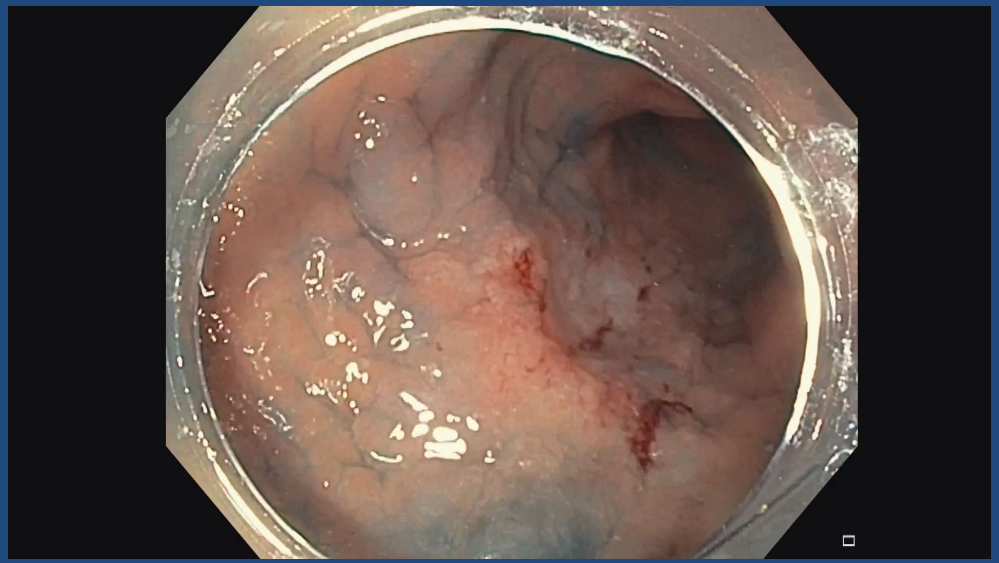


Higher Risk of SM Invasion

When to Hold

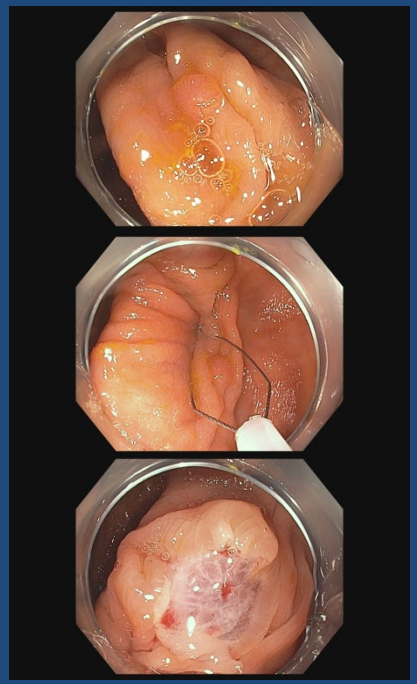
Ominous Features for Deep Submucosal Invasion

- Paris 0-IIc / 0-III classification
- Kudo V pit pattern/NICE type III
- Non-granular lesions
- Firmness on palpation
- Wall fixation
- Ulceration
- Friability
- Non-lifting sign (no prior biopsy/resection attempt)

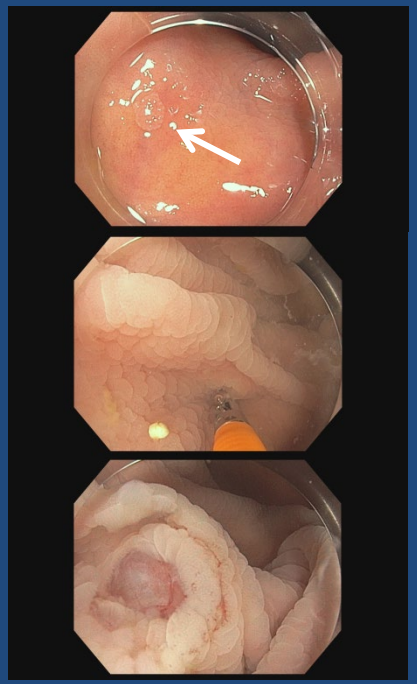


When to Cold

Cold Snare



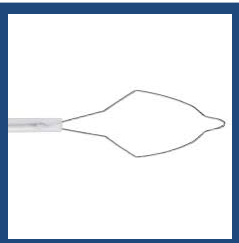
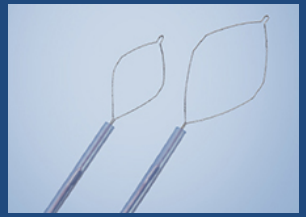
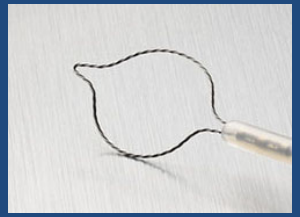
Cold Biopsy



- For polyps ≤10 mm
- Cold snare
  - Preferred technique
  - Safe on antithrombotic therapy
  - Use a dedicated thin (“cheese wire”) and stiff cold snare
  - Press down and close; do not tent
- Cold biopsy forceps
  - For polyp 1-3 mm in size when cold snaring impractical

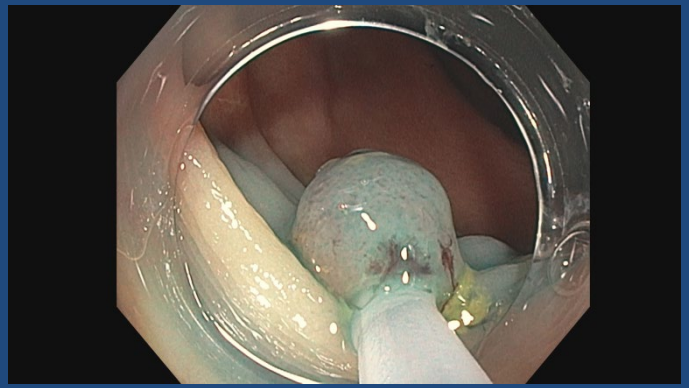
Repici A et al. Endoscopy 2012;44:27
Ferlitsch M et al. Endoscopy 2017;49:270

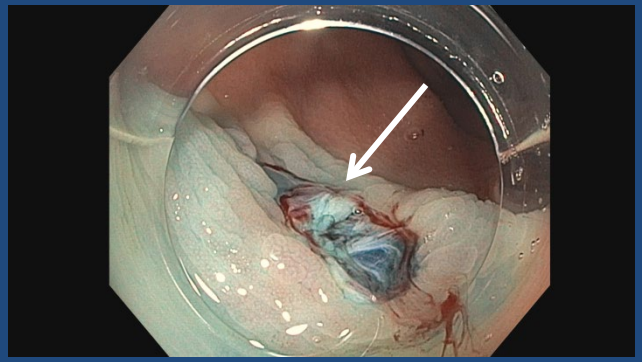
Dedicated Cold Snares

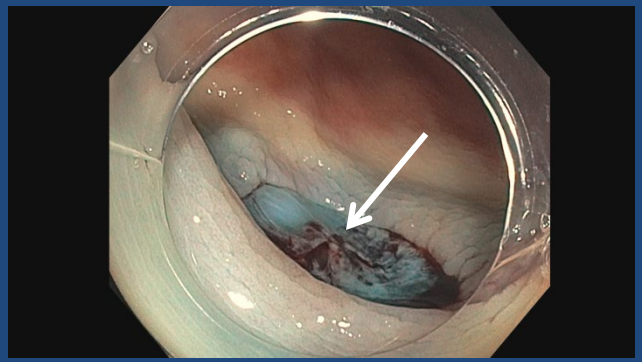
	 Exacto Cold (US Endoscopy)	 SnareMaster Plus (Olympus)	 Captivator COLD (Boston Scientific)
Sheath diameter (mm)	2.4	2.6	2.4
Sheath stiffness	Stiff	Medium stiff	Stiff
Wire diameter (mm)	0.3	0.3	0.32
Snare loop width (mm)	9	10, 15	10
Snare shape	Shield	Hexagonal	Round
Electrosurgery	No	Yes	No

Horiuchi A et al. Dig Endosc 2019;31:372

Tissue Protrusions Following Cold Snaring





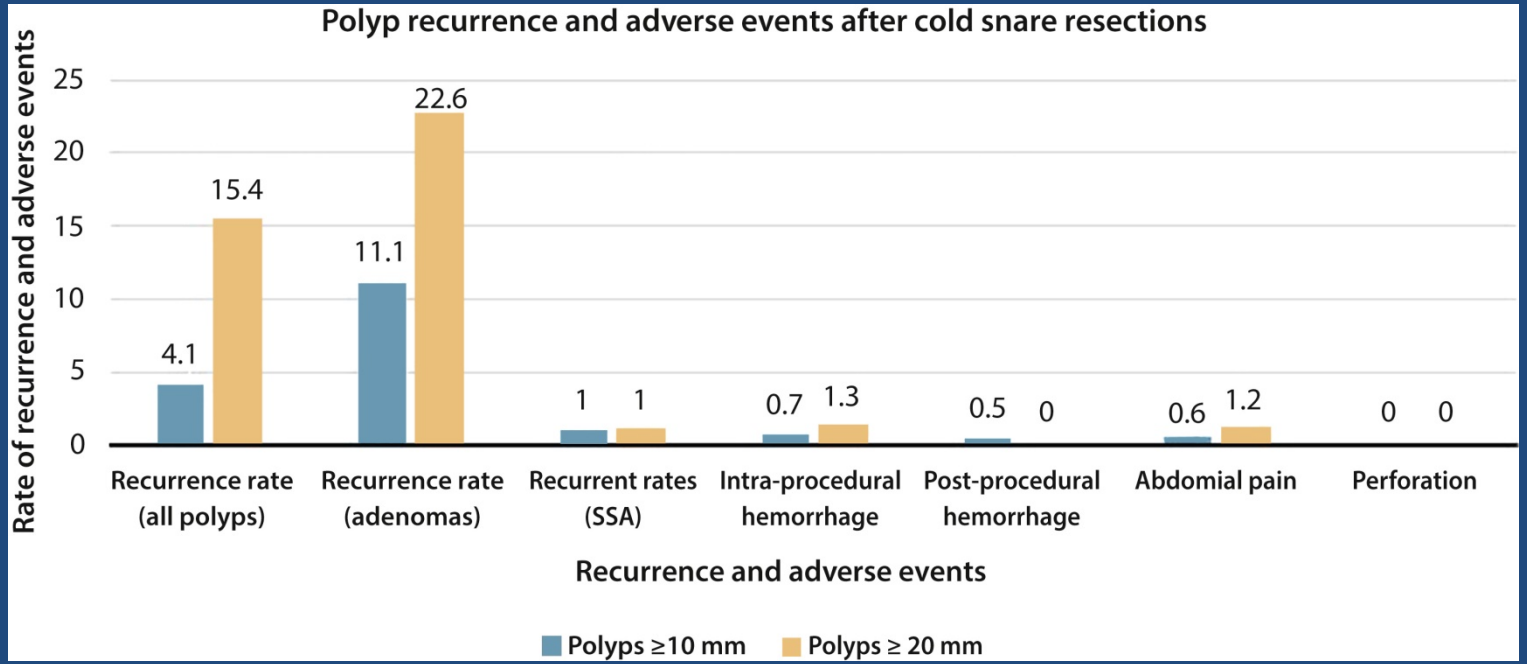


Submucosa in 94% and muscularis mucosa in 80% on histopathology

Tutticci N et al. GIE 2015;82:523

Cold Snare Resection of Polyps >10 mm is Effective and Safe, Particularly for Serrated Polyps

Systematic review and pooled analysis: 522 polyps (range, 10-60 mm)



Thoguluva Chandrasekar V et al. GIE 2019;89:929

Serrated Polyps

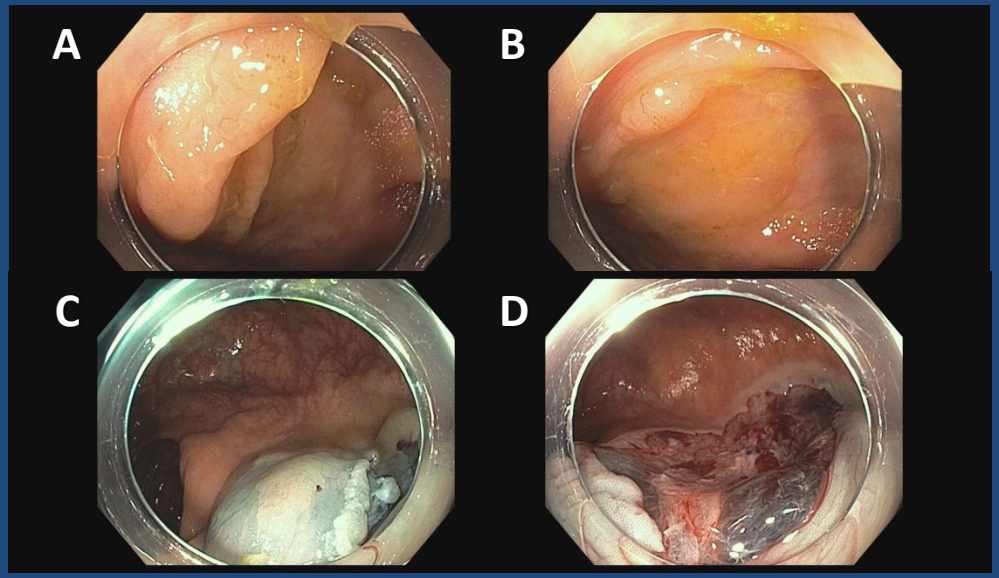
- Typically right-sided and flat subtle lesions with indistinct margins
- Important to delineate margins prior to resection
  - Enhanced imaging
    - Topical dye spray
    - NBI
  - Submucosal injection of dye (MB or IC) solution

WLE

NBI

Dye Injection

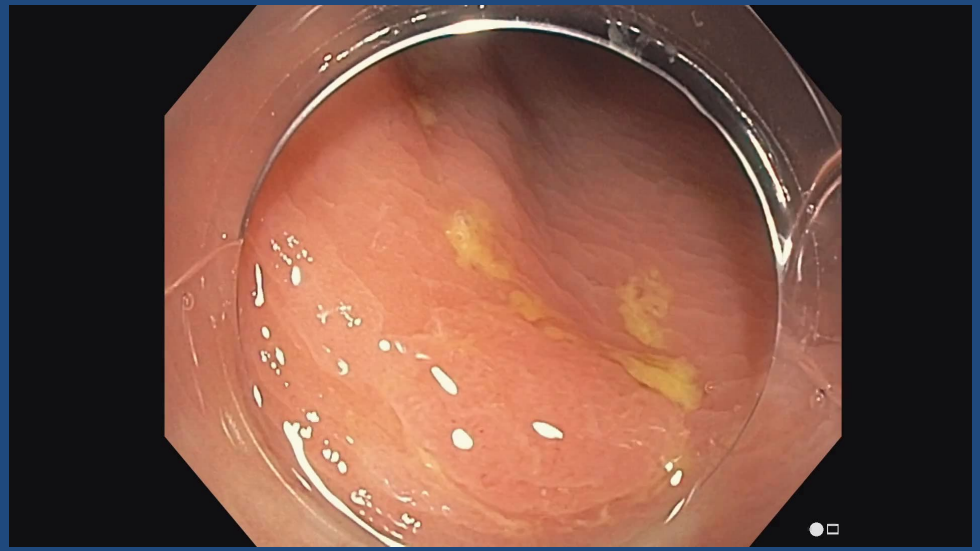
Cold Snare EMR of Large Polyps



- **Suitable lesions**
  - Granular LSLs and serrated type lesions
- **Unsuitable lesions**
  - Kudo V or Paris 0-IIa+c with nongranular surface
  - Lobulated lesions
- **Pros**
  - No perforation
  - Minimal risk of clinically significant delayed bleeding
- **Cons**
  - More fragmented specimens
  - Potentially longer duration than hot EMR

Mangira D et al. GIE 2020 Jan 15 [Epub ahead of print]

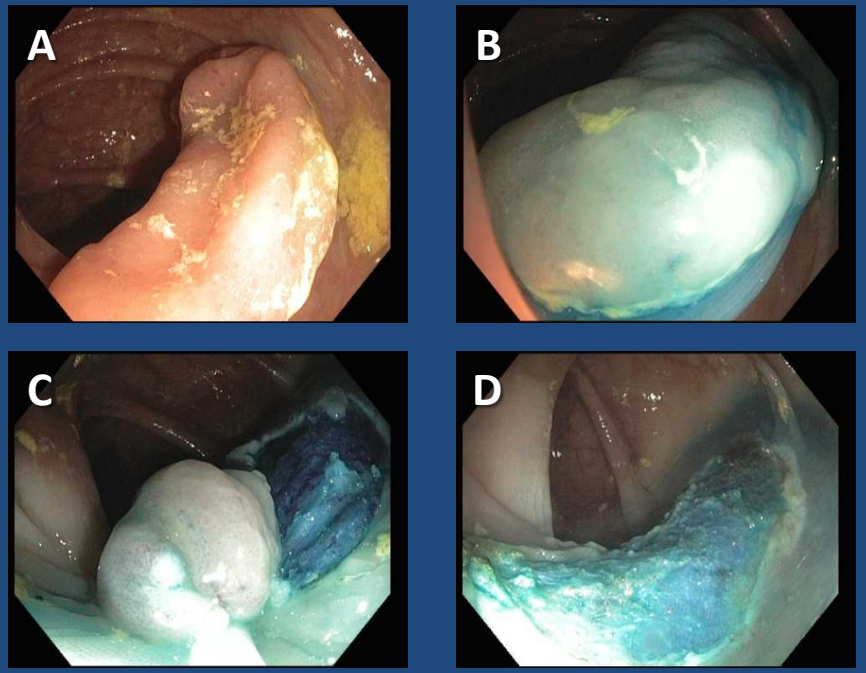
Cold Snare EMR of Large Polyps



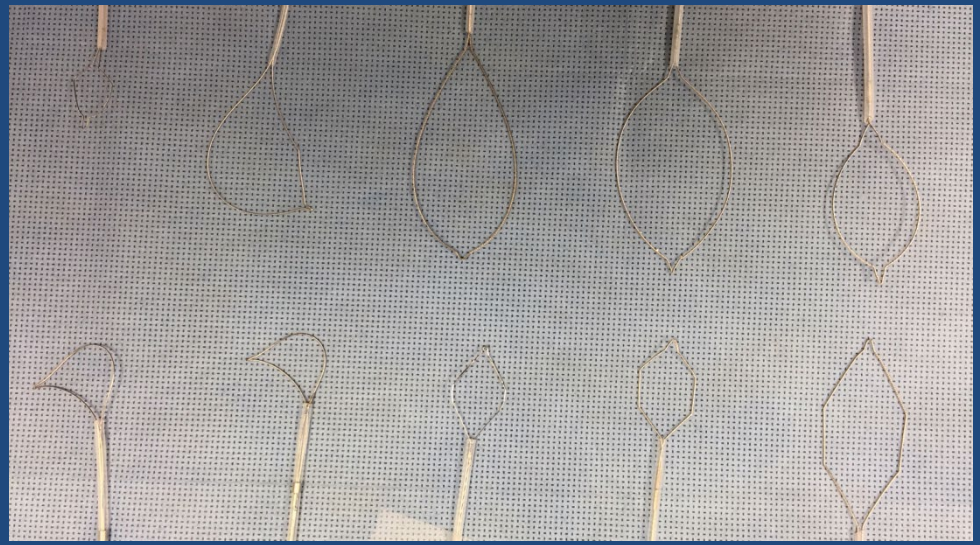
- **Technique**
  - Submucosal fluid lift with dye + epinephrine (1:100,000)
  - Piecemeal resection with dedicated cold snare
  - Sequential inject-resect
  - Include wider margin (2 mm) of adjacent normal mucosa
- **Future studies**
  - RCT of cold vs hot EMR
    - Lesion selection
    - Efficacy and safety

Hot Snare EMR

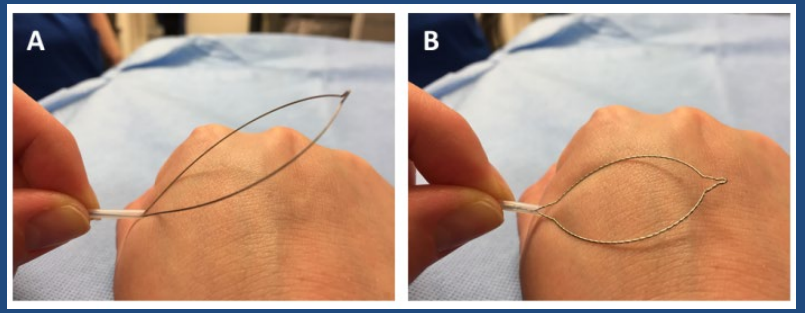
- Submucosal fluid lift
  - Saline vs viscous
  - +/- epinephrine
- Snare resection
  - Recommend stiff snare
  - En bloc (<2 cm)
  - Piecemeal (≥2 cm)



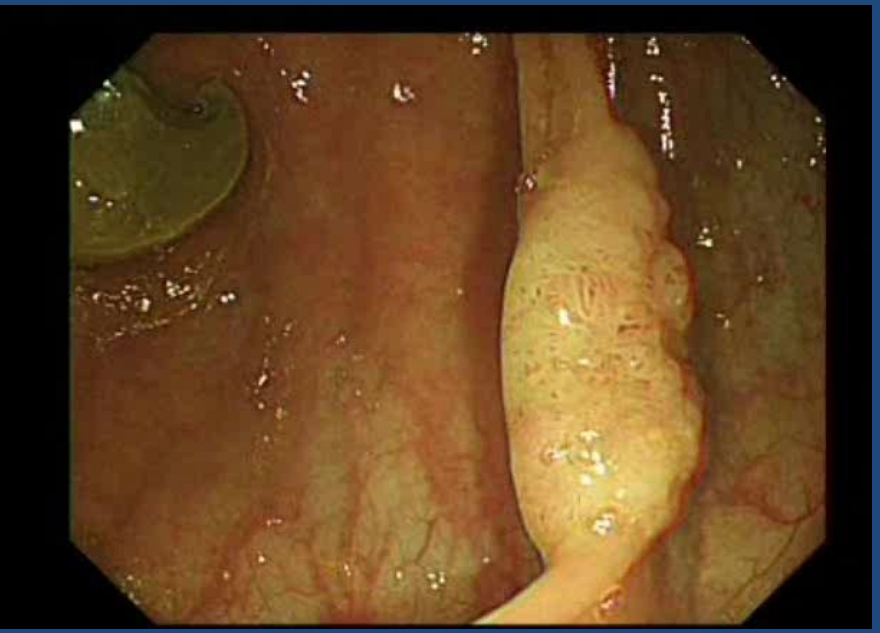
Snares



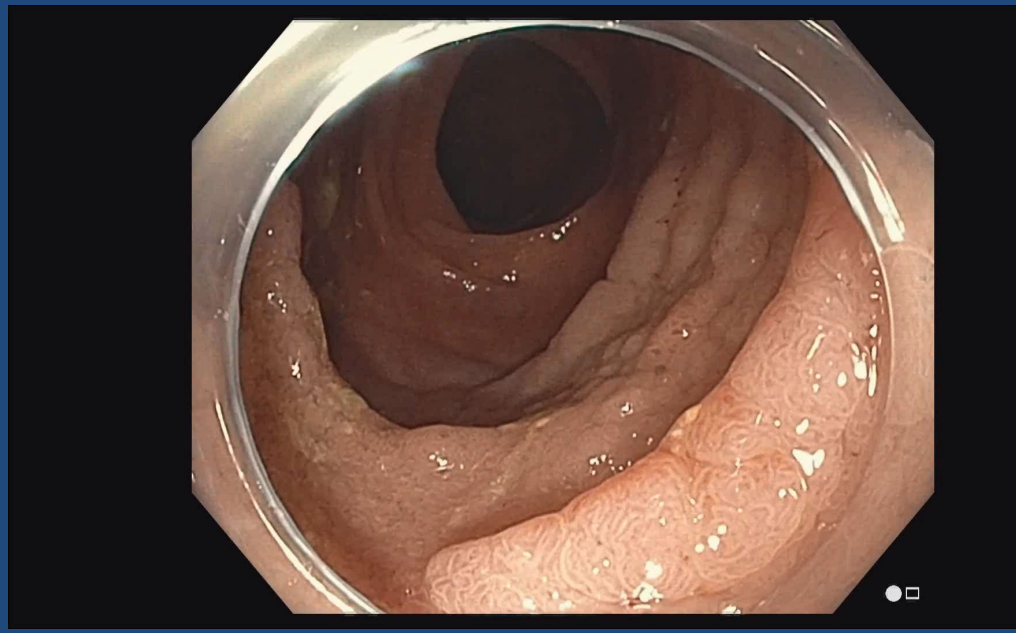
“Standard” vs. “Stiff” Snare



Hot Snare EMR

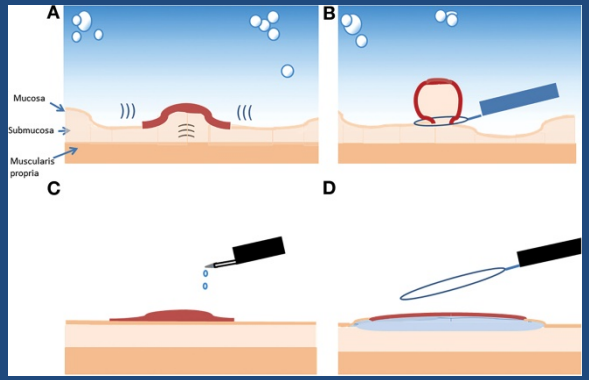


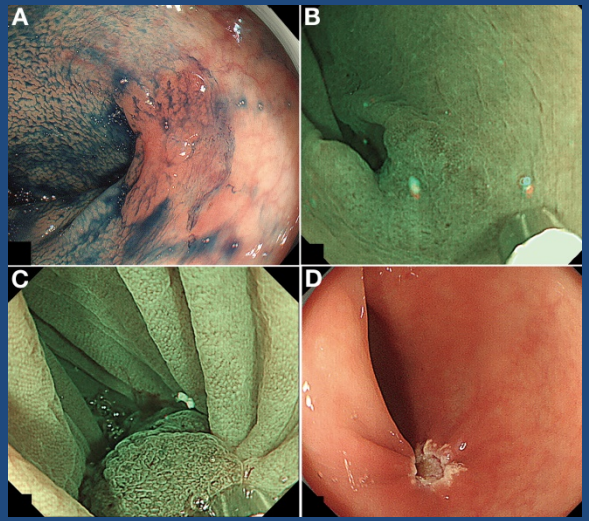
En Bloc Resection



Piecemeal Resection

Underwater EMR



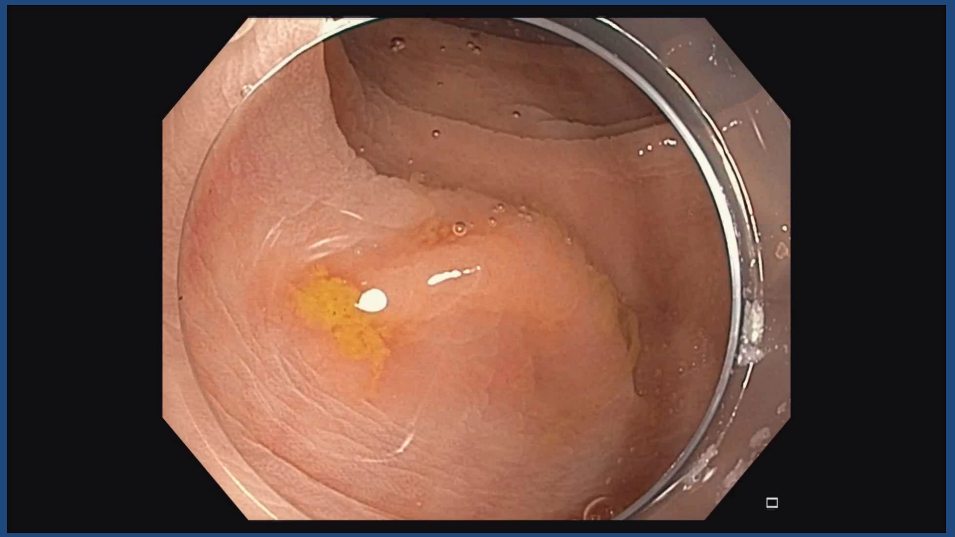


- Snare excision ***without*** submucosal fluid lift under water immersion
- RCT* for lesions 10-20 mm in size:
  - Better en bloc (89% vs 75%; p=0.007) and RO resections (69% vs 50%, p=0.011) than conventional EMR
  - No differences in procedure time or adverse events
- Future studies
  - RCTs for lesions >20 mm
  - Long-term data on recurrence

Yamashina T et al. Gastroenterology 2019;157:451*

Snare Tip Coagulation of EMR Margin to Minimize Risk of Residual/Recurrent Polyp

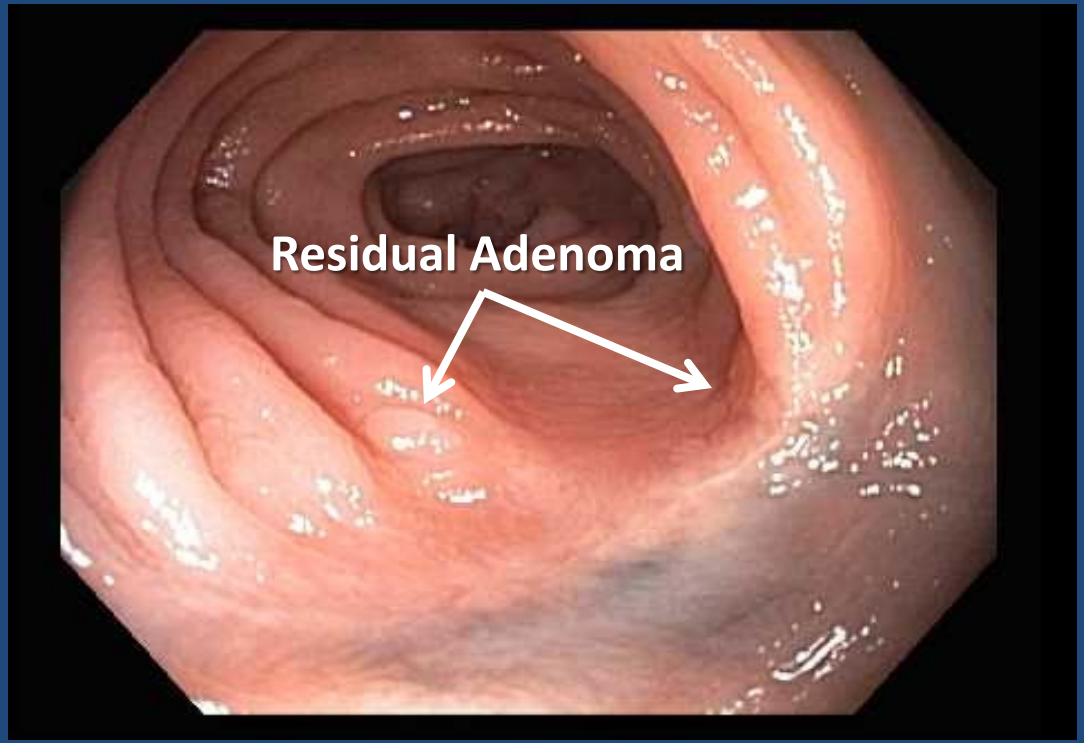
- Recurrence decreased from 25% to 5.2% following EMR of large LSLs in RCT*
- Settings
  - Soft Coag; 80 W; effect 4 (ERBE)



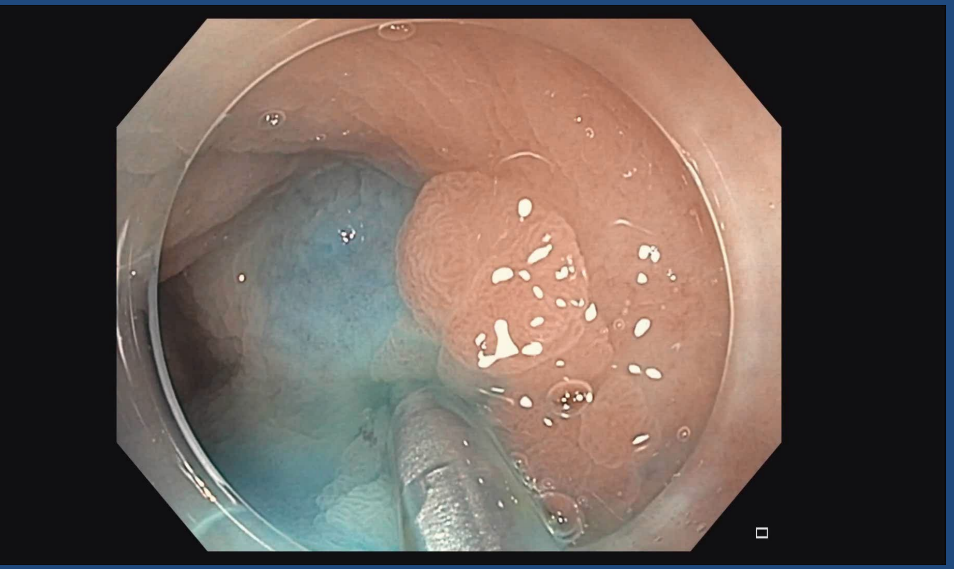
Klein A al. Gastroenterology 2019;156:604*

Technical Challenge

- Non-lifting residual/recurrent polyp due to fibrosis/scarring:
  - Extensive biopsy
  - Thermal therapy
  - Tattoo proximity



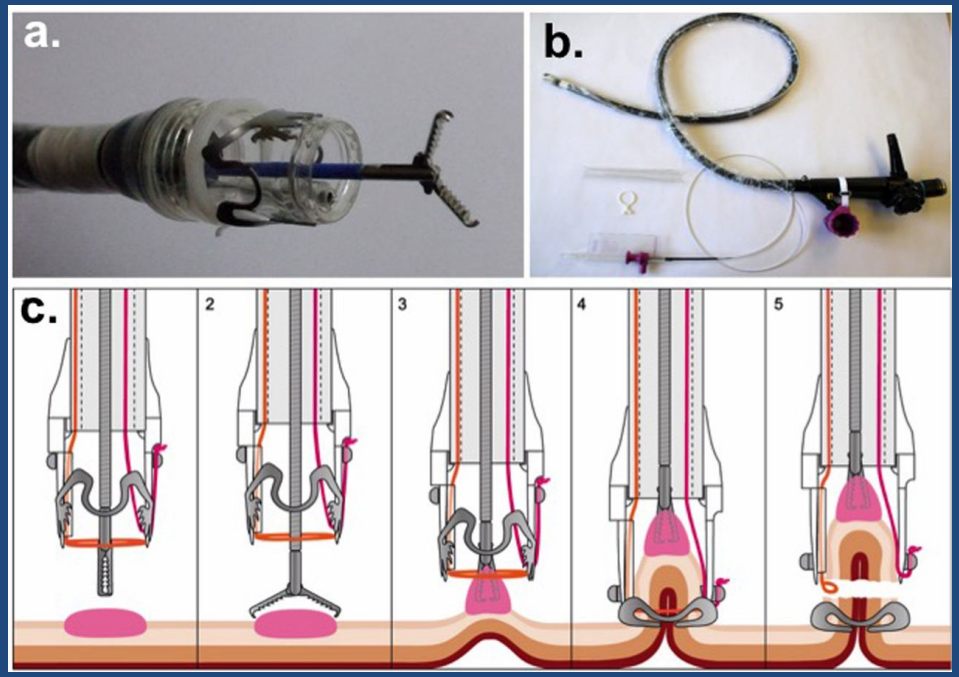
Hot Biopsy Avulsion to Remove Scarred/Non-lifting Residual Polyp Tissue



- Submucosal fluid injection as best feasible
- Histologic assessment of removed tissue possible
- Use cutting current

Holmes I et al. GIE 2016;84:822
Kumar V et al. GIE 2019;89:999

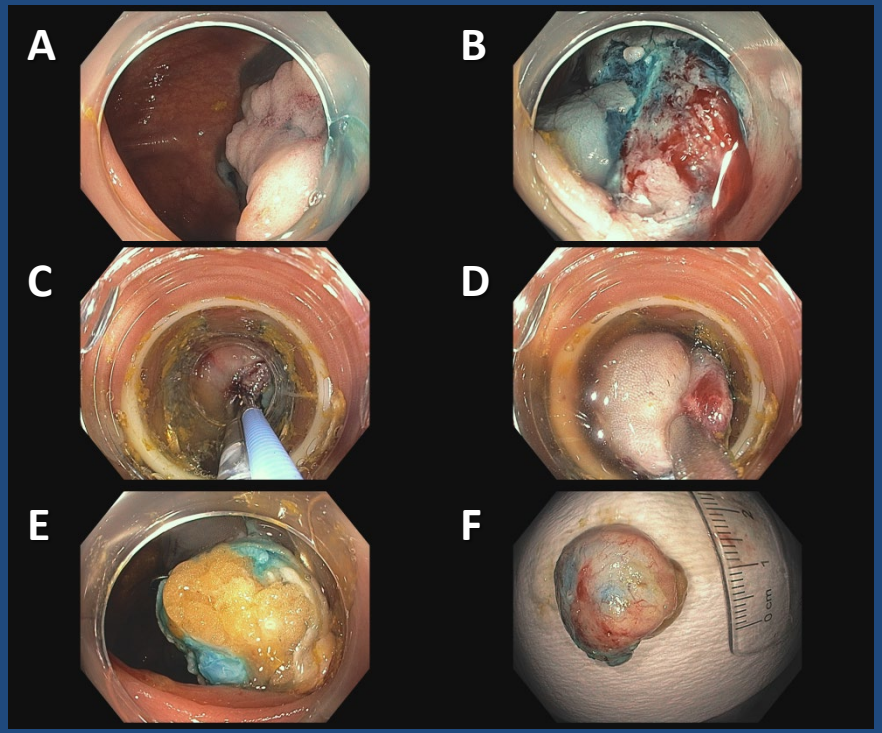
Full Thickness Resection Device (FTRD)



From Schmidt A et al. Gut 2018;67:1280

- For lesions <2-2.5 cm in size
  - Non-lifting adenomas and/or at difficult locations
  - Incomplete EMR
  - Select early cancers
  - Subepithelial tumors

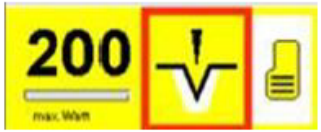
FTRD



- **Technique**
  - Thermal marking of lesion if needed
  - Scope withdrawal for device set-up
  - Advance FTRD-loaded scope to lesion (most difficult part)
  - Lesion retraction into cap (e.g., grasping forceps); *limited/no* suction
  - Clip deployment followed by snare resection

FTRD Settings

Manufacturer	Generator	Cutting current  FTRD® SYSTEM	Coagulation  FTRD® MARKING PROBE
ERBE	VIO® 300 D	highCUT, effect 4, Pmax 200W	forcedCOAG, effect 1, Pmax 20W
	VIO® 200 S	autoCUT, effect 5, Pmax 180W *Alternative:* endoCUT Q, effect 1, cutting duration 4, cutting interval 1	forcedCOAG, effect 1, Pmax 20W
	VIO® 3	highCUT, effect 4.0	forcedCOAG, effect 1.0

CONMED	Pure Cut	200 Watt	
OLYMPUS (ESG-100)	Cut 1	Level 120	
OLYMPUS (ESG-300/400)	PureCut	120 Watt, Effect: 1	

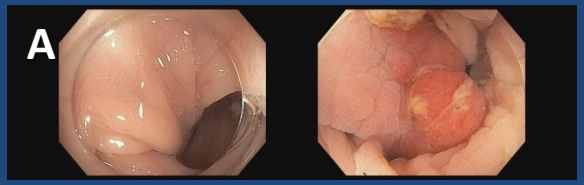
FTRD – Issues and Outcomes

- Long rigid cap
  - Limited view, difficult scope maneuvering, perforation risk
- Inability to reach the target
  - Narrowed, fixated colon
- Inability to remove the intended lesion
  - Unable to retract stiff or scarred lesion
- Adverse events
  - Perforation; appendicitis (peri-appendiceal lesions); bleeding; lumen occlusion; extraluminal organ entrapment

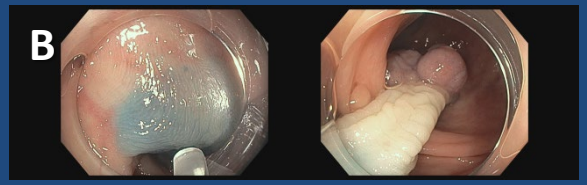
- Prospective study (n=181 pts)*
  - Various colorectal lesions
  - Technical success 89.5%
  - Overall R0 resection 76.9%
    - Higher with lesions ≤2 cm vs >2 cm (81.2% vs 58.1%, p=0.0038)
  - Adverse events 9.9%
    - 2.2% rate of emergency surgery for perforation and acute appendicitis

Schmidt A et al. Gut 2018;67:1280*

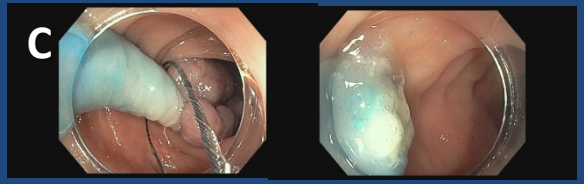
Case of the Large Pedunculated Polyp



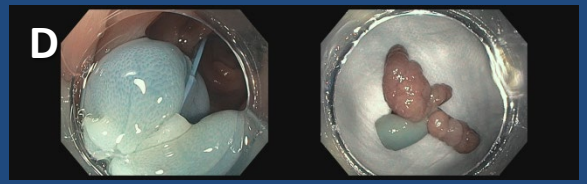
Pre-epi



Post-epi



Snare resection



Endoloop placement

- Epinephrine injection into head and stalk
  - Shrinks polyp
- Prefer to clip or endoloop stalk *after* resection
- Resect stalk about 1/3-1/2 from base
  - Allows re-grasping residual stump if immediate bleeding occurs

Interventional IBD: Indications and Outcomes

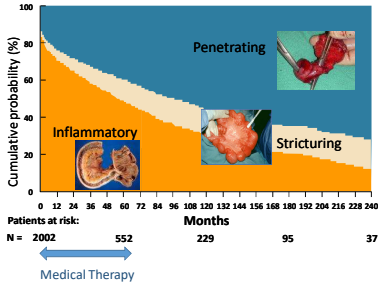
Bo Shen, MD
Professor of Medicine and Surgery
Director of Interventional IBD Center, Vice Chair for Innovation, Department of Medicine/
Department of Surgery
Columbia University- New York Presbyterian Hospital
Gastroenterology/Colorectal Surgery
New York, New York

Interventional IBD: Indications and Outcomes

Bo Shen, MD
Professor of Medicine (in Surgery)
Director of Interventional IBD Center
Vice Chair for Innovation in Medicine and Surgery

NewYork-Presbyterian
Columbia University Medical Center

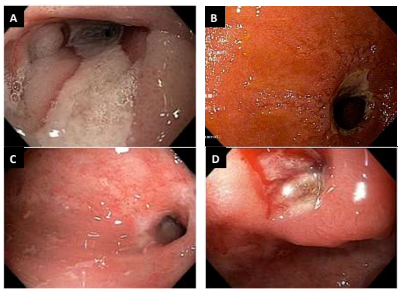
Disease Course of Crohn's Disease



NewYork-Presbyterian
Columbia University Medical Center

Cosnes J, et al, *Inflamm Bowel Dis* 2002;8:244-50

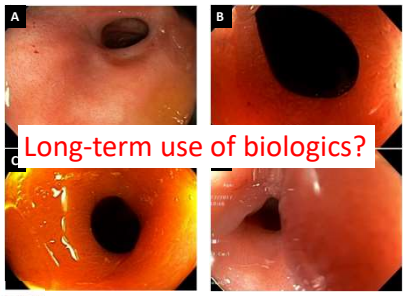
Evolution of Crohn's Strictures



NewYork-Presbyterian
Columbia University Medical Center

Shen B, Ed. *Atlas of Endoscopic Imaging* Elsevier 2019

Evolution of Crohn's Strictures



Long-term use of biologics?

NewYork-Presbyterian Columbia University Medical Center

Shen B, Ed. *Atlas of Endoscopic Imaging* Elsevier 2019

Where are they?

- Anti-fibrosis drugs
- Anti-muscle hypertrophy drugs
- Anti-neuronal hyperplasia drugs

NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC 2020*

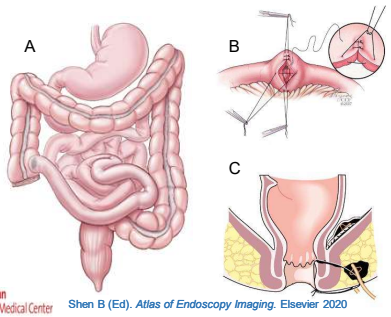
RCTs of Biologics in CD: Patients with **Stricture** Were Excluded

Authors	Agents	Exclusion Criteria
Menon P NEJM '04	Anti-IL12	"Bowel obstruction or high-grade stricture"
Sandborn WJ NEJM '05	Natalizumab ENACT1, 2	"A stricture with obstructive symptoms"
Sandborn WJ NEJM '12	Ustekinumab CERTIFI	"Clinically significant stricture"
Colombel J-F GE '07	Adalimumab CHARM	"Symptomatic obstructive disease"
Hanauer S GE '06	Adalimumab CLASSIC-I	"Symptomatic obstructive strictures"
Sandborn WJ Gut '07	Adalimumab CLASSIC-II	"Symptomatic obstructive strictures"
Sandborn WJ NEJM '07	Certolizumab PRECISE-I	"Obstructive symptoms with strictures"
Schreiber S NEJM '07	Certolizumab PRECISE-II	"Obstructive symptoms with strictures"
Colombel J-F NEJM '07	Infliximab+/-AZA SONIC	"A symptomatic stricture"
Sandborn WJ NEJM '13	Vedolizumab GEMINI 2	"Intestinal strictures"
Sandborn WJ NEJM '16	Ustekinumab CERTIFY	clinically significant stricture that may affect CDAI calculation
Feagan B NEJM '16	Ustekinumab UNITI	GI condition that may require surgery or affect CDAI calculation

NewYork-Presbyterian Columbia University Medical Center

Updated from Bhawaraj S, Fleshner P, Shen B. *Inflamm Bowel Dis* 2015;21:2194-213

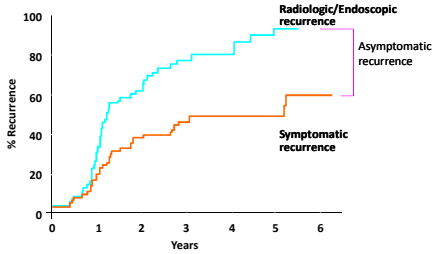
Surgical Treatment Modalities



NewYork-Presbyterian Columbia University Medical Center

Shen B (Ed). *Atlas of Endoscopy Imaging*. Elsevier 2020

Post-surgical Recurrence for CD



NewYork-Presbyterian Columbia University Medical Center

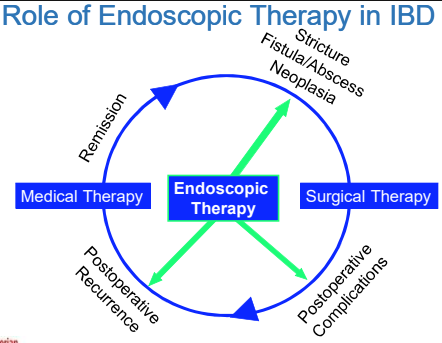
McLeod RS, et al. *Gastroenterology* 1997;113:1823-7

After Surgical Resection of Ileocolonic Stricturing CD

NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC 2020*

Role of Endoscopic Therapy in IBD



NewYork-Presbyterian Columbia University Medical Center

Shen B, et al. *Am J Gastroenterol* 2019;114;539-40

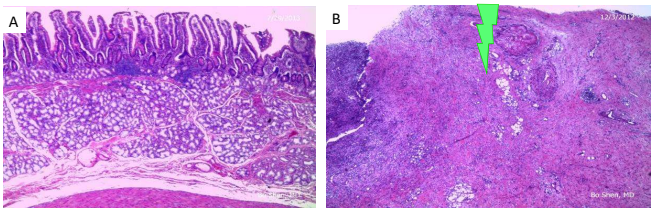
Challenges in Endoscopic Treatment for IBD

- Inflammation
- Absent layered structure of bowel
- Immunosuppressive medications
- Malnutrition
- Altered anatomy by disease or surgery
- Limited bowel reserve

NewYork-Presbyterian Columbia University Medical Center

Shen B. 2020

Absence of Layered Bowel Wall



Normal small bowel

Small bowel Crohn's

NewYork-Presbyterian Columbia University Medical Center

Shen B (Ed). *Interventional IBD* Elsevier 2018

INDICATIONS OF ENDOSCOPIC THERAPY

- Strictures
- Fistulae/Abscesses
- Surgical leaks
- Ablation of colitis-associated neoplasia

NewYork-Presbyterian
Columbia University Medical Center

INDICATIONS OF ENDOSCOPIC THERAPY

- Strictures
- Fistulas/Abscesses
- Surgical leaks
- Ablation of colitis-associated neoplasia

NewYork-Presbyterian
Columbia University Medical Center

Practical guidelines on endoscopic treatment for Crohn's disease strictures: a consensus statement from the Global Interventional Inflammatory Bowel Disease Group

Bo Shen, Gorsimran Kochhar, Udayakumar Navaneethan, Francis A Farraye, David A Schwartz, Marietta Iacucci, Charles N Bernstein, Gerald Dryden, Raymond Cross, David H Bruining, Taku Kobayashi, Martin Lukas, Amandeep Shergill, Martin Bortlik, Nan Lan, Milan Lukas, Shou-Jiang Tang, Paulo Gustavo Kotze, Ravi P Kiran, Parambir S Dulai, Sandra El-Hachem, Nayantara Coelho-Prabhu, Shyam Thakkar, Ren Mao, Guodong Chen, Shengyu Zhang, Begoña González Suárez, Yago Gonzalez Lama, Mark S Silverberg, William J Sandborn

Stricture formation is a common complication of Crohn's disease, resulting from the disease process, surgery, or drugs. Endoscopic balloon dilation has an important role in the management of strictures, with emerging techniques, such as endoscopic electroincision and stenting, showing promising results. The underlying disease process, altered bowel anatomy from disease or surgery, and concurrent use of immunosuppressive drugs can make endoscopic procedures more challenging. There is an urgent need for the standardisation of endoscopic procedures and peri-procedural management strategies. On the basis of an extensive literature review and the clinical experience of the consensus group, which consisted of representatives from the Interventional Inflammatory Bowel Disease Group, we propose detailed guidance on all aspects of the principles and techniques for endoscopic procedures in the treatment of inflammatory bowel disease-associated strictures.

Lancet Gastroenterol Hepatol 2020

Center for Interventional Inflammatory Bowel Disease, Colombia University Irving Medical Center, New York Presbyterian Hospital, NY, USA (Prof B Shen MD); Division of Gastroenterology, Hepatology and Nutrition, Allegheny Health Network, Pittsburgh, PA, USA (G Kochhar MD, S El-Hachem MD, Prof S Thakkar

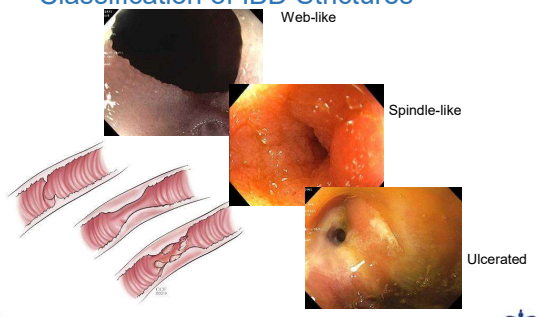
Introduction

of complications, and the role of medical therapy for the

NewYork-Presbyterian
Columbia University Medical Center

Shen B, et al. Gi-IBD group. *Lancet Gastroenterol Hepatol* 2020 Jan 16 [E pub]

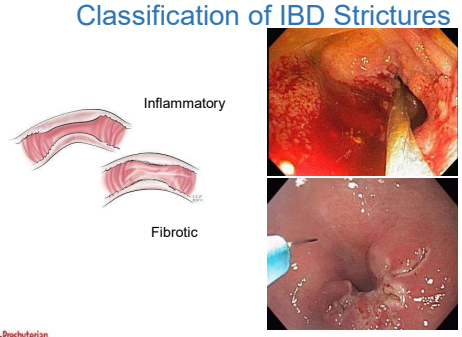
Classification of IBD Strictures



NewYork-Presbyterian
Columbia University Medical Center

Paine E, Shen B. *Gastrointest Endosc* 2013;78:818-35

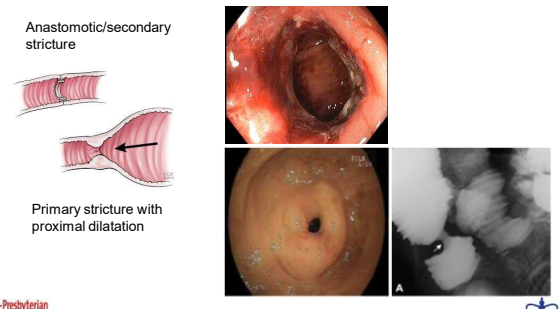
Classification of IBD Strictures



NewYork-Presbyterian
Columbia University Medical Center

Paine E, Shen B. *Gastrointest Endosc* 2013;78:818-35

Classification of IBD Strictures



NewYork-Presbyterian
Columbia University Medical Center

Paine E, Shen B. *Gastrointest Endosc* 2013;78:818-35

INDICATIONS OF ENDOSCOPIC THERAPY

- Strictures
  - Balloon dilation
  - Stricturotomy/Strictureplasty
  - Stenting
- Fistulae/Abscesses
- Surgical leaks
- Ablation of colitis-associated neoplasia

NewYork-Presbyterian
Columbia University Medical Center

Endoscopic Treatment Modalities

NewYork-Presbyterian
Columbia University Medical Center

Shen B (Ed). *Atlas of Endoscopy Imaging*. Elsevier 2020

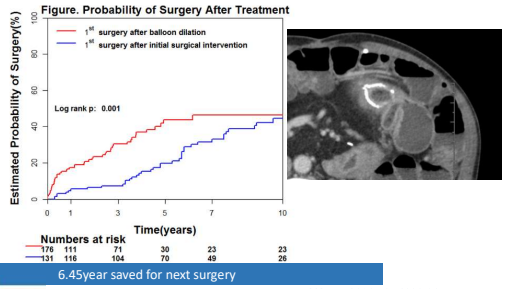
Balloon Dilation of CD Stricture

Authors	N	Anast. Strict.	Max balloon	Steroid inject.	Success	Clinical Efficacy	Major complication
Dear 2001	22	91%	18	n	100%	73%	0
Sabate 2003	38	65%	25	n	84%	53%	3%
Ferlitsch 2006	46	62%	20	y	85%	57%	4%
Brooker 2003	14	79%	20	y	100%	79%	0
Thomas-Gibson 2003	59	73%	18	n	73%	41%	3%
Ramober 1995	13	71%	18	y	100%	100%	0
Couckuyt 1995	55	67%	20	n	85%	60%	11%
Morini 2003	43	67%	18	n	79%	42%	0
Blomberg 1991	27	100%	25	n	100%	67%	0
Singh 2005	17	30%	20	y	100%	76%	18%
Ajlouni 2007	37	37%	20	n	100%	95%	3%
Stienecker 2009	25	48%	18	n	96%	84%	3%
Thienpont 2009	138	84%	18	n	97%	76%	5%
Atreja 2013	128	63%	20	y/n	83%	67%	3.1%
Krause 2014	20	25%	20	y/n	100%	Improved HBI	NA

NewYork-Presbyterian
Columbia University Medical Center

Updated from Bharadwaj S, Fleshner P, Shen B. *Inflamm Bowel Dis* 2015;21:2194-213

Endoscopic Dilation vs. Surgical Resection in Ileocolonic *Anastomotic* CD Stricture

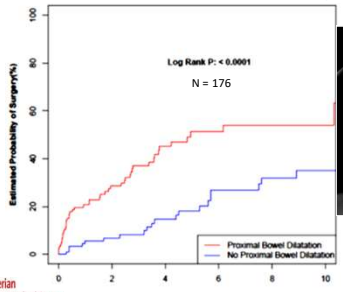


6.45year saved for next surgery

NewYork-Presbyterian
Columbia University Medical Center

Lian L, et al. *Clin Gastroenterol Hepatol* 2017;15:1226-31

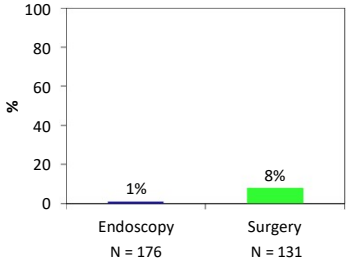
Impact of the Pre-stenotic Luminal Dilation on the Outcome of Endoscopy Therapy



NewYork-Presbyterian
Columbia University Medical Center

Lian L, et al. *Clin Gastroenterol Hepatol* 2017;15:1226-31

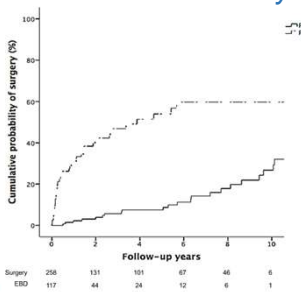
Complications (per procedure) Endoscopic Balloon Dilation vs. Surgery



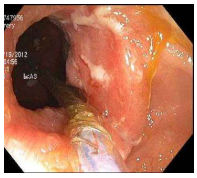
NewYork-Presbyterian
Columbia University Medical Center

Lian L, et al. *Clin Gastroenterol Hepatol* 2017;15:1226-31

Surgery-free Survival after Balloon Dilation vs Resection for *Primary* CD Strictures



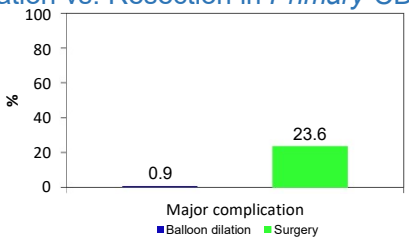
P < 0.001



NewYork-Presbyterian Columbia University Medical Center

Lan N, et al. *Clin Gastroenterol Hepatol* 2018;24:697-707

Complications (per procedure): Balloon Dilation vs. Resection in *Primary* CD Stricture



214 sessions of balloon dilation vs 258 surgical resection

NewYork-Presbyterian Columbia University Medical Center

Lan N, et al. *Clin Gastroenterol Hepatol* 2018;24:697-707

The Knife

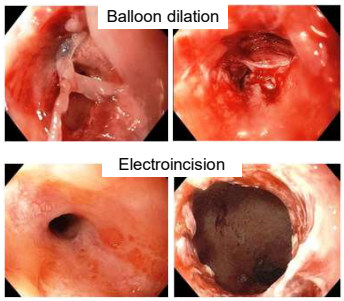
$120

$580

NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC* 2020

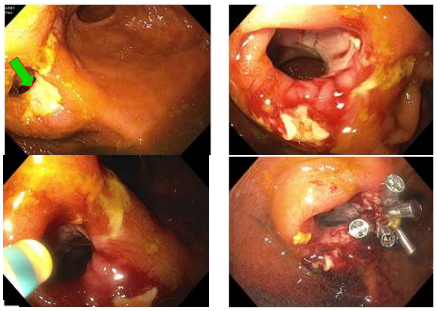
Balloon Dilation vs. Electroincision



NewYork-Presbyterian Columbia University Medical Center

Chen M, Shen B. *Inflamm Bowel Dis* 2015;21:2222-40

Ulcerated Stricture: Stricturotomy, But Not Balloon Dilation



NewYork-Presbyterian Columbia University Medical Center

Shen B, et al. GI-IBD group. *Gastrointest Endosc* 2019;89:215-37

Terminology

- Electroincision = action of cut
- Stricturotomy = cut of stricture
- Strictureplasty = stricturotomy + spacers

NewYork-Presbyterian Columbia University Medical Center

Shen B, et al. Global Interventional IBD Group. *Lancet Gastro Hepatol* 2020 Jan 16 [Epub]

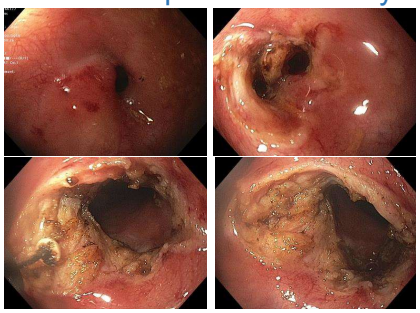
Consensus Statement from Global Interventional IBD

	Level of Evidence	Grade of Rec
3. OTHER ENDOSCOPIC TREATMENT MODALITIES		
3-1: Terminology for endoscopic electroincision, endoscopic stricturotomy, and endoscopic stricturoplasty with clip placement needs standardization	5	D
3-2: Endoscopic electroincision may be performed in patients with EBD-refractory strictures in centers with required technical capabilities	2b	C
3-3: Electroincision may be particularly useful for anorectal strictures in IBD	5	D
3-4: Electroincision may be conducted with various knives with ERCP Endocut	5	D
3-5: Stent may be used for refractory strictures after failed EBD and endoscopic electroincision	4	C
4. POST-PROCEDURE CONSIDERATION		
4-1: Patients with a high likelihood of adverse events should be further evaluated and closely observed	5	D
4-2: Intra- and post- procedure antibiotics are recommended in patients suspected of or at risk for procedure-associated perforation	5	D
4-3: Follow-up endoscopy is suggested to assess the long-term response to the therapy, and to repeat treatment, if needed, within a year	5	D

NewYork-Presbyterian Columbia University Medical Center

Shen B, et al. Global Interventional IBD Group. *Lancet Gastro Hepatol* 2020 Jan 16 [Epub]

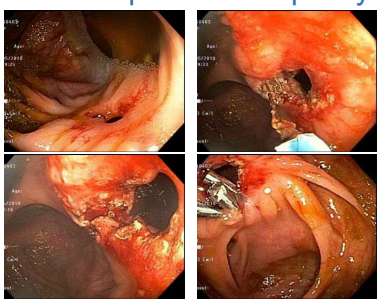
Endoscopic Stricturotomy



NewYork-Presbyterian Columbia University Medical Center

Shen B, et al. Global Interventional IBD Group. *Lancet Gastro Hepatol* 2020 Jan 16 [Epub]

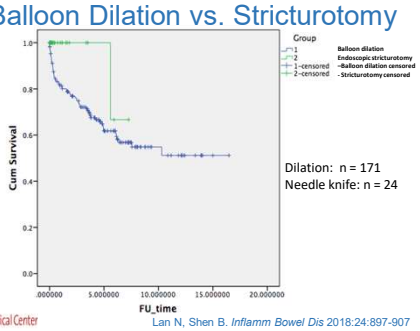
Endoscopic Strictureplasty



NewYork-Presbyterian Columbia University Medical Center

Shen B, et al. Global Interventional IBD Group. *Lancet Gastro Hepatol* 2020 Jan 16 [Epub]

Surgery-free Survival of CD *Anastomotic* Stricture: Balloon Dilation vs. Stricturotomy

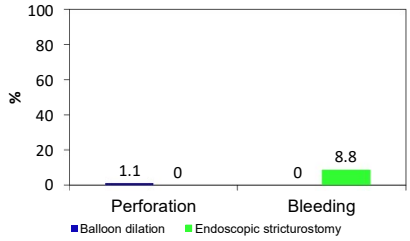


Dilation: n = 171
Needle knife: n = 24

NewYork-Presbyterian
Columbia University Medical Center

Lan N, Shen B. *Inflamm Bowel Dis* 2018:24:897-907

Perforation or Bleeding (per procedure): Balloon Dilation and Electroincision

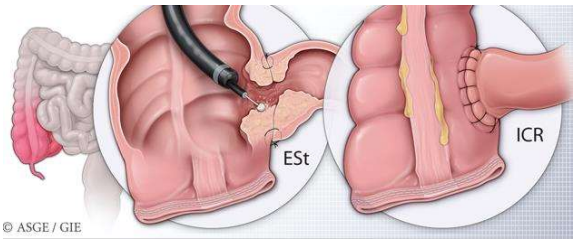


45 sessions of stricturotomy 478 sessions of balloon dilation

NewYork-Presbyterian
Columbia University Medical Center

Lan N, Shen B. *Inflamm Bowel Dis* 2018:24:897-907

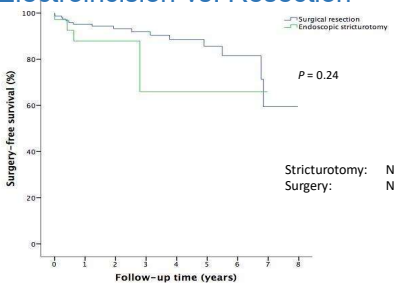
Endoscopic Electroincision vs. Surgery



NewYork-Presbyterian
Columbia University Medical Center

Lan N, et al, *Gastrointest Endosc* 2019;90:259-68

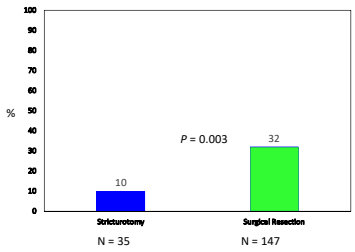
Surgery-free Survival of CD *Anastomotic* Stricture: Electroincision vs. Resection



NewYork-Presbyterian Columbia University Medical Center

Lan N, et al, *Gastrointest Endosc* 2019;90:259-68

Complications (per procedure) in CD Anastomotic Stricture: Electroincision vs. Surgery



Post-procedure	Electroincision N=35	Surgery N=147	P
Clavien-Dindo classification	5/49 (10.2%)	46/147(31.3%)	0.003
I	0 (0.0%)	9 (6.1%)	0.62
II	4 (8.2%)	31 (21.1%)	0.04
III	1 (2.0%)	7 (4.8%)	0.40

Perforation=1; Bleeding=4

NewYork-Presbyterian Columbia University Medical Center

Lan N, et al, *Gastrointest Endosc* 2019;90:259-68

Endoscopic Therapy vs. Surgery in Stricturing CD

	Endoscopy		Surgery	
	Balloon	Stricturotomy Stricturoplasty	Resection & Anastomosis	Stricturoplasty
Immediate efficacy	••	••	•••	•••
Short-term efficacy (days)	••	•••	•••	•••
Long-term efficacy	•	••	••	••
Bleeding	2-3%	6-10%	And others: 20-40%	And others: 20-30%
Perforation	1-5%	1%		
Specific indications	Angulated strictures; Inflammatory strictures	Fibrotic strictures; refractory strictures; Distal bowel strictures	Long, refractory, complex strictures	Small bowel disease

NewYork-Presbyterian Columbia University Medical Center

Shen B. *Curr Opinion Gastroenterol* 2020;36:33-40

INDICATIONS OF ENDOSCOPIC THERAPY

- Strictures
- Fistulae/Abscesses
- Surgical leaks
- Ablation of colitis-associated neoplasia

NewYork-Presbyterian
Columbia University Medical Center

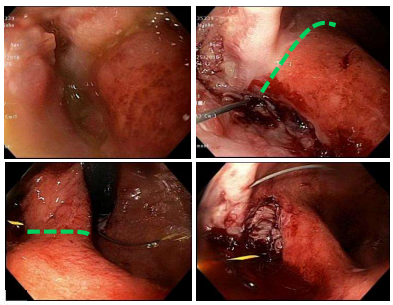
Principles of Endoscopic Therapy for Fistula/Abscess

Fistulotomy
↓
Drainage
↓
Clipping

NewYork-Presbyterian
Columbia University Medical Center

Shen B. *CUMC 2020*

Endoscopic Fistulotomy



NewYork-Presbyterian
Columbia University Medical Center

Shen B (Ed) *Interventional IBD* Elsevier 2018

Endoscopic Fistulotomy

NewYork-Presbyterian Columbia University Medical Center

Kochhar G, Shen B. *Gastrointest Endosc* 2018;88:87-94

Location of Fistula (N = 29)

Location of fistula	Number (%)
Perianal fistula	6 (20.6%)
Fistula at the tip of "J" to anastomosis	7 (24.1%)
Pouch-pouch body or anastomosis fistula along suture line	14 (48.2%)
Neo-terminal ileum-to-proximal pouch body fistula	1 (3.4%)
Ileo-colonic fistula from the anastomosis to the colon	1 (3.4%)

NewYork-Presbyterian Columbia University Medical Center

Kochhar G, Shen B. *Gastrointest Endosc* 2018;88:87-94

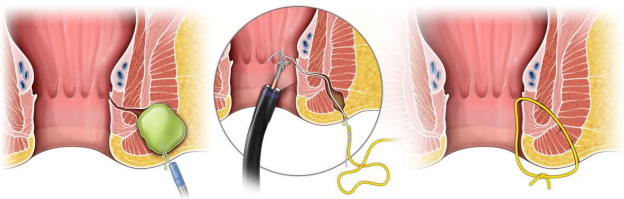
Outcome of Endoscopic Fistulotomy

Outcomes	N (%)
Repeat fistulotomy	
One additional session	14 (48.2 %)
Two additional sessions	5 (17.2 %)
Confirmation of healing	
Endoscopy	25 (86.2 %)
Imaging	3 (10.3 %)
Symptom response	21 (72.4 %)
Complications	
Bleeding	1 (3.4 %)
Blood transfusions	1 (3.4 %)
Perforation	0 (0.0%)
Hospitalization	1 (3.4 %)

NewYork-Presbyterian Columbia University Medical Center

Kochhar G, Shen B. *Gastrointest Endosc* 2018;88:87-94

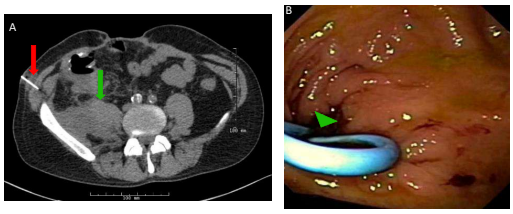
Seton Placement



NewYork-Presbyterian Columbia University Medical Center

Kochhar G, Shen B. *Gastrointest Endosc* 2018;88:87-94

Abscess: Pigtail Stent



NewYork-Presbyterian Columbia University Medical Center

Shen B. *Gastrointest Endosc* 2017;85:1133-43

Endoscopic Treatment for Fistula/Abscess

Abdominal Imaging/Endoscopy

- **w/ Stricture** → Balloon/ Endoscopic Stricturotomy
- **Fistula**
  - Anastomotic, Distal bowel, Short/shallow → Fistulotomy, Clipping, Injection (stem cells)?
  - Disease-related, Bladder, Vagina → Surgery
- **Abscess** → I & D, Pigtail, Seton

NewYork-Presbyterian Columbia University Medical Center

Shen B (Ed) *Interventional IBD* Elsevier 2018

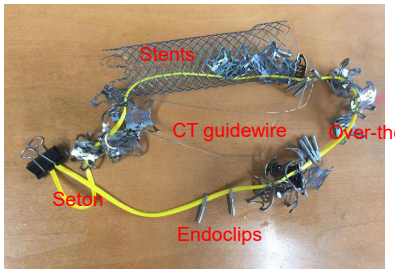
INDICATIONS OF ENDOSCOPIC THERAPY

- Strictures
- Fistulae/Abscesses
- Surgical leaks
- Ablation of colitis-associated neoplasia

NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC 2020*

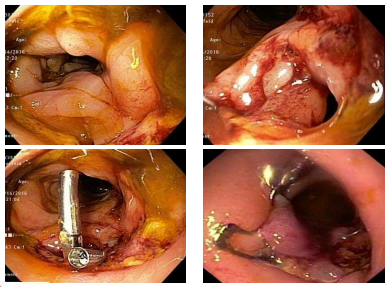
Corrective Endoscopy in Colorectal Surgery



NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC 2020*

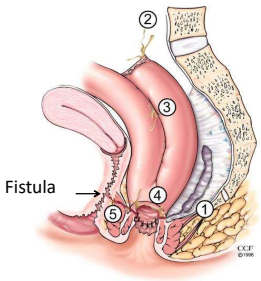
Colorectal Anastomosis Leak Over-the-Scope Clip



NewYork-Presbyterian Columbia University Medical Center

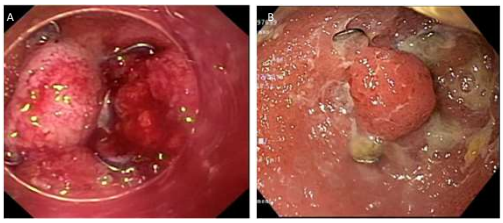
Shen B. *Gastrointest Endosc* 2017;85:1133-43

Surgical Leaks in the Ileal Pouch



Shen B. *CUMC 2020*

Over-the-Scope Clip: Tip of the "J" Leak in Pouch



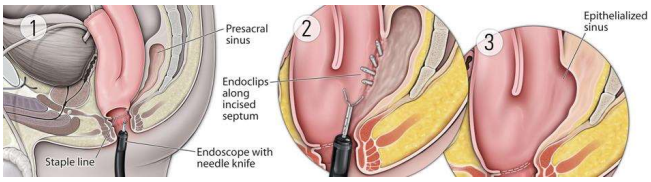
Shen B. *Gastrointest Endosc* 2017;85:1133-43

Endoscopic Clipping of the Tip of the "J" Leak

Characteristic and outcome		N (%)
Presenting symptoms	Abdominal pain Fever Diarrhea	5 (41.6%) 1 (8.3%) 11 (91.6%)
Successful closure of leak during endoscopy		12 (100%)
Immediate post-procedure complications		0
Post procedure- complications in the 1st 30 days		1 (8.3%)
Additional endoscopic therapy	Repeat OTSC	5 (41.6%)
Need for surgery		4 (33.3%)
Follow up time		1.2 ± 0.6 years

Kochhar G, Shen B. *Endosc Int Open J* 2017;5:64-6

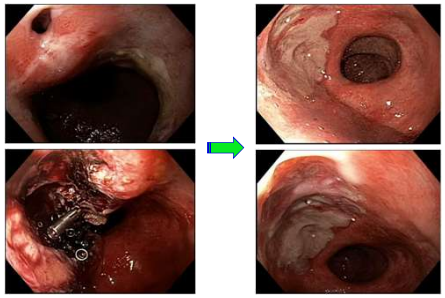
Endoscopic Sinusotomy: Presacral Sinus



NewYork-Presbyterian Columbia University Medical Center

Lan N, Hull TL, Shen B. *Gastrointest Endosc* 2019;89:144-56

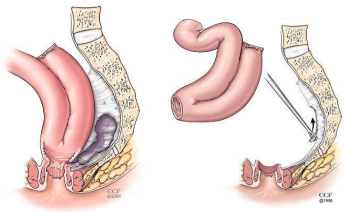
Endoscopic Sinusotomy



NewYork-Presbyterian Columbia University Medical Center

Lan N, Hull TL, Shen B. *Gastrointest Endosc* 2019;89:144-56

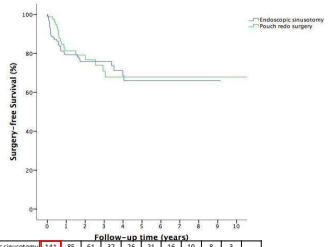
Presacral Sinus: Surgical Redo Pouch



NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC 2020*

Surgery-free Survival: Endoscopic Sinusotomy vs. Redo Surgery

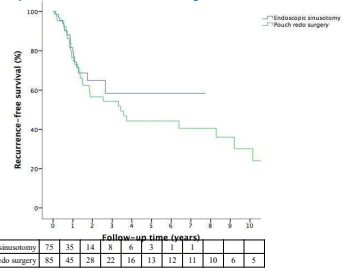


Endoscopic sinusotomy	141	85	61	37	26	21	16	10	8	3
Pouch redo surgery	85	46	33	23	19	15	13	12	11	6	5

NewYork-Presbyterian
Columbia University Medical Center

Lan N, Hull TL, Shen B. *Gastrointest Endosc* 2019;89:144-56

Recurrence-free Survival: Endoscopic Sinusotomy vs. Redo Surgery

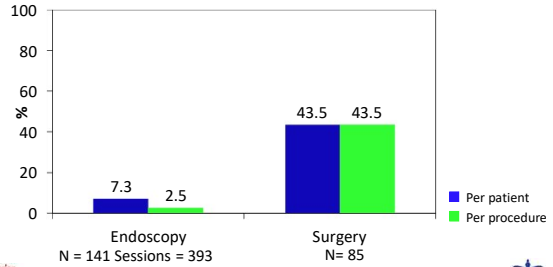


Endoscopic sinusotomy	75	35	14	8	6	3	1	1		
Pouch redo surgery	85	45	28	22	16	13	12	11	10	6	5

NewYork-Presbyterian
Columbia University Medical Center

Lan N, Hull TL, Shen B. *Gastrointest Endosc* 2019;89:144-56

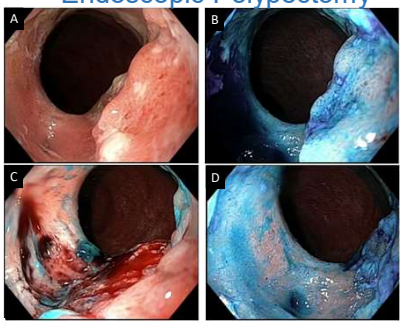
Major Complications: Endoscopic vs. Surgical Therapy



NewYork-Presbyterian
Columbia University Medical Center

Lan N, Hull TL, Shen B. *Gastrointest Endosc* 2019;89:144-56

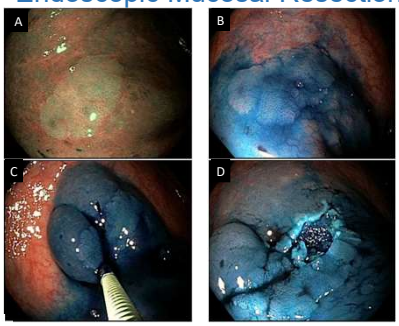
Endoscopic Polypectomy



NewYork-Presbyterian
Columbia University Medical Center

Shen B. *CUMC 2020*

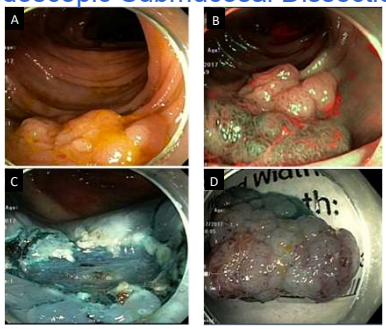
Endoscopic Mucosal Resection



NewYork-Presbyterian
Columbia University Medical Center

Shen B. *CUMC 2020*

Endoscopic Submucosal Dissection



NewYork-Presbyterian
Columbia University Medical Center

Courtesy of Emre Gorgun, MD. Cleveland Clinic

Endoscopic Management of IBD

- Goals:
  - Deliver therapy: more definitive than medical and less invasive than surgery
  - Defer or avoid surgery
- Indications and candidates
- Endoscopic balloon dilation for primary CD stricture?
- Refractory anastomotic stricture: concurrent prolapse
- Further perfecting endoscopic stricturotomy and strictureplasty
- Fistula therapy: fistulotomy > drainage > clipping
- Sinusotomy
  - Effective and safe in presacral sinus
- Role of endoscopic ablation in colitis-associated neoplasia?

NewYork-Presbyterian Columbia University Medical Center

Shen B. *CUMC 2020*

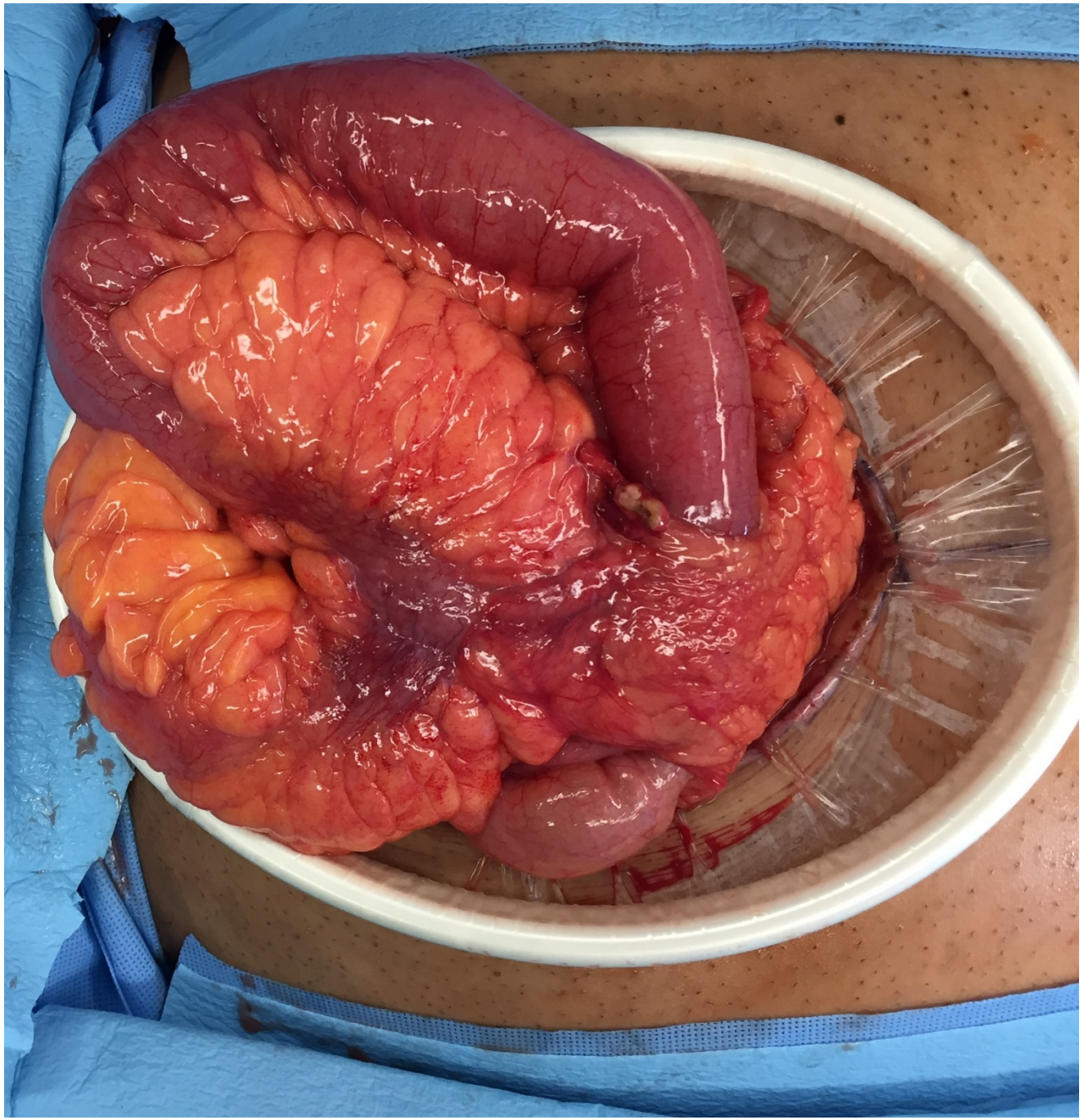
Thank You!

NewYork-Presbyterian Columbia University Medical Center

Timing of Surgical Intervention in Inflammatory Bowel Disease

Jon Vogel, MD
Professor of Surgery
GITES Division,
Colorectal Surgery Section
University of Colorado
Aurora, Colorado

What's New in IBD Surgery



University of Colorado
Anschutz Medical Campus

uchealth

Jon Vogel, MD

10/22/2019

Disclosure

Re: CLINICAL RESEARCH NETWORK AWARDS - SRN: "The Short versus Long interval to loop Ileostomy Reversal after ileal Pouch Surgery in patients with ulcerative colitis trial (SLIRPS Trial)" - Ref. #585850

Objectives: To discuss…

- Crohn's Disease of the small bowel with stricture or abscess.
- The impact of Crohn's medical therapy on surgical procedures.
- Perianal Crohn's Disease.
- Severe ulcerative colitis.
- Colitis with dysplasia.

University of Colorado
Anschutz Medical Campus

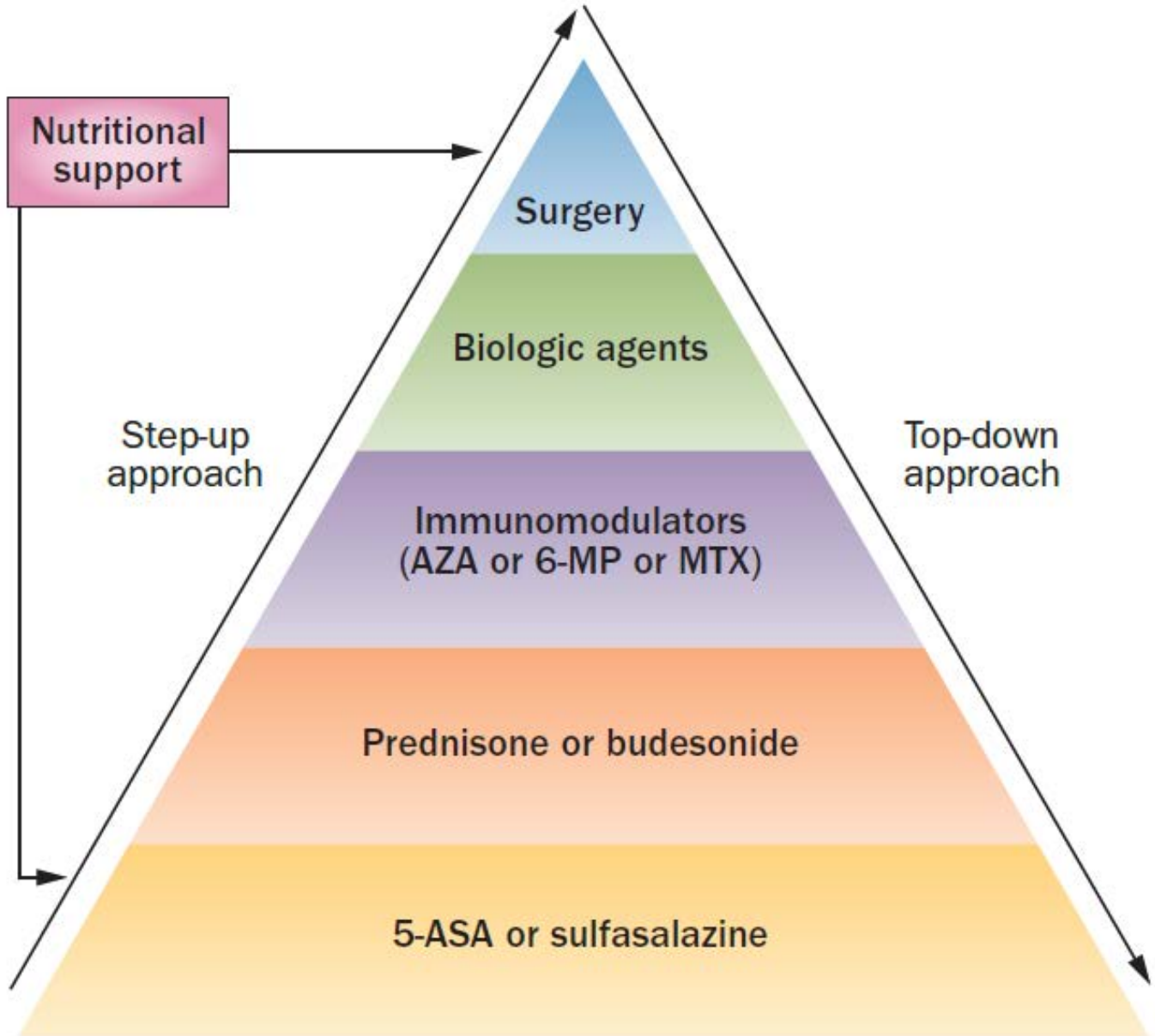
- Symptomatic Terminal ileal Crohn's disease
- Biologic therapy naïve
- Anti-TNF?
- Surgery?

University of Colorado
Anschutz Medical Campus

Ileal Crohn's Disease: Inflximab or Resection?

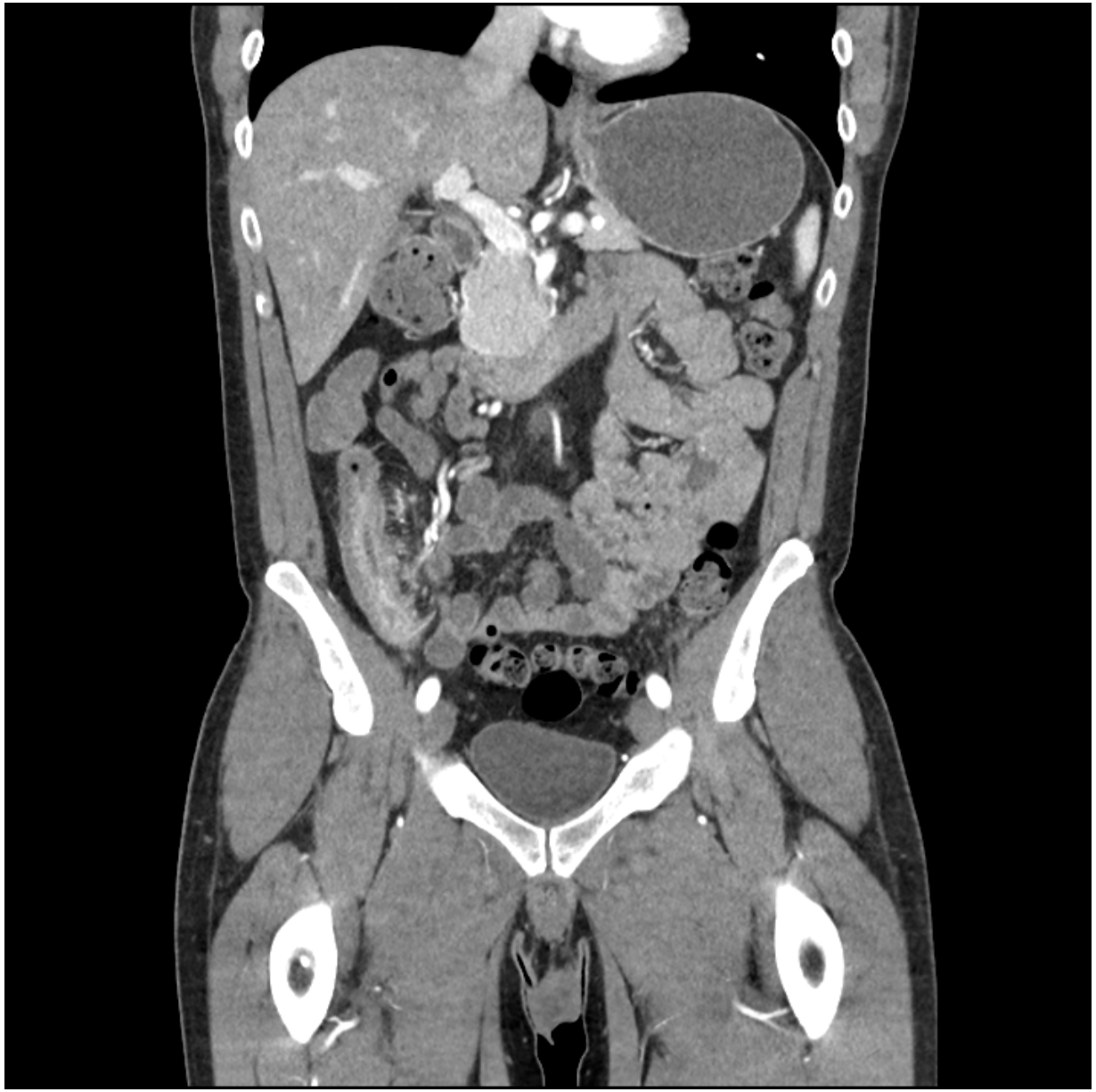
- Randomized Prospective Multicenter Trial: INFLX or ileocolic resection (ICR)
- Eligibility: failure of treatment with steroids, Imuran or MTX, biologic naive
- Quality of life/health: about the same
- Unscheduled hospital admission: ICR 18%, INFLX 21%
- At 4 (2-6) year follow-up, 26% ICR group started on anti-TNF and 37% IFLX group underwent resection
- ICR is a reasonable alternative to IFLX for TI CD uncontrolled with first-line medical therapy

CY. Ponsioen, Lancet Gast Hepatol 2017

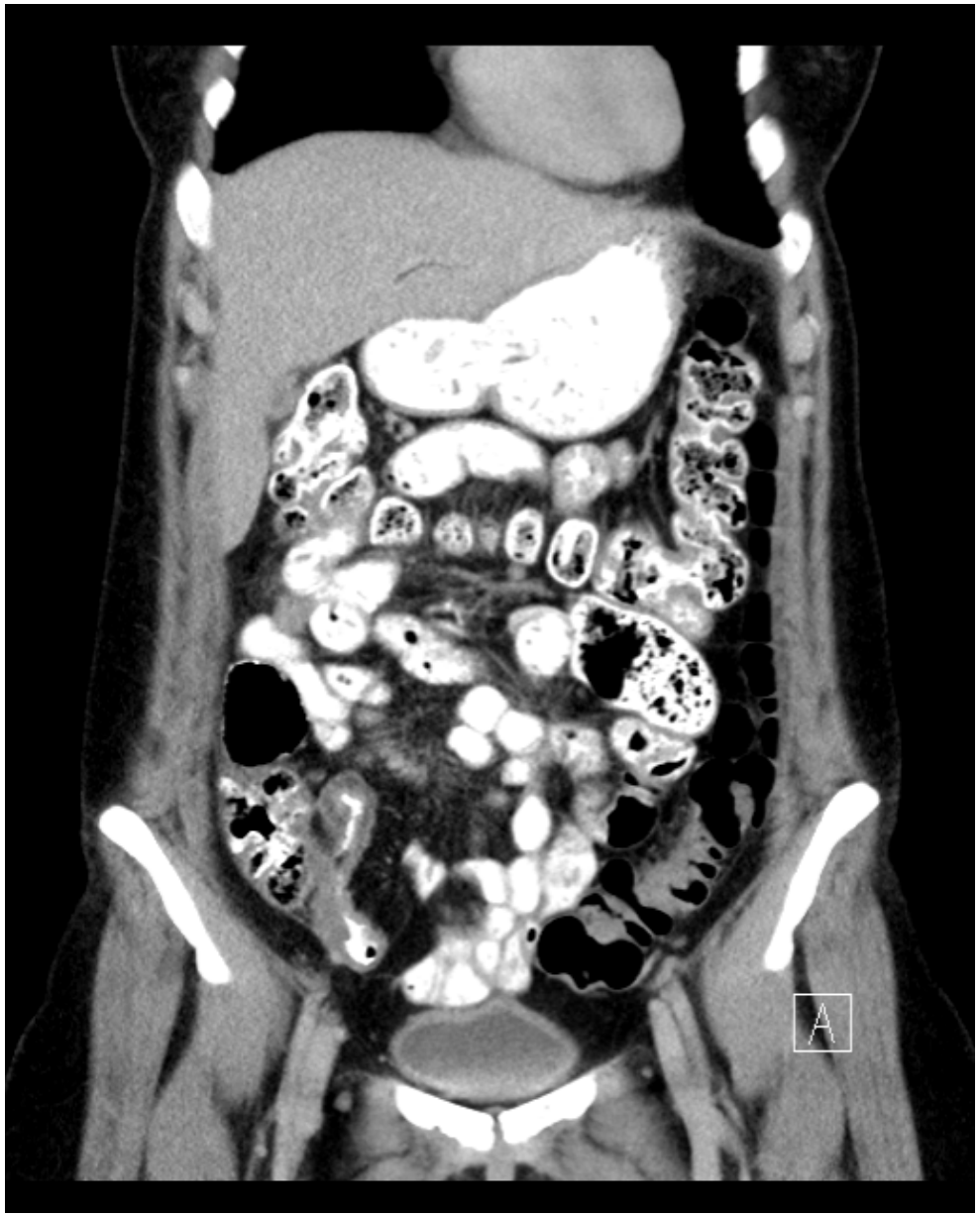

Nutritional support
Surgery
Biologic agents
Step-up approach
Top-down approach
Immunomodulators (AZA or 6-MP or MTX)
Prednisone or budesonide
5-ASA or sulfasalazine

Crohn's Disease Small Bowel Stricture

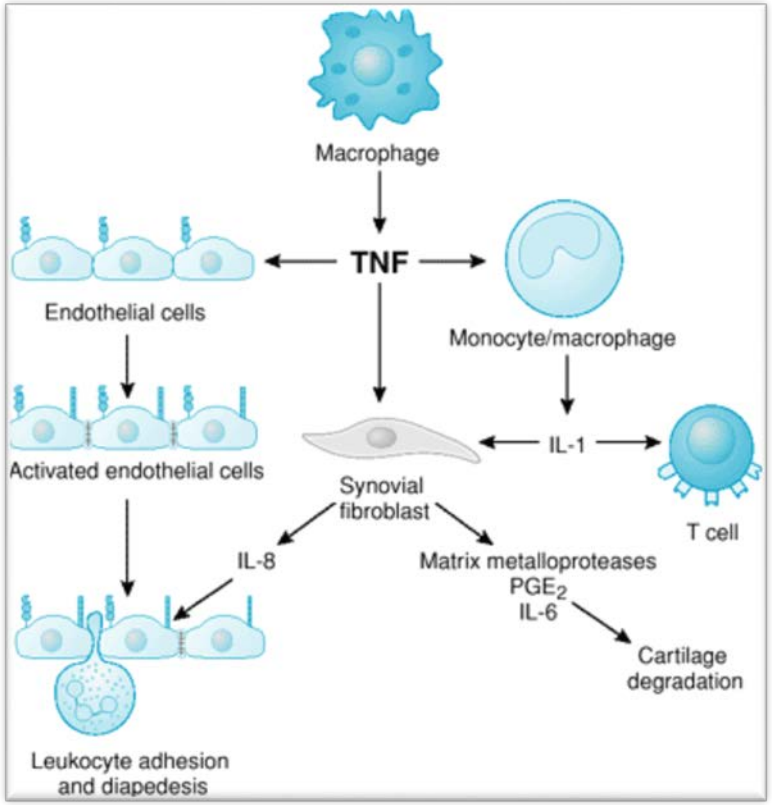
- Is it inflammatory from fibrotic or both?
- Medical therapy is first line for inflammatory strictures
- Endoscopic dilation
  - Strictures < 5 cm without associated abscess/inflamm mass or fistula
  - Primary or anastomotic strictures
  - Repeat dilation often required
  - 1/3 require surgery at 5 years
- Strictureplasty, or Resection for fibrotic strictures not amenable to dilation



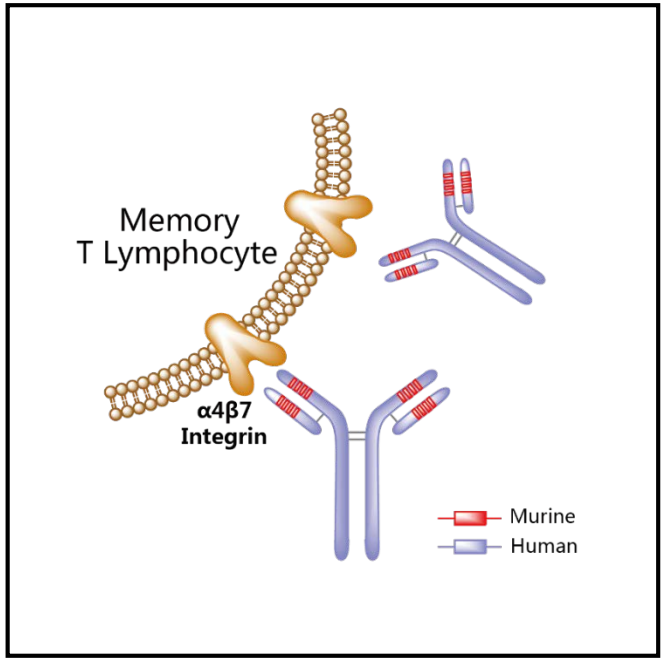
CTE



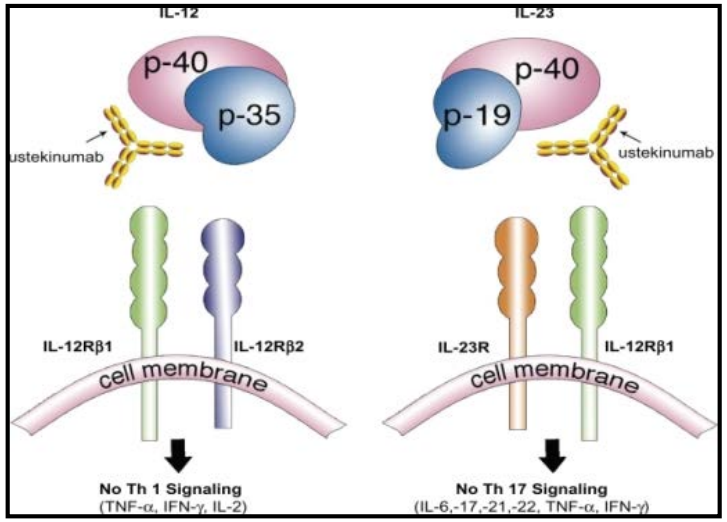
CT



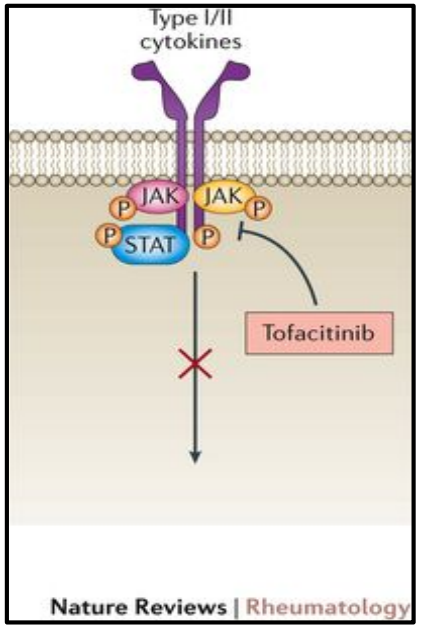
Infliximab, Adalimumab, etc.



Vedolizumab



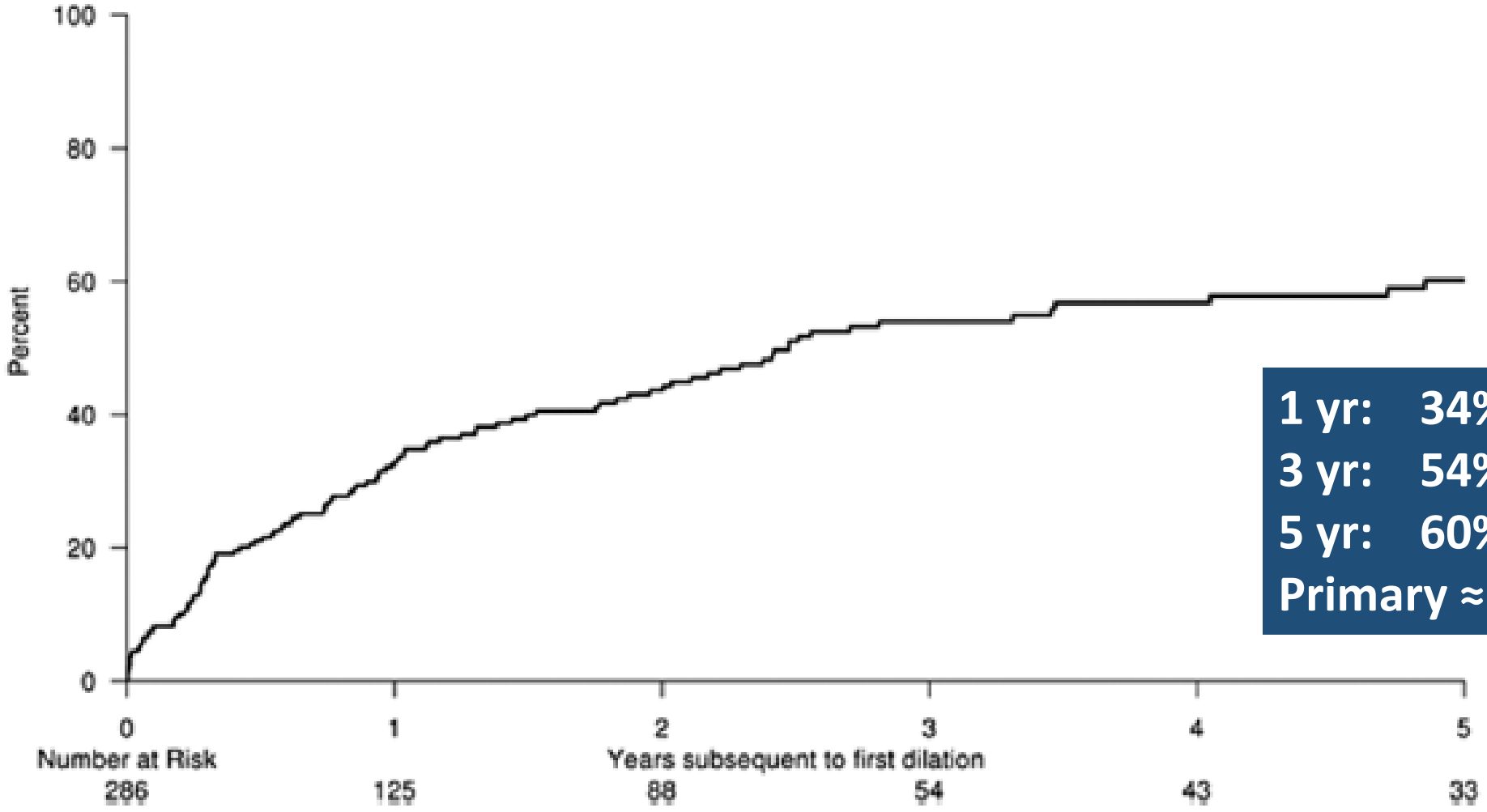
Ustekinumab



Tofacitinib

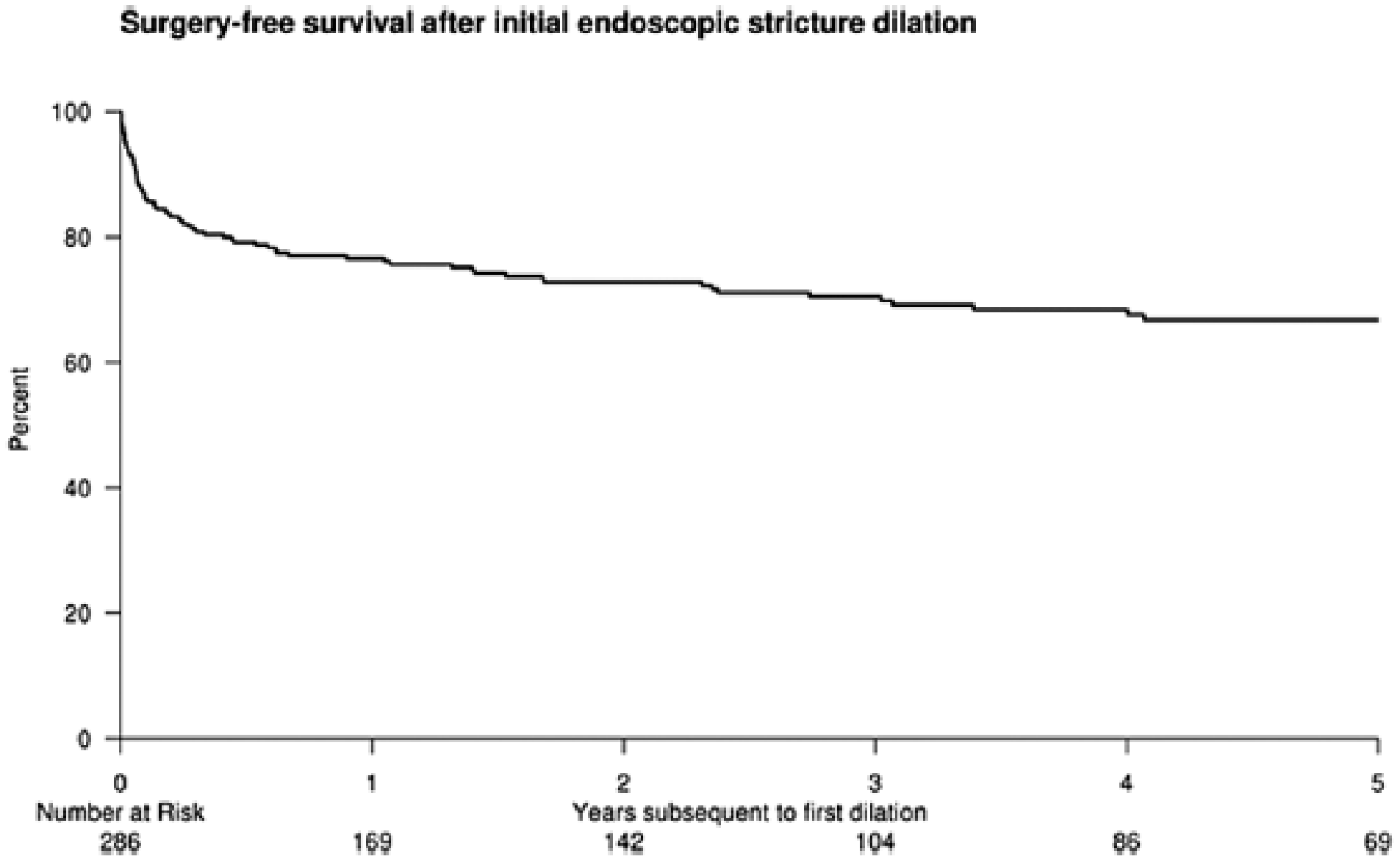
Figure 2 (A) Ileal stricture in patient with Crohn's disease (B) Balloon dilatation (C) Post-dilatation the stricture has opened up

Cumulative probability of intervention after initial endoscopic stricture dilation (repeat endoscopic)



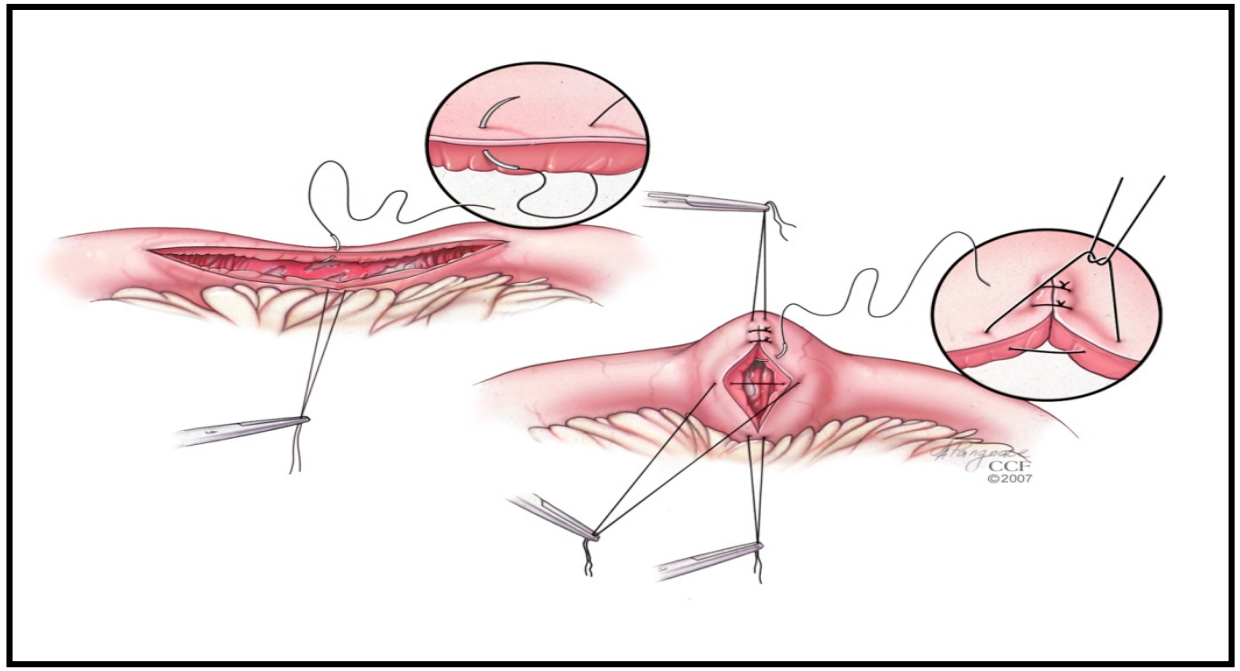
1 yr: 34%
3 yr: 54%
5 yr: 60%
Primary ≈ Anastomotic

R. Shivashankar 2018, IBD

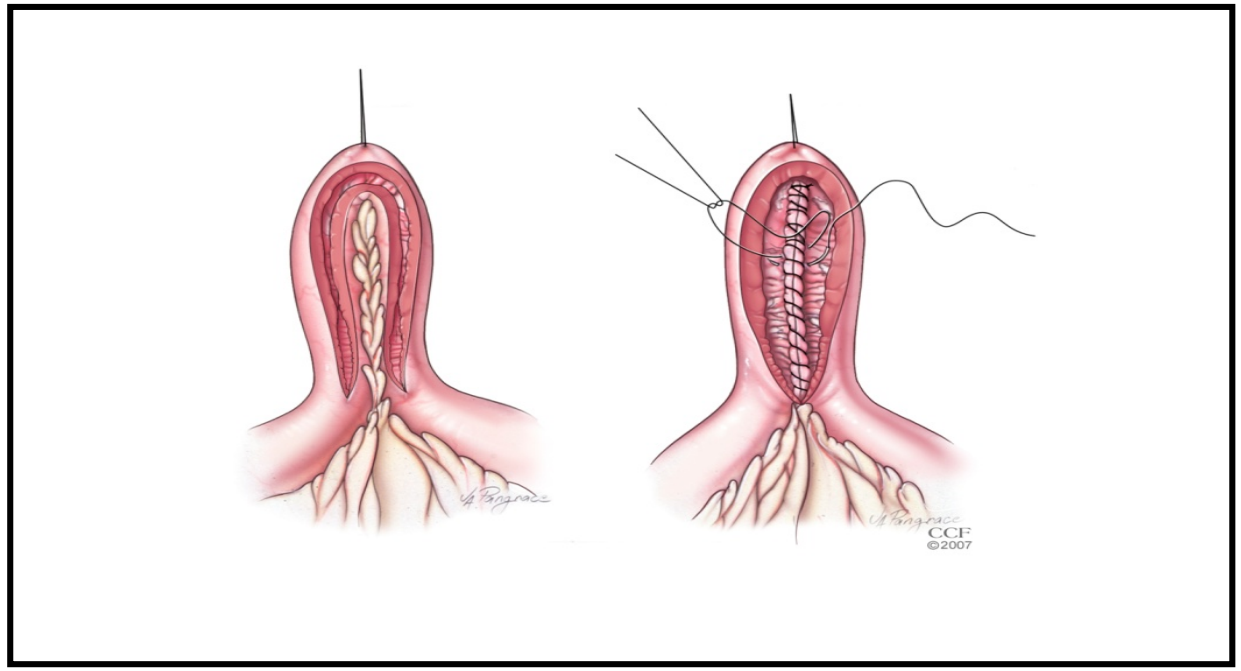


R. Shivashankar 2018, IBD

Common Strictureplasties



Heinecke-Mikulicz ≤ 7cm

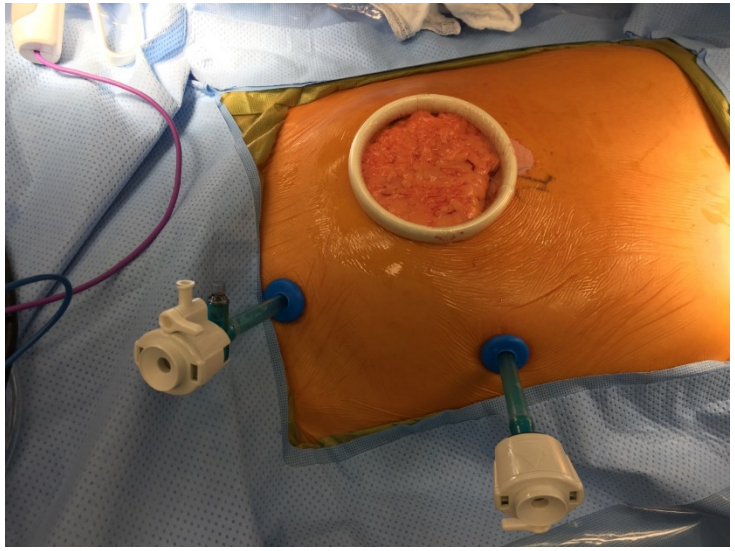


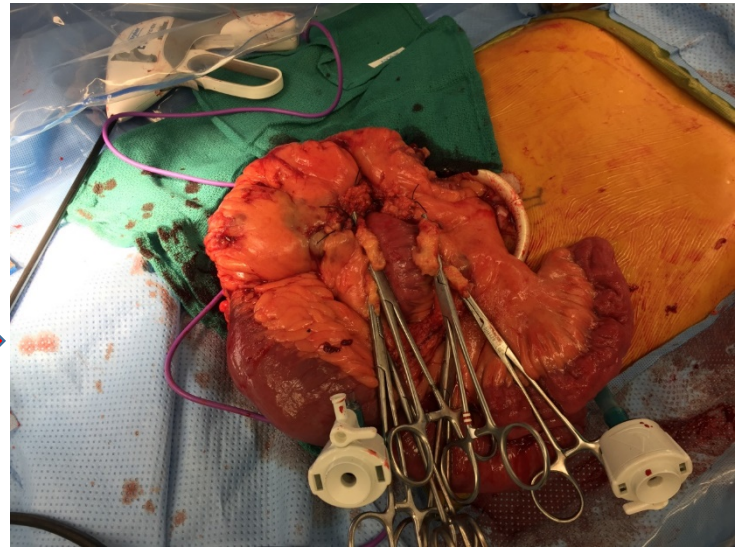
Finney 7-15 cm

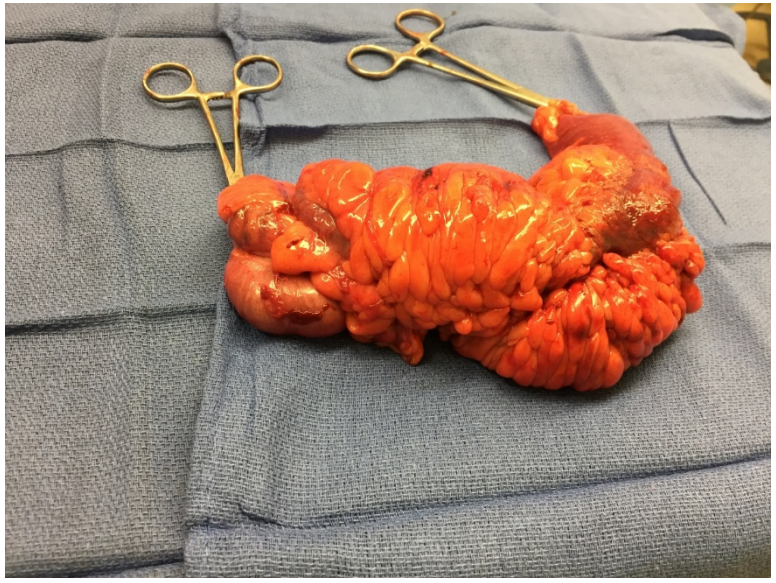
uchealth

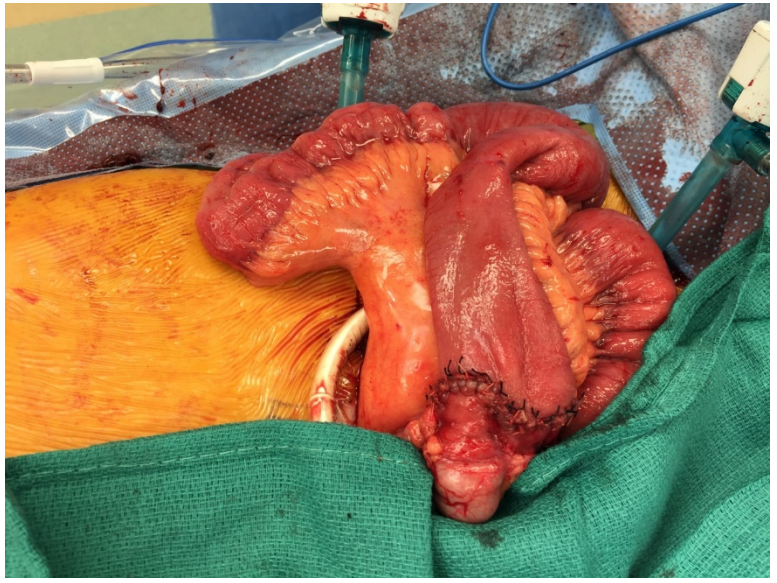
Crohn's Disease: Strictureplasty Results

Study	Dietz 2001	Michelassi 2004
Patients	314	30
Strictureplasty Type	HM 989, F 129	IP 31, HM 22, F 3
Concomitant Resection	205 (66)	25 (83)
Residual Small Bowel	275cm (40-520)	275cm (107-561)
Complications	18%	10%
Operative Recurrence	37% at 8 years	23% at 4 years

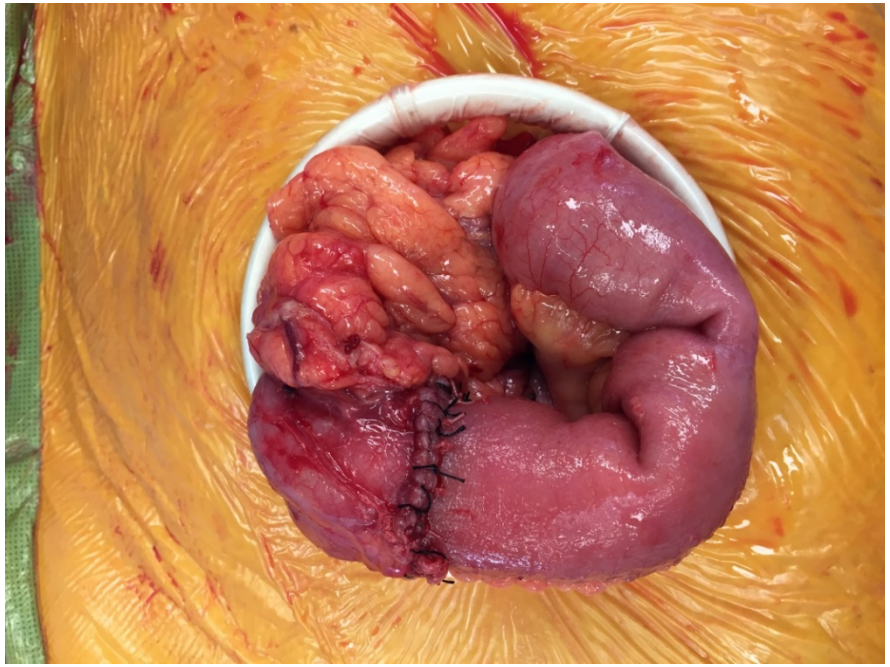


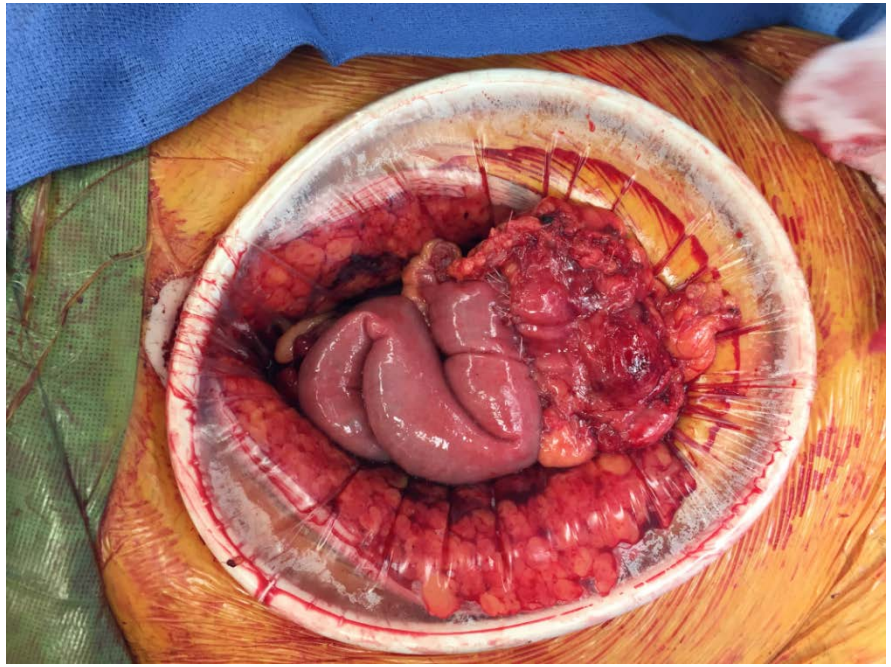






Discussion: Laparoscopy, mesentery division, anastomosis, diversion

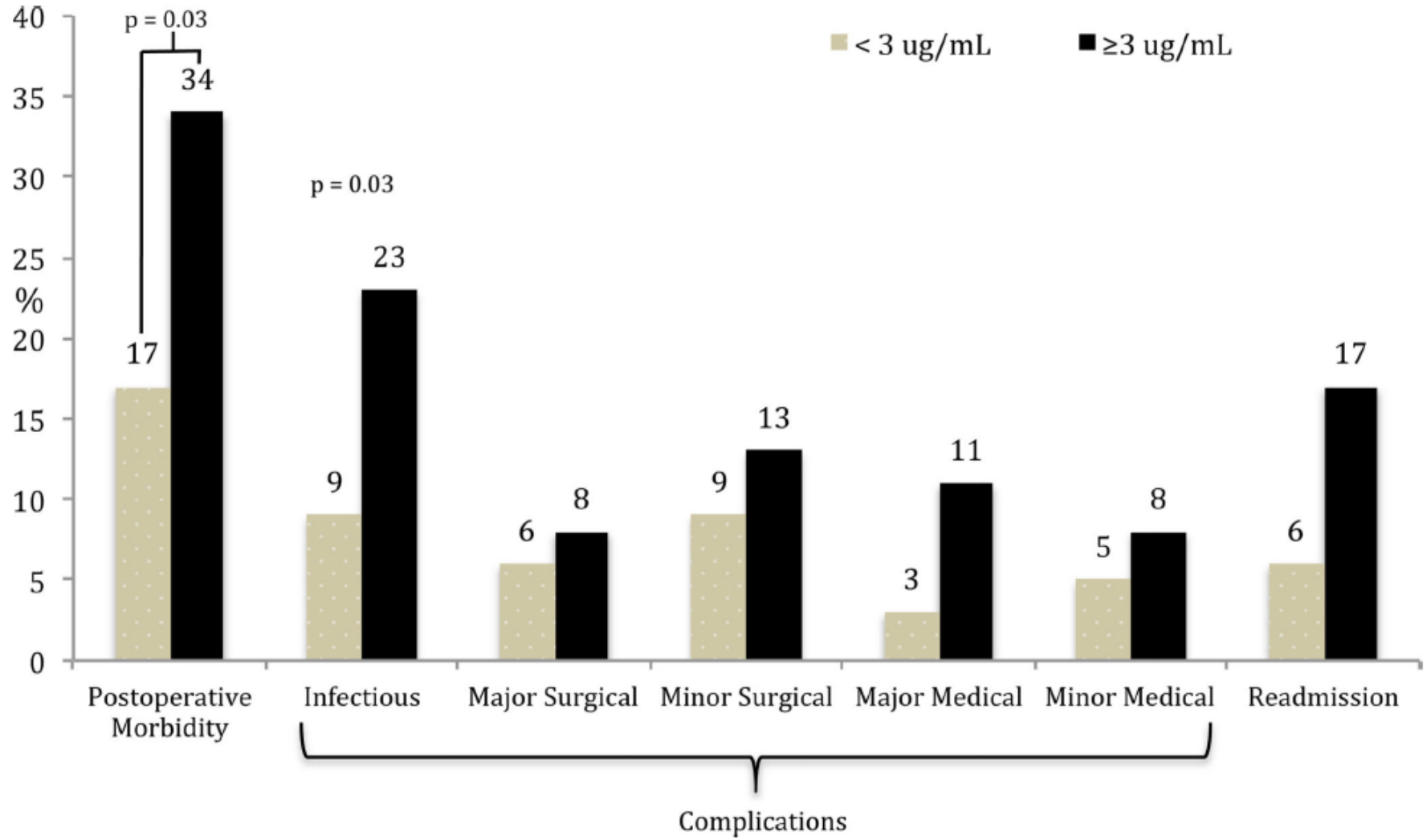




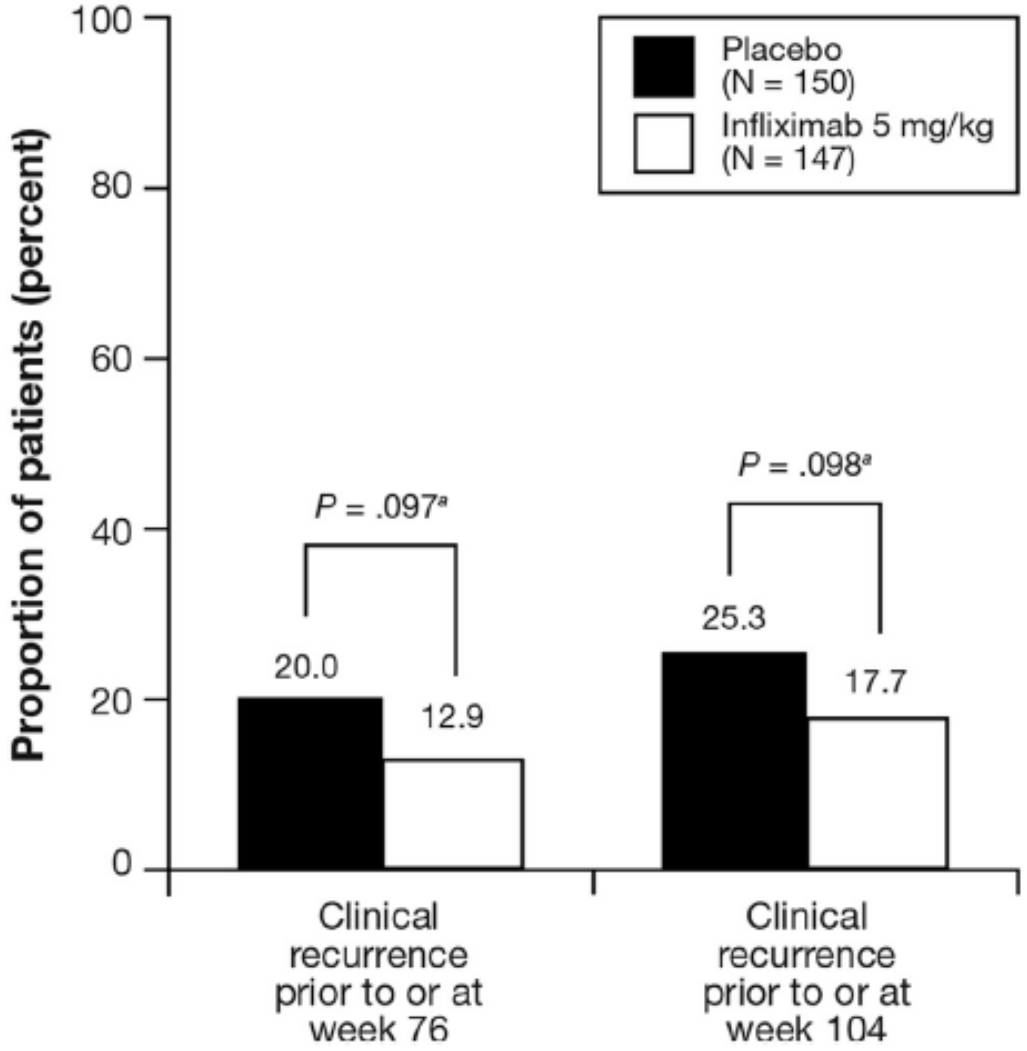
- Multicenter, Randomized, prospective Trial, 170 patients*
- Sutured end-end ICA *vs* Stapled side-side ICA (100mm)
- Stapled: ↓ OR time, ↑ Length of stay
- Complications: 20%, no diff
- Anastomotic Leak: 7%, no diff
- Reoperation: 7%, no diff
- Recurrence at 12 months: Endo 40%, Symptom 20%, no diff
- **Cochrane 2011:** Stapled had ↓anastomotic leaks compared to sutured (2.5% vs 6% OR 0.48, p=0.03).

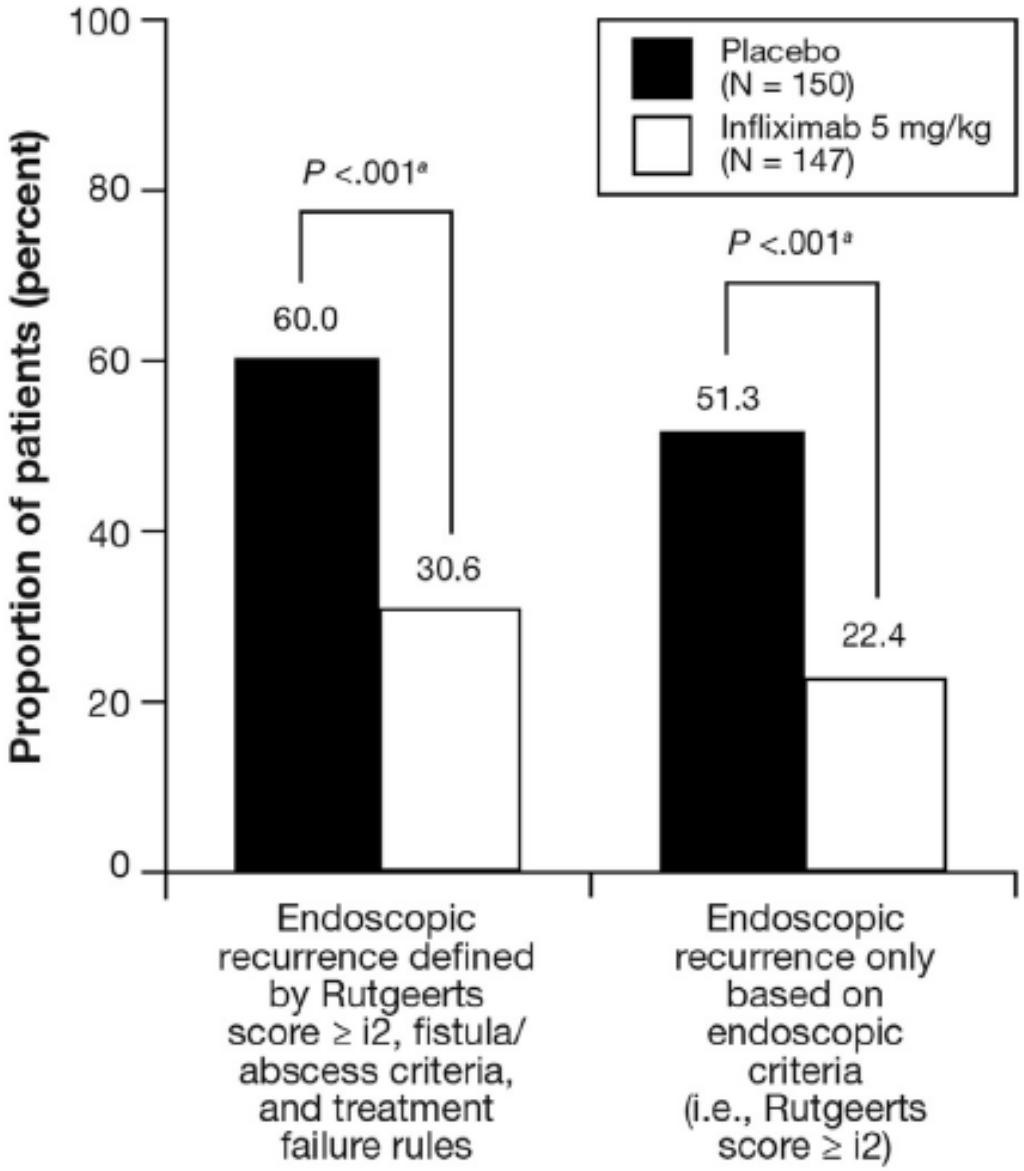
*RS McLeod *et al.* 2009

Fleshner INFLX serum levels study



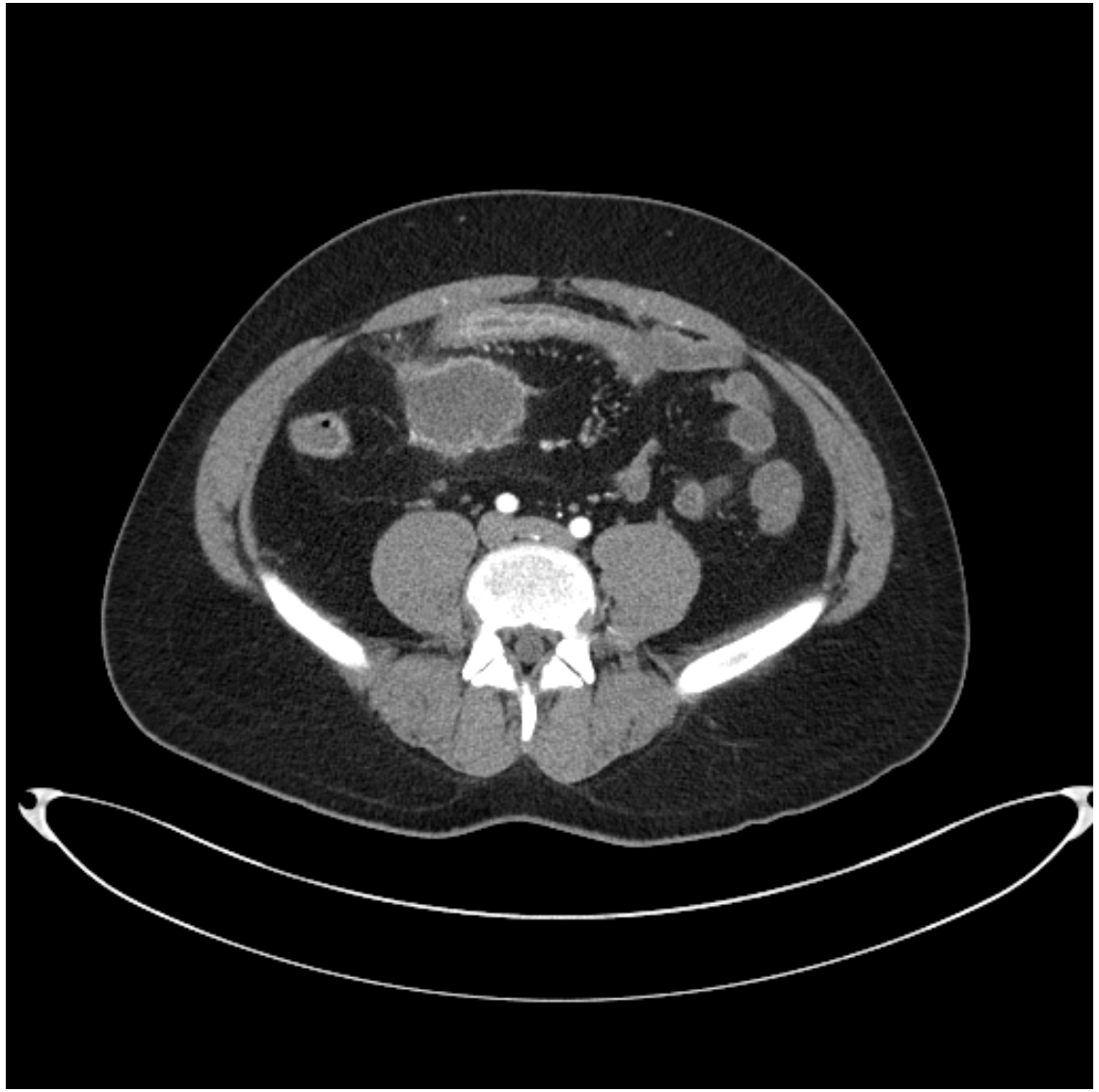
C. Lau, et al. Ann Surg 2015





M. Regueiro, Gastroenterol 2016 - RPT, 297 CD patients, 104 sites worldwide, all had ICR, randomized to placebo of INFLX ≤ 45 days after surgery

28M with Crohn's disease, abdominal pain, fever, CT above. What treatment is preferred?

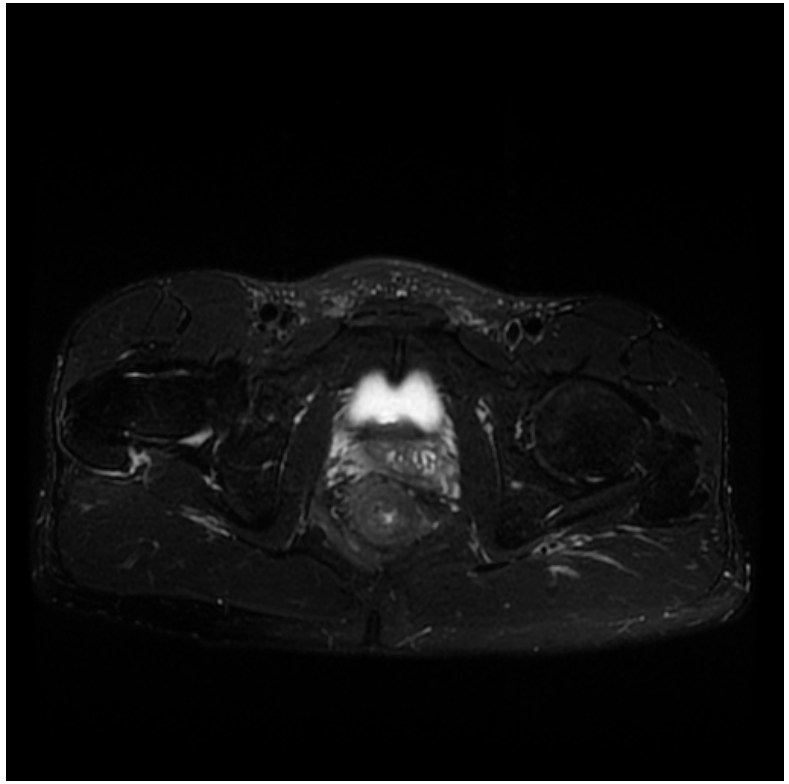


Crohn's Disease with Abdominal Abscess

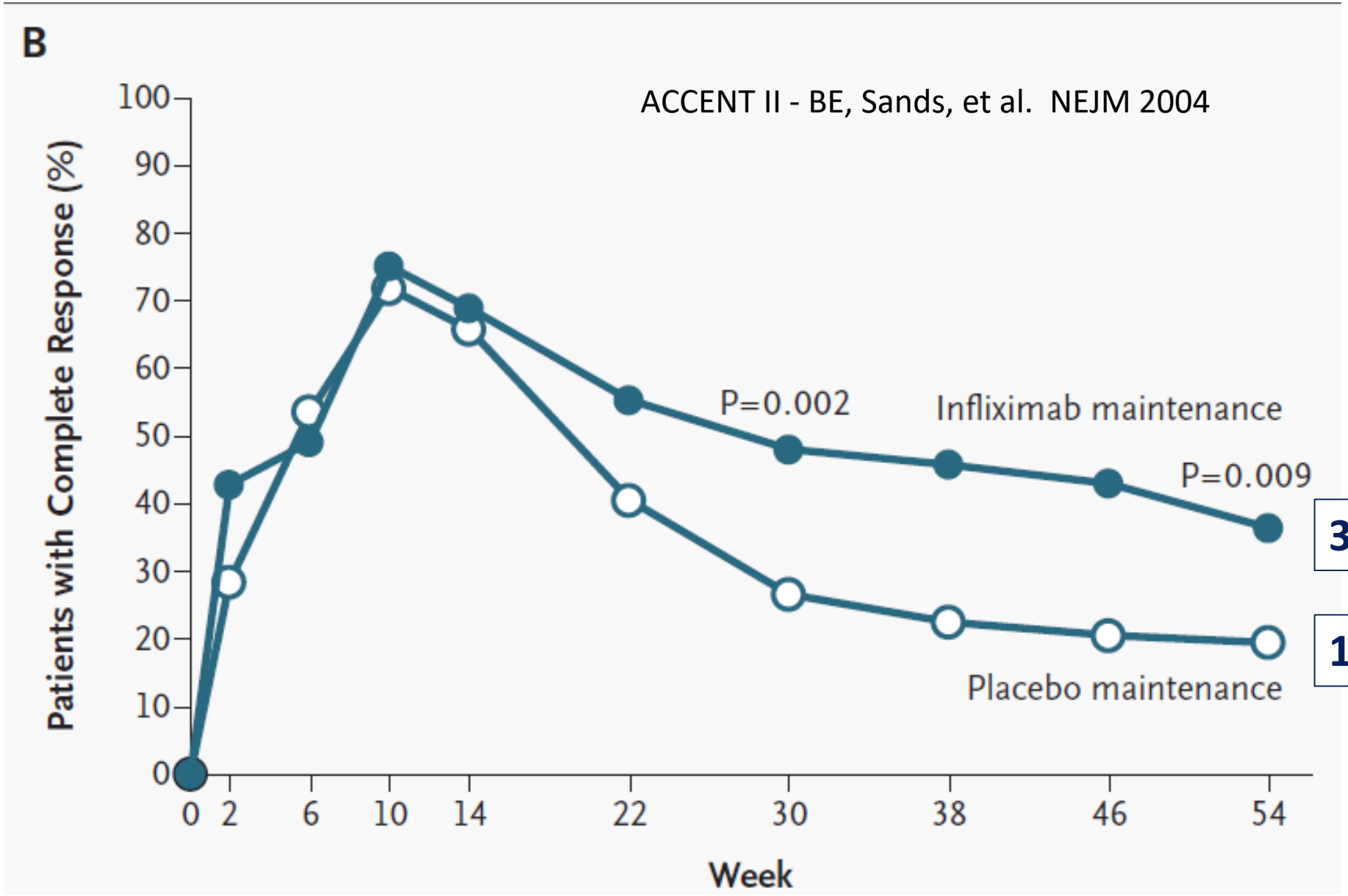
- Small (<3cm) abscess: Antibiotics alone
- Abscess > 3 cm: Percutaneous drainage (PD) + Antibiotic
- **Successful PD (=abscess resolution and no surgery) in 23-78%**
- Risk factors for PD failure: steroids, colonic disease, large, multi-loculated or multifocal abscesses
- Initial PD then surgery is associated with ↓overall complications, ↓ need for ostomy , ↓ cost, and similar rates of post-op ECF, compared to initial surgery

ASCRS Crohn's Disease Clinical Practice Guidelines, 2015

PACD presentation



INFLX



***Complete Response = The absence of draining fistula**

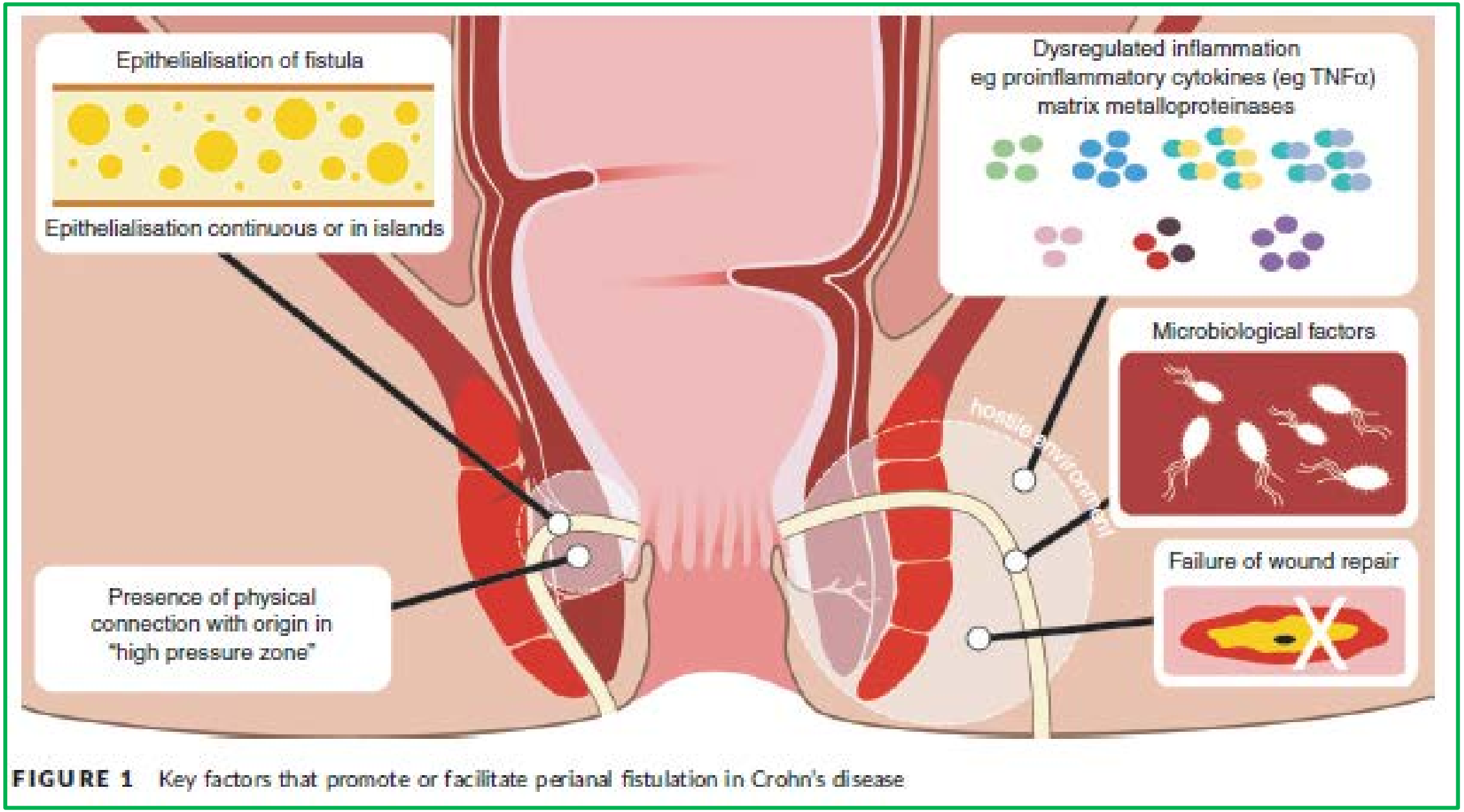


FIGURE 1 Key factors that promote or facilitate perianal fistulation in Crohn's disease

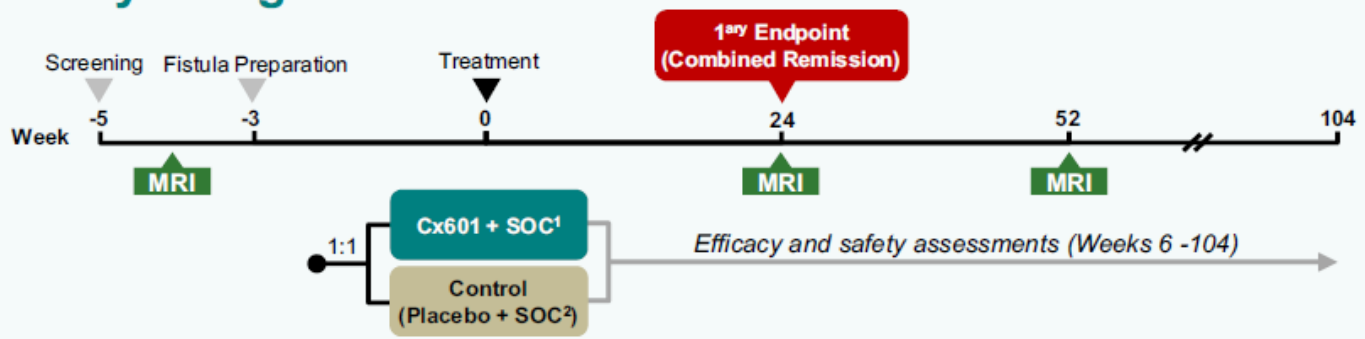
P. Tozer, Aliment Pharm Ther. 2018

ADMIRE CD Study: Cx601 for Complex Perianal Fistulas in Crohn's disease

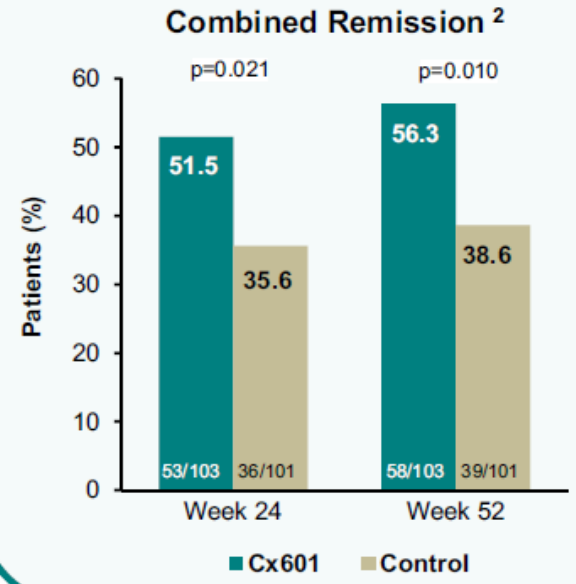
Treatment

Cx601 is a suspension of allogeneic expanded adipose-derived stem cells (eASC) injected locally, and has been shown to be efficacious and well tolerated in Crohn's disease patients with treatment-refractory complex perianal fistulas

Study design



Efficacy

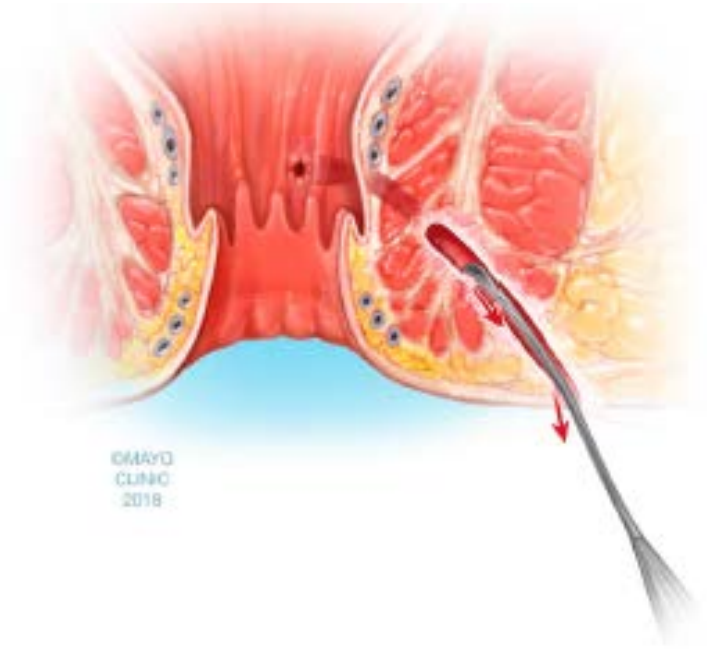


1. Standard of care; 2. mITT population (modified intention to treat)

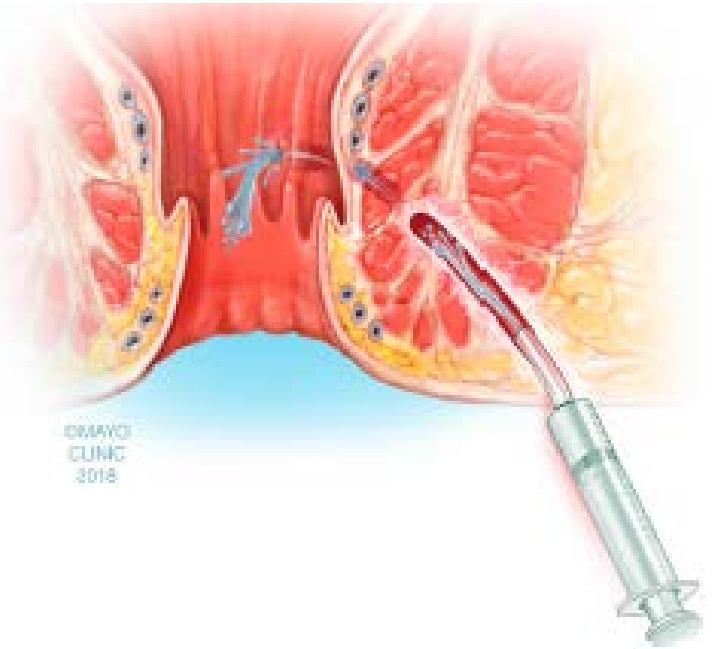
Gastroenterology

J. Panes, et al. Gastroenterology 2018

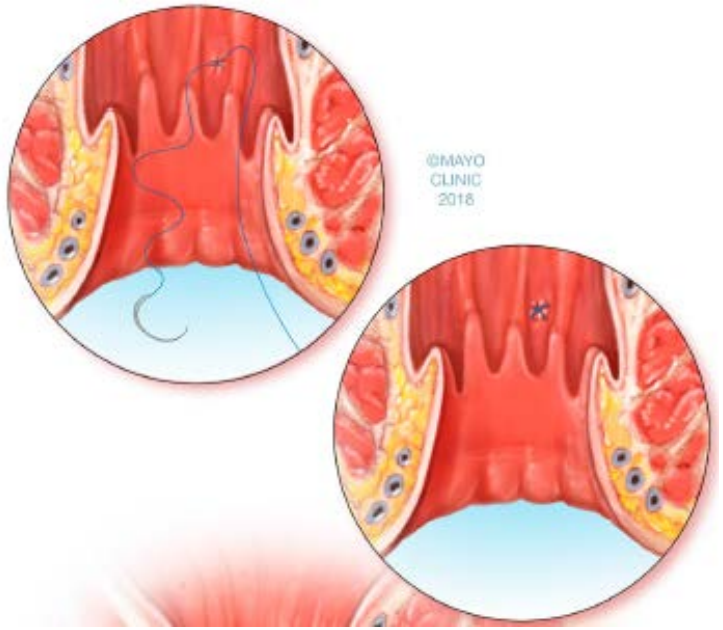
1.



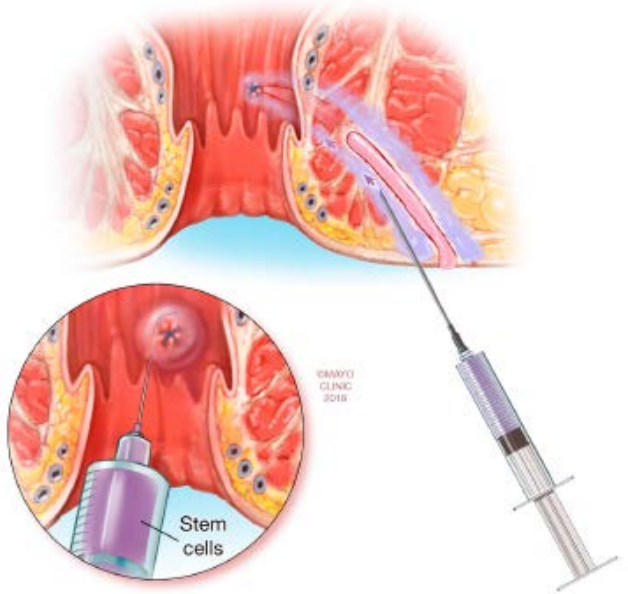
2.



3.

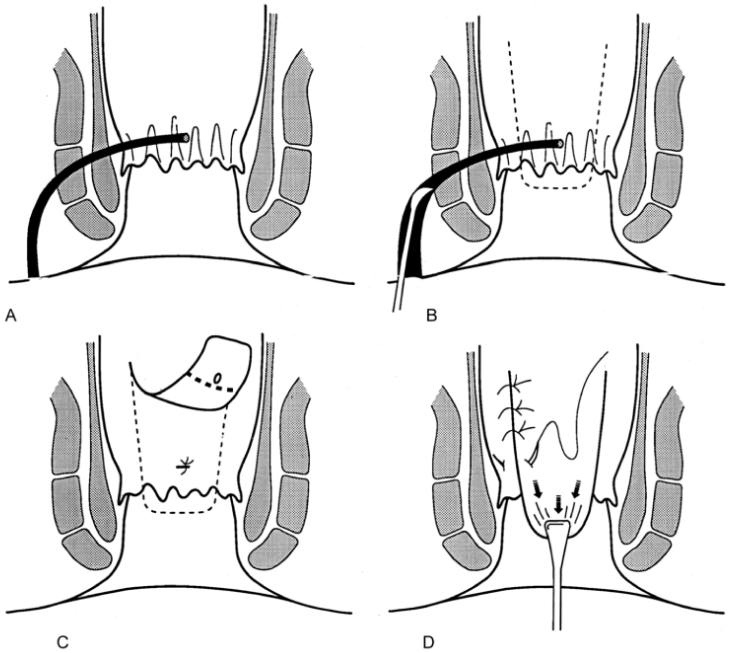


4.



T. Georgiev-Hristov, 2018

Common Surgical Procedures for FPACD



50% fistula healing in CD*

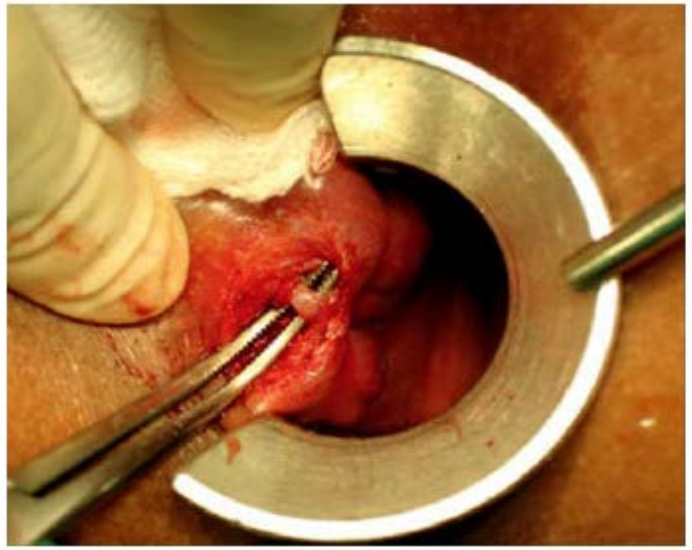
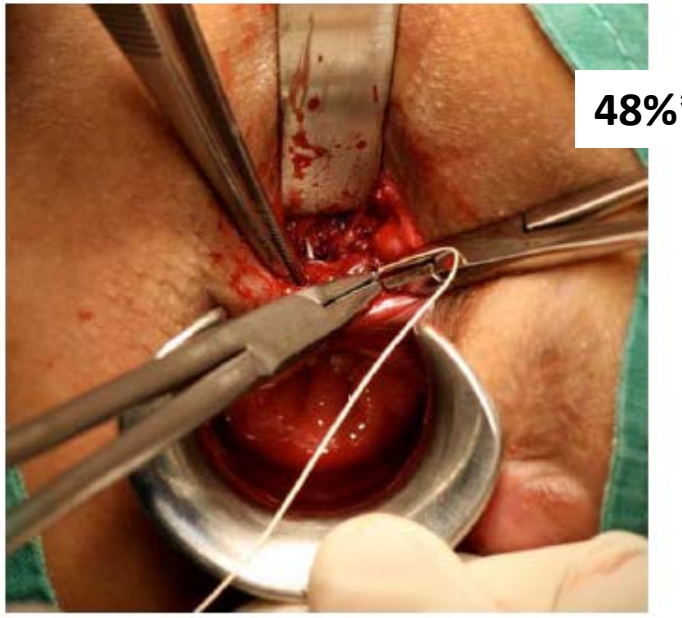
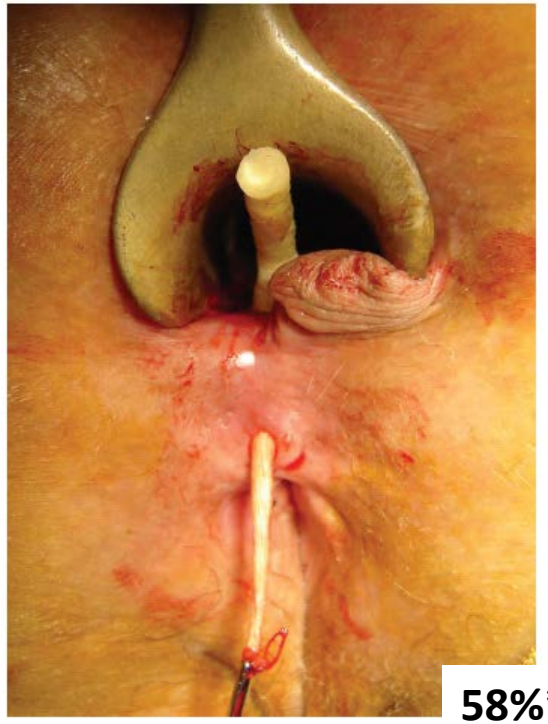


Fig. 4 Intersphincteric fistulous tract hooked up with a Mixter forceps



48%**

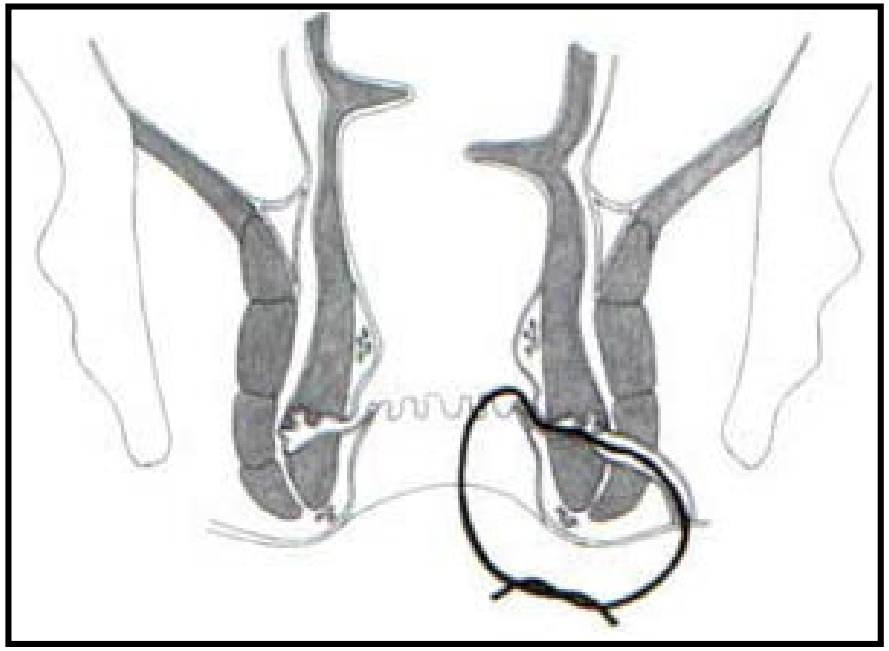
Fig. 5 Sutured ligation of intersphincteric tract to close the internal opening in the internal anal sphincter



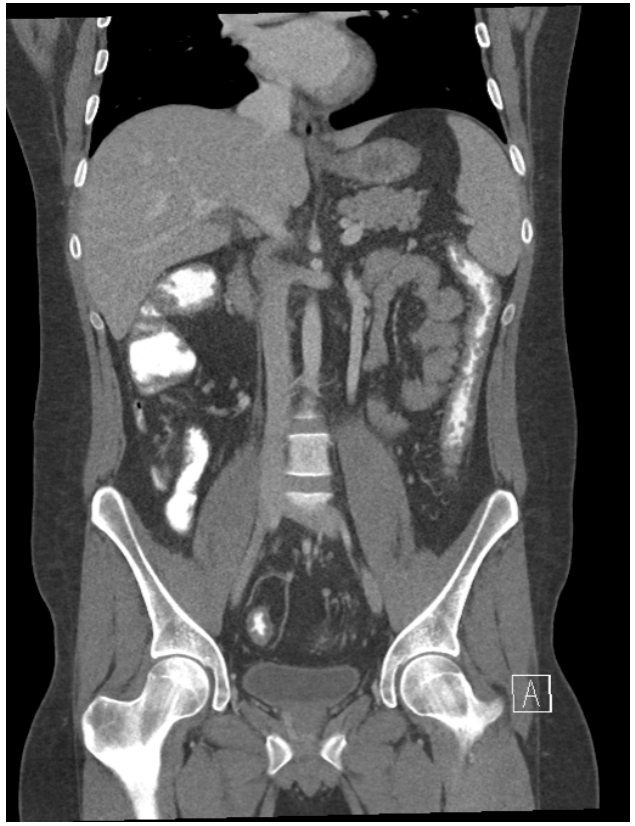
58%***

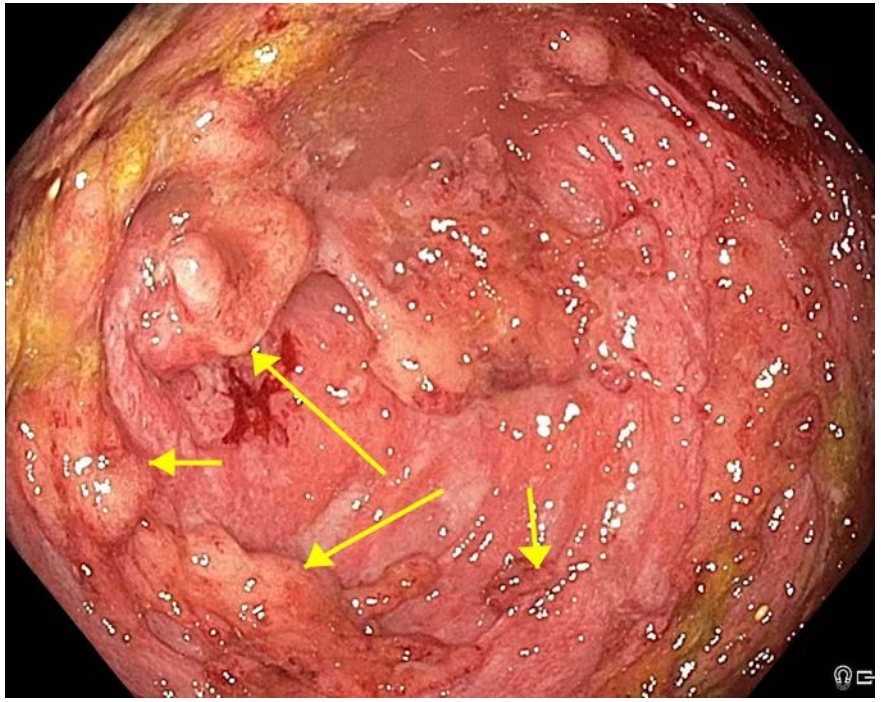
*T. Sonoda, et al. DCR, 2002
** J. Kaminski, Colorectal Dis 2016
*** Y. Nasseri, Colorectal Dis 2016

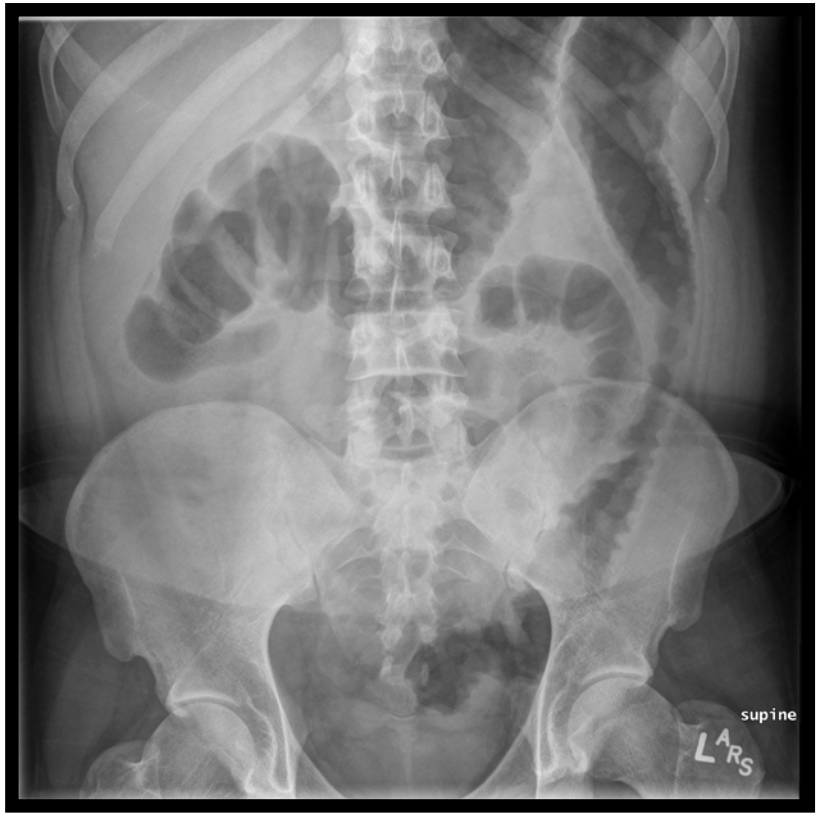
When should the seton be removed?

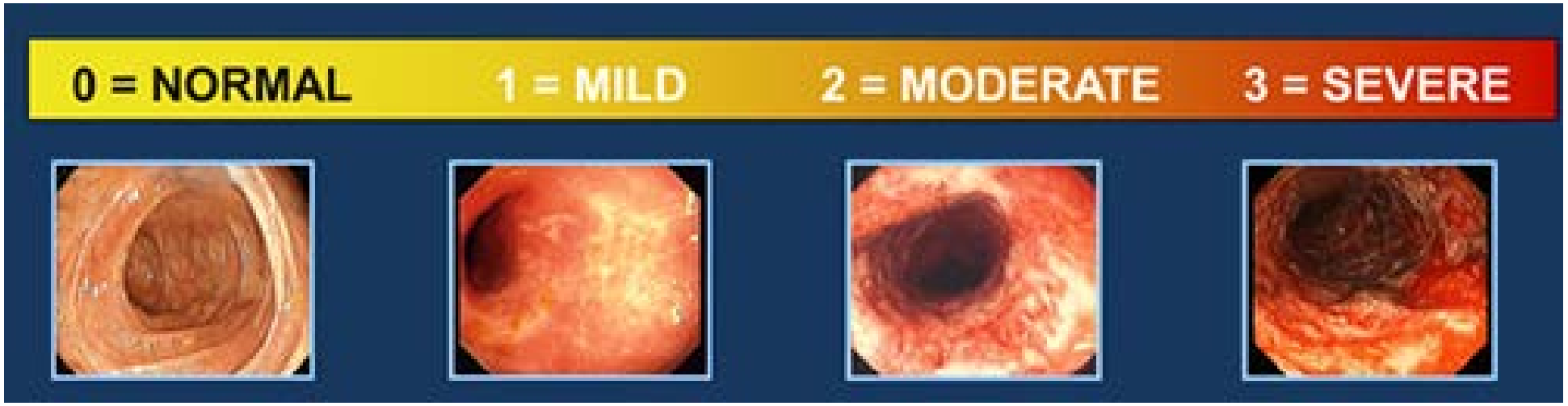


- During or soon after aTNF induction (D. Tougeron, 2009)
- After 2nd induction dose aTNF (P. Roumeguère, 2011)
- 4 months (C. Savoye-Collet, 2011)
- 2 to 8 months after insertion (A. Haennig, 2015)
- 6-7 months (S. Sebastian 2018)
- < 8 months (G. Bouguen, 2013)


A




supine


0 = NORMAL
1 = MILD
2 = MODERATE
3 = SEVERE

Steroids

↓

Anti-TNF

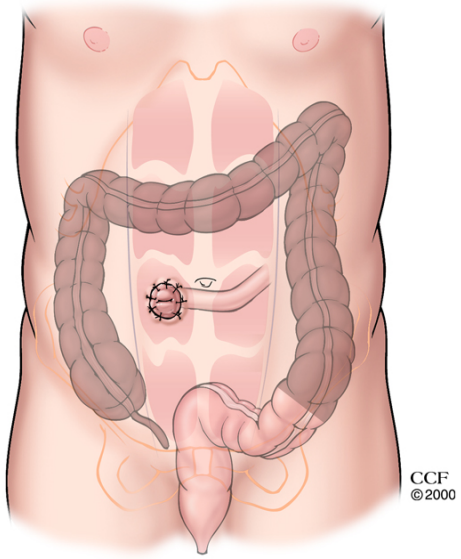
↓

Colectomy

20-30% at ≤3 months

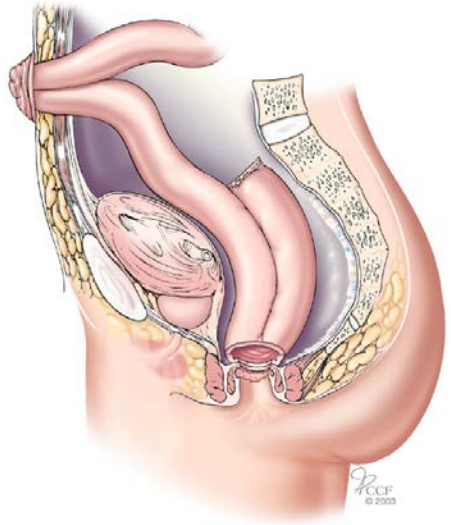
40-50% at 5 years

Total Abdominal Colectomy, end Ileostomy (stage 1 of 3-stage j-pouch)



Stage 2

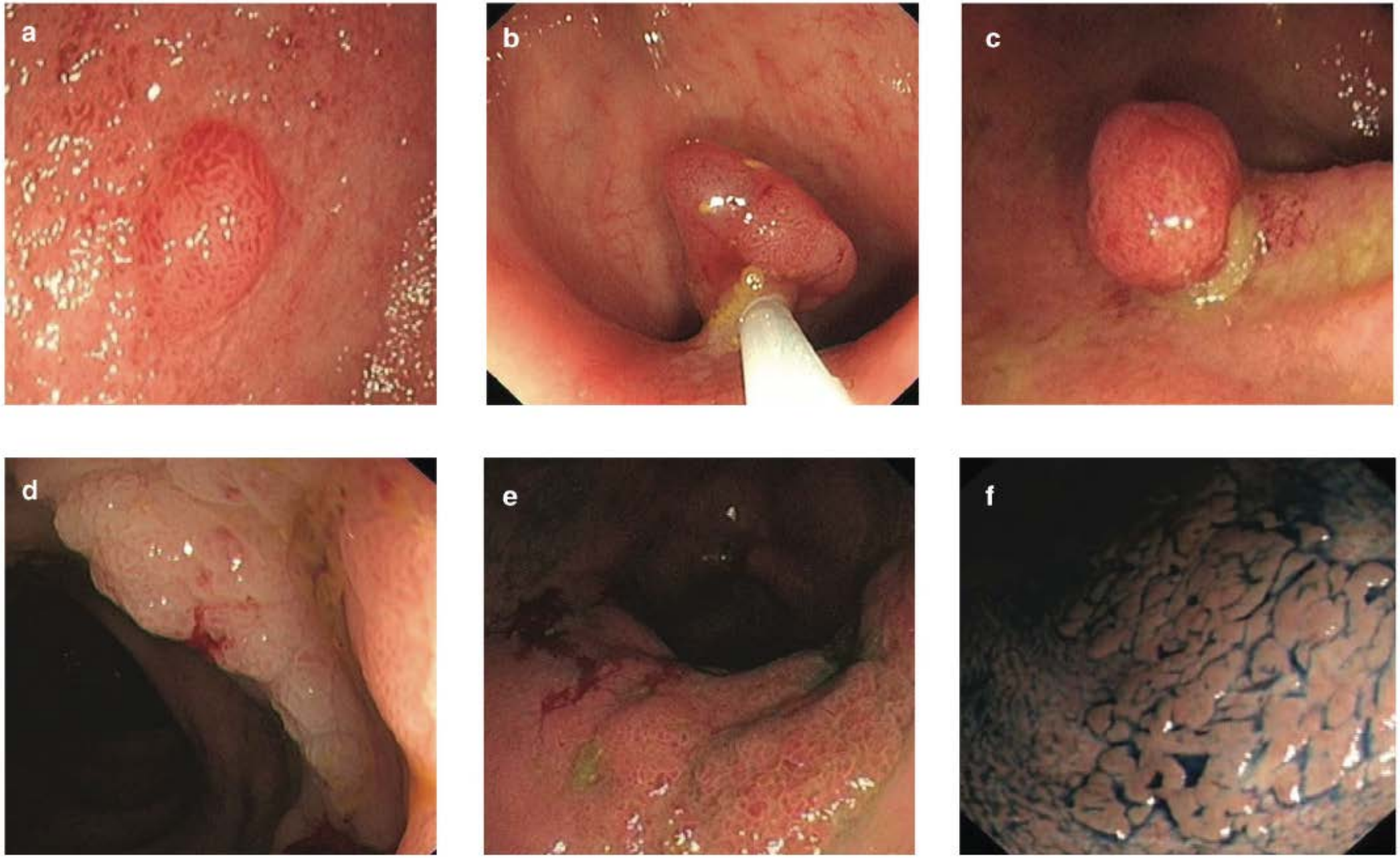
3- 6months



Stage 3

3 months

Take-down loop ileostomy



C. Choi, *et al.* Am J Gastroenterology 2015

DALM?

GIE®

CONSENSUS STATEMENT

SCENIC international consensus statement on surveillance and management of dysplasia in inflammatory bowel disease

- **Visible dysplasia**
  - LGD or HGD, polypoid (strong Rec.) or non-polypoid (cond. Rec.), endoscopic excision if possible, surveillance endoscopy, no surgery.

- **Invisible dysplasia**
  - Specialist referral to determine if truly invisible or visible
  - Visible: see above
  - Invisible: 6% → cancer w/ 1-4 year follow-up
    - Risk factors for CA: multifocal dysplasia, PSC, FMH CRCA, etc.

AGA, ASGE 2015

What's New in IBD Surgery?

- Biological therapies
- TI Crohn's Disease: Surgery instead of biologics?
- CD strictures: Endoscopic therapy
- Pre-op biologics & postoperative complications?
- Fistulizing perianal CD: Stem cells!
- Severe acute colitis: Anti-TNF → ↓ colectomy
- IBD colitis & dysplasia: ↑ endoscopy, ↓ surgery
- And so much more…

uchealth

Thank you

ESOPHAGUS AND STOMACH

Current Management and Future Trends in Eosinophilic Esophagitis

Paul Menard-Katcher, MD
Associate Professor of Medicine
Luminal Section Chief, Associate Fellowship Program Director
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Current Management and future trends in Eosinophilic Esophagitis (EoE)

Paul Menard-Katcher
Associate Professor of Medicine
Division of Gastroenterology and Hepatology
University of Colorado School of Medicine

Disclosures

- No financial disclosures
- Will be discussing off label use of medications (there are no on-label use of medications for EoE)

Objectives

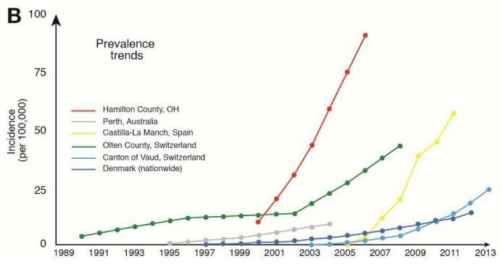
- Discuss updated recommendations for use of PPI in diagnosis of EoE
- Highlight potential EoE therapies coming down the pike
- Reinforce safety of dilation in EoE
- Have time for questions

EoE Basics

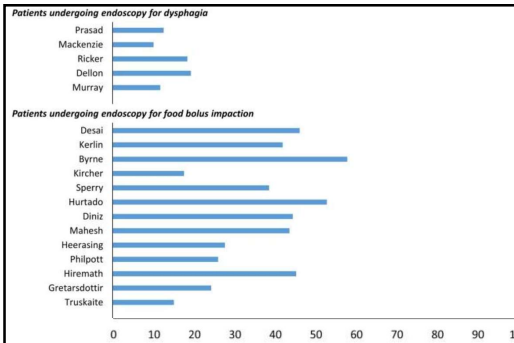
- Chronic immune/antigen-mediated esophageal disease
- Clinicopathologic diagnosis:
  - Symptoms of esophageal dysfunction
  - Eosinophilic infiltrate in the esophagus
  - Absence of other potential causes of esophageal eosinophilia

Liacouras CA et al. The Journal of Allergy and Clinical Immunology 2011;128:3-20

Disease Emergence



Dellon ES, Hirano I. Epidemiology and Natural History of Eosinophilic Esophagitis. Gastroenterology. 2018;154(2):319-332



Dellon ES, Hirano I. Epidemiology and Natural History of Eosinophilic Esophagitis. Gastroenterology. 2018;154(2):319-332

Clinical Features of EoE

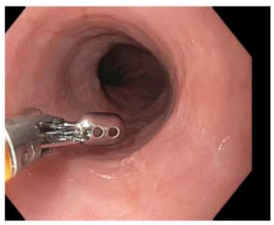
- In adults & adolescents: dysphagia (25-100%)
- ~ 50% of cases of acute food impaction
- Food avoidance
- Maybe heartburn

Dellon ES et al. Clin Gastroenterol Hepatol 2012;10:1066-78

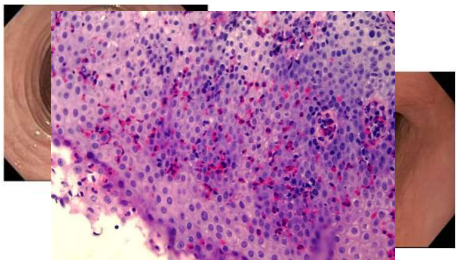
29 year-old male with recent food bolus impaction

- Long history of dysphagia to solids and transient food bolus impactions
- Has been dilated 4-5 times in past
- Symptoms improve with dilation and avoidance of dairy
- When asked if he has ever been diagnosed with Eosinophilic Esophagitis, responds: "That's what they said it was!"

EGD



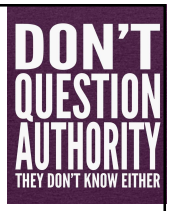
Endoscopic Appearance



Biopsies reveal > 50 eosinophils/HPF

- Next steps?
  a) Start PPI
  b) Start swallowed steroids (fluticasone or budesonide)
  c) Refer to Allergist for skin prick testing
  d) Initiate dietary therapy (empiric elimination diet)

Next steps?



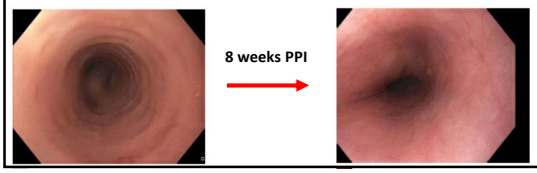
- 2013 EoE Consensus Guidelines
  - For diagnosis of EoE
    - 1. Symptoms of Esophageal Dysfunction
    - 2. Esophageal Eosinophilia (≥ 15 eos per HPF)
    - 3. Persistence of Esophageal Eosinophilia after an adequate PPI trial
- Why #3?

PPIs in EoE

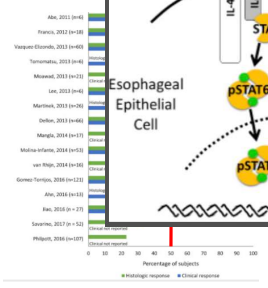
- 2007: 8 week PPI trial best approach to rule out esophageal eosinophilia related to GERD.
  - GERD and EoE believed to be mutually exclusive
- Multiple observations over next decade:
  - A large proportion of patients with clinical symptoms and esophageal eosinophilia responded to treatment with PPIs without classic features of GERD
  - New condition: PPI-responsive esophageal eosinophilia (PPI-REE)
  - EoE and GERD still 2 distinct conditions

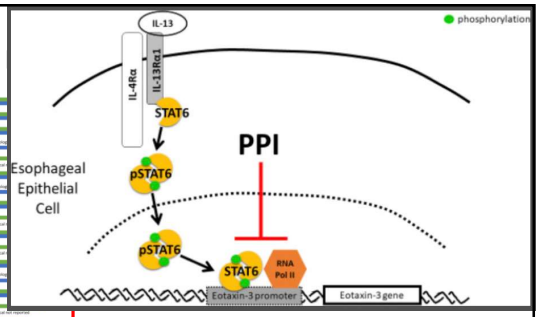
PPIs in EoE

- Evolving work suggests that EoE and GERD are not necessarily mutually exclusive
  - Can coexist
  - EoE can lead to secondary reflux (decreased compliance/dysmotility)
  - GERD can lead to decreased epithelial barrier integrity → antigen exposure

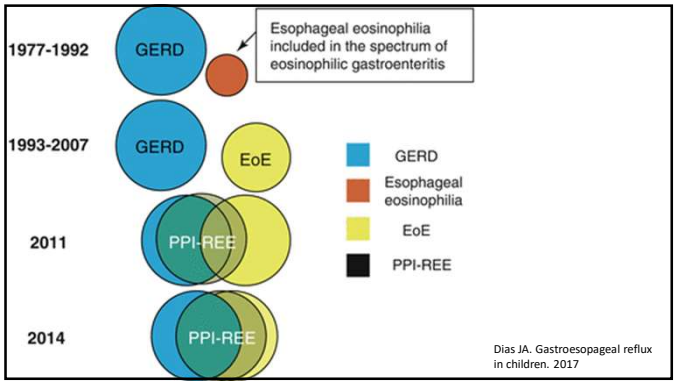


PPIs in





Dellon ES et al. Updated international consensus diagnostic criteria for eosinophilic esophagitis: Proceedings from the AGREE conference. Gastroenterol 2018.



Dias JA. Gastroesopageal reflux in children. 2017

PPI-REE = EoE?

- PPI-REE emerged as a subtype of EoE in some patients
- Are PPI-REE and EoE same condition?

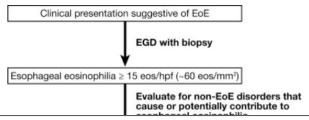
- Should PPIs be considered as EoE treatment?
- Should PPI trial be removed from diagnostic guidelines?

Updated International Consensus Diagnostic Criteria for Eosinophilic Esophagitis: Proceedings of the AGREE Conference

Evan S. Dellon, Chris A. Liacouras, Javier Molina-Infante, Glenn T. Furuta, Jonathan M. Spergel, Noam Zevit, Stuart J. Spechler, Stephen E. Attwood, Alex Straumann, Seema S. Aceves, Jeffrey A. Alexander, Dan Atkins, Nicoleta C. Arva, Carine Blanchard, Peter A. Bonis, Wendy M. Book, Kelley E. Capocelli, Mirna Chehade, Edaire Cheng, Margaret H. Collins, Carla M. Davis, Jorge A. Dias, Carlo Di Lorenzo, Ranjan Dohil, Christophe Dupont, Gary W. Falk, Cristina T. Ferreira, Adam Fox, Nirmala P. Gonsalves, Sandeep K. Gupta, David A. Katzka, Yoshikazu Kinoshita, Calies Menard-Katcher, Ellyn Kodroff, David C. Metz, Stephan Miehlke, Amanda B. Muir, Vincent A. Mukkada, Simon Murch, Samuel Nurko, Yoshikazu Ohtsuka, Rok Orel, Alexandra Papadopoulou, Kathryn A. Peterson, Hamish Philpott, Philip E. Putnam, Joel E. Richter, Rachel Rosen, Marc E. Rothenberg, Alain Schoepfer, Melissa M. Scott, Neil Shah, Javed Sheikh, Rhonda F. Souza, Mary J. Strobel, Nicholas J. Talley, Michael F. Vaezi, Yvan Vandenplas, Mario C. Vieira, Marjorie M. Walker, Joshua B. Wechsler, Barry K. Wershil, Ting Wen, Guang-Yu Yang, Ikuo Hirano and Albert J. Bredenoord

AGREE

Dellon ES et al. Updated international consensus diagnostic criteria for eosinophilic esophagitis: Proceedings from the AGREE conference. Gastroenterol 2018.

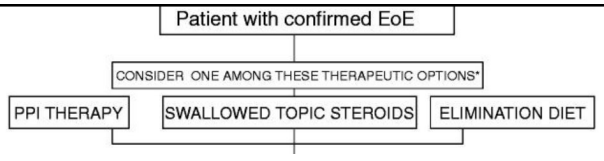


- Symptoms of esophageal dysfunction
  - Concomitant atopic conditions should increase suspicion for EoE.
  - Endoscopic findings of rings, furrows, exudates, edema, stricture, narrowing, and crepe paper mucosa should increase suspicion for EoE
- ≥15 eos/hpf (~60 eos/mm ^{2}) on esophageal biopsy
  - Eosinophilic infiltration should be isolated to the esophagus.
- Assessment of non-EoE disorders that cause or potentially contribute to esophageal eosinophilia

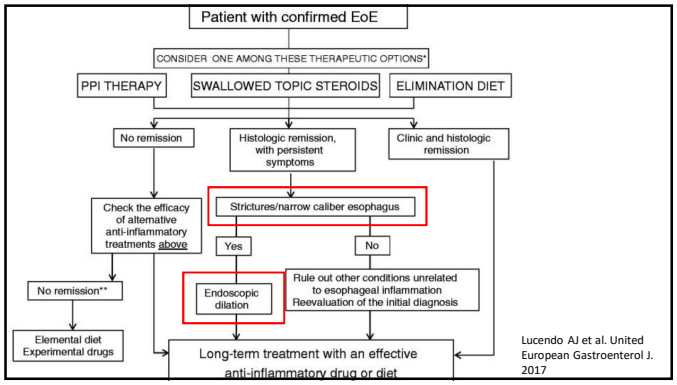
PPIs as a treatment option in EoE

- "…because of low cost, good safety profile, convenience, and a large body of literature describing PPI response in patients with esophageal eosinophilia and endoscopic findings suggestive of EoE, a PPI should be considered as a potential early or initial treatment, although swallowed steroids or dietary elimination may also be considered."

Dellon ES et al. Updated international consensus diagnostic criteria for eosinophilic esophagitis: Proceedings from the AGREE conference. Gastroenterol 2018.

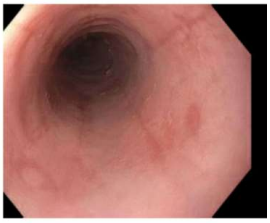


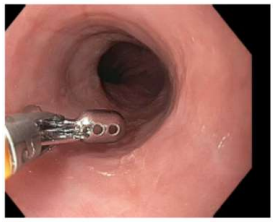
Lucendo AJ et al. United European Gastroenterol J. 2017



Lucendo AJ et al. United European Gastroenterol J. 2017

Our patient



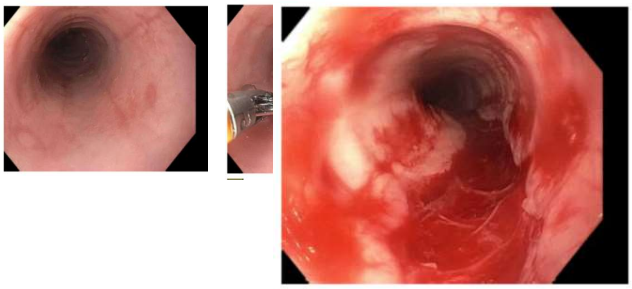


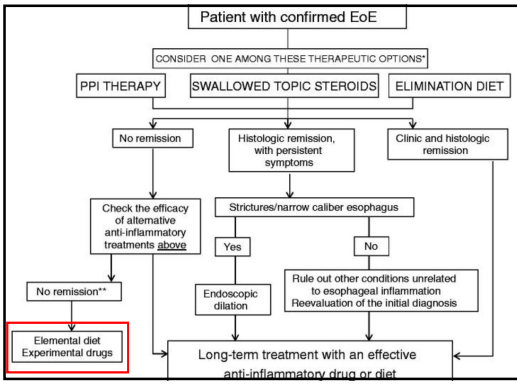
Efficacy and Safety of Dilation in EoE

- Dilation previously thought to be more dangerous in EoE (increased fragility and risk of perforation)
- Recent meta-analysis suggest dilation in EoE is safe and similar risk as dilation in non-EoE conditions
  - 845 EoE patients, 1820 dilations, 0.38% perforation risk, 0.05% bleeding risk
  - 0 deaths
  - 95% clinical improvement
- Post-procedural chest pain common (anticipatory guidance)
- Mucosal tear considered sign of dilation effect

Moawad FJ et al. APT 2017 46(2):96-105

Dilation in EoE

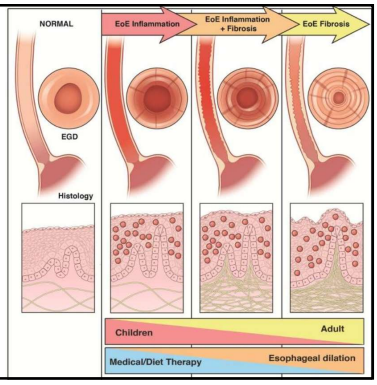




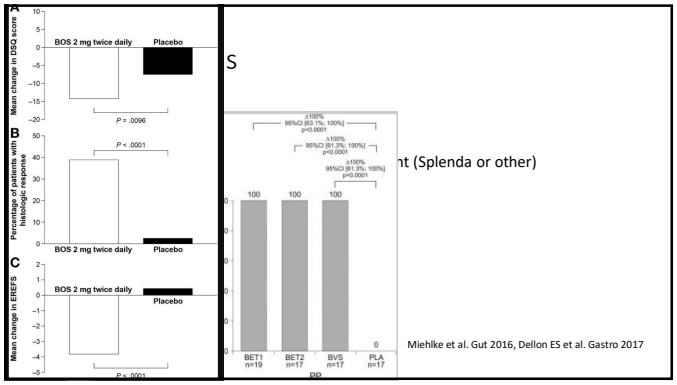
Lucendo AJ et al. United European Gastroenterol J. 2017

What's coming?

- Why?
  - Steroid non-responders
  - Loss of effect
  - Burden of dietary therapy
  - "Severe disease"



Dellon ES, Hirano I. Epidemiology and Natural History of Eosinophilic Esophagitis. Gastroenterology. 2018;154(2):319-332

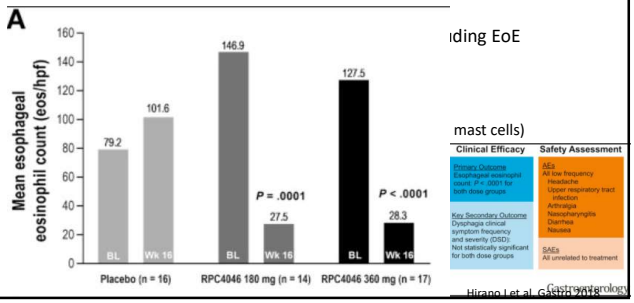


S

nt (Splenda or other)

Miehlke et al. Gut 2016, Dellon ES et al. Gastro 2017

What's coming?



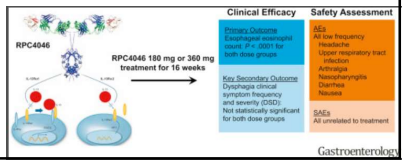
ıding EoE

mast cells)

Hirano I et al. Gastro 2018

What's coming?

- Il-13/Il-4 pathways implicated in allergic diseases including EoE
- 3 biologics with promising phase 2 results
  - 1 anti-Il-13 (RPC4046)
  - 1 anti-Il-4 (Dupilumab)
  - Anti-siglec 8 receptor antagonist (found on eosinophils and mast cells)



Summary

- Preponderance of evidence suggest PPIs are effective in treating EoE
- Revised guidelines suggest use of PPIs as a treatment for EoE (not a diagnostic test)
- Once EoE diagnosed, choice for therapy includes PPIs, topical steroids and dietary therapy
- Dilation is safe and effective in EoE
- Improved topical steroid formulations are close
- Phase 2 data from 3 biologics appear promising in EoE

Thank you and Questions?

Rescue Therapies for Upper GI Bleeding

Louis M. Wong Kee Song,
MD, FASGE
Professor of Medicine
Mayo Clinic Health System
Division of Gastroenterology and Hepatology
Rochester, Minnesota

Rescue Therapies for Upper GI Bleeding

Louis M. Wong Kee Song, M.D.

Mayo Clinic

Rochester, MN

Learning Objectives

- Outline the utility and limitations of newer endoscopic devices for the rescue of non-variceal upper GI bleeding

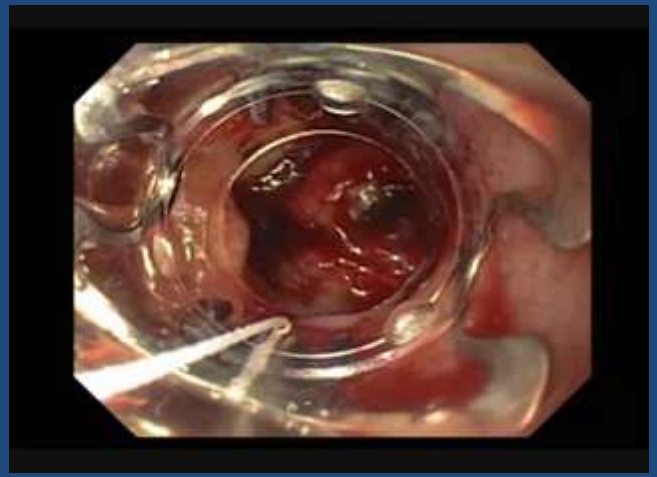
- Highlight salvage treatment options for esophageal variceal bleeding

Over-the-Scope Clip (OTSC)

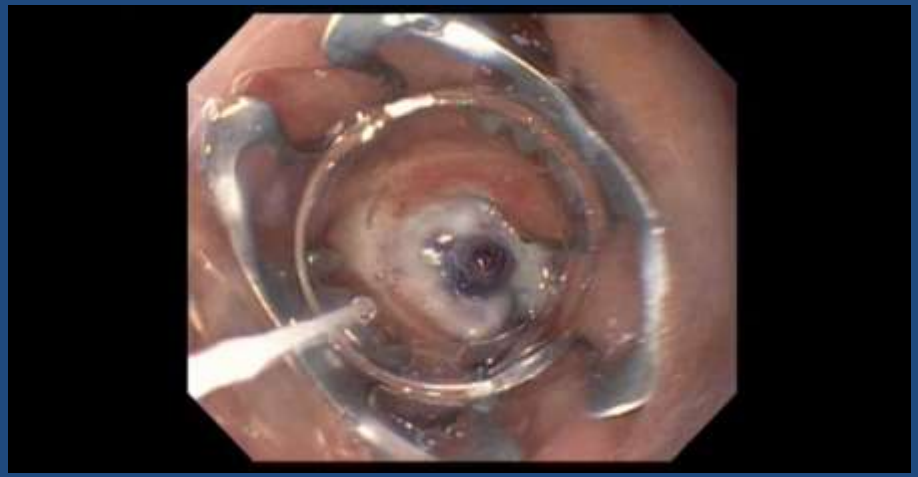
- Similar to band ligation
- Suitable for focal non-variceal lesions
  - Ulcer (peptic, other)
  - Mallory-Weiss tear
  - Dieulafoy lesion
  - Tumor
- Primary* or rescue therapy

Jensen DM et al. AJG 2019;114:A577*
Zhong C et al. BMC Gastroenterol 2019;19:225

Rescue OTSC



Recurrent DU Bleeding with Prior Epinephrine Injection and Bipolar Coagulation



Recurrent Duodenal EMR Bleeding with Prior Bipolar Coagulation, TTS Clips and IR Embolization

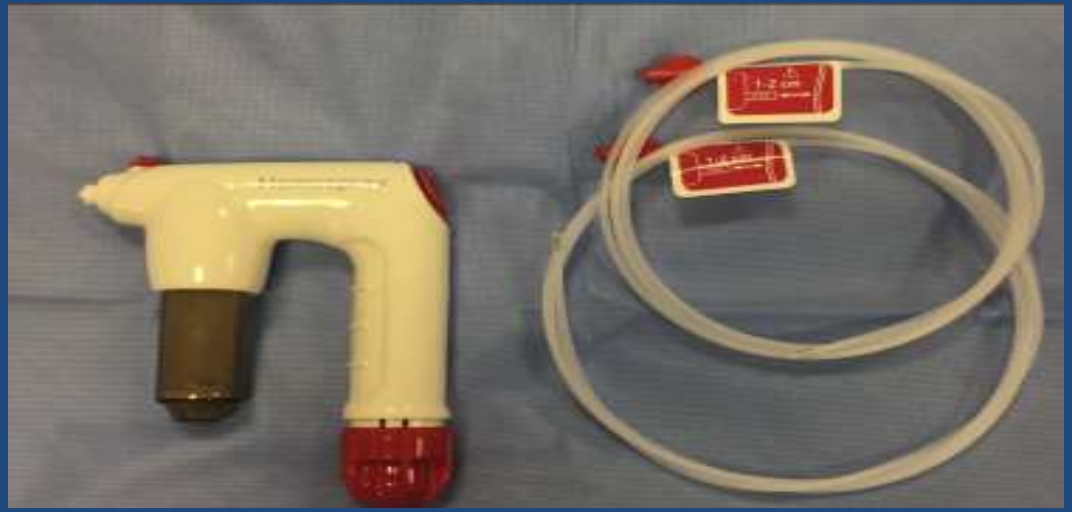
Brandler J et al. CGH 2018;16:690
Schmidt A et al. Gastroenterology 2018;155:674

OTSC

- **Pros**
  - Compression strength
  - OTSC cap facilitates access to lesion
- **Cons**
  - Device set-up
  - Passage through narrowed lumen
  - Clip misplacement
    - Interferes with subsequent therapy
  - Inadequate lesion suction
    - Deep fibrotic ulcer base

Hemostatic Powder

- FDA approved 2018
- Inert and nontoxic powder
- Aerosolized with use of CO_2 canister
- Forms an adherent mechanical plug
- Risks: perforation, embolization, and bowel obstruction



TC-325 (Hemospray, Cook Medical)

Hemostatic Powder

- **Upper GI applications**
  - Ulcer
  - Dieulafoy
  - Tumor
  - Post-resection
  - Varices (off-label)


Bleeding Duodenal Ulcer


Bleeding Ulcerated GIST

Hemostatic Powder as Rescue Therapy

- Outcomes
  - >90% intraprocedural hemostasis
  - 25-50% rebleeding rate
  - Predictors of failure
    - Spurting bleeding
    - Hemodynamic instability
- Bridge therapy for actively bleeding ulcers
  - Enables subsequent intervention under better circumstances
  - Lesion downgrade (spurting ulcer into NBVV?)

Rodríguez de Santiago E et al. GIE 2019;90:581
Cahyadi O et al. Endosc Int Open 2017;5:E1159
Barkun AN et al. Ann Intern Med 2019 [Epub ahead of print]

Endoscopic Suturing

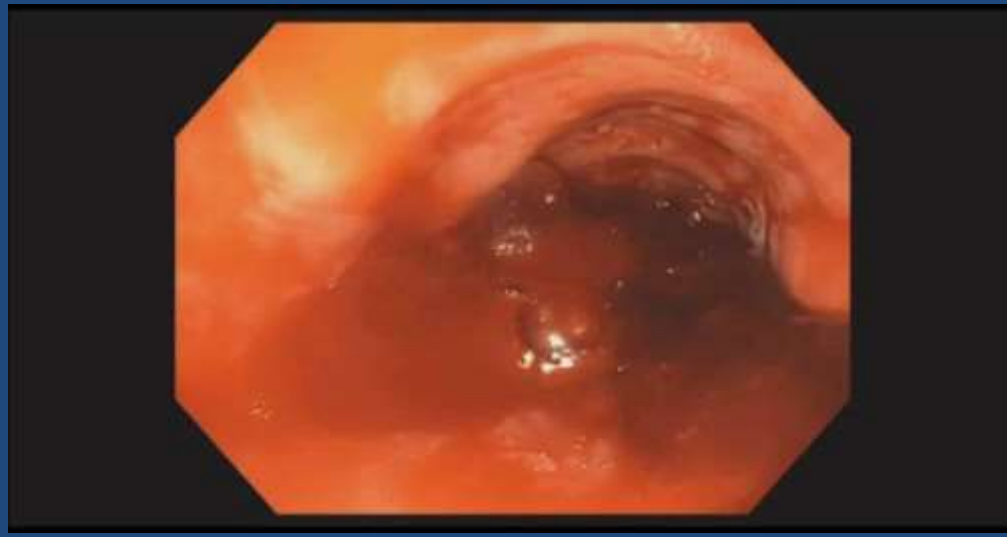
- Full thickness suturing device (OverStitch™)
- Potential role in select nonvariceal GI bleeding lesions
  - Recalcitrant marginal ulcers
  - Closure of large bleeding defects not amenable to conventional hemostatic means

Endoscopic Suturing

Issues

- Double-channel upper endoscope
- Limited maneuverability and access
- Learning curve
- Impaired visualization and device actuation in setting of active bleeding

Long Bleeding Esophageal Tear

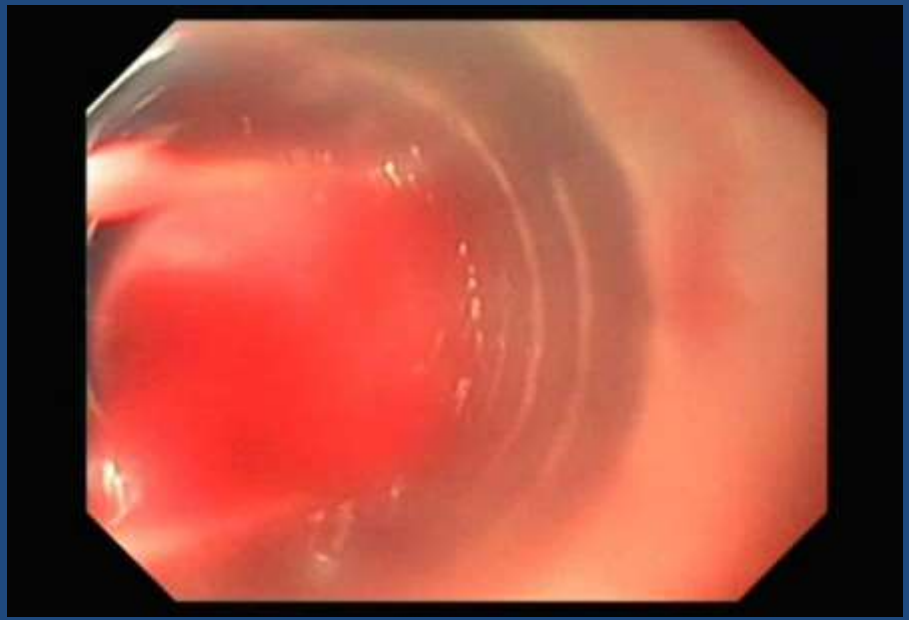


Rescue Therapies for Esophageal Variceal Bleeding

- Second-line endoscopic therapies
  - Sclerotherapy
  - Cyanoacrylate
  - Hemostatic powder
- Balloon tamponade
- Self-expandable metal stents (SEMS)
- Transjugular intrahepatic portosystemic shunt (TIPS)
- Surgical procedures
  - Shunt
  - Nonshunt

Sclerotherapy

- 2nd line or rescue therapy when ligation is infeasible or fails
- Injection volume
  - Sclerosant-dependent
- Intra- versus para-variceal injection
  - Less adverse events with intra-variceal injection

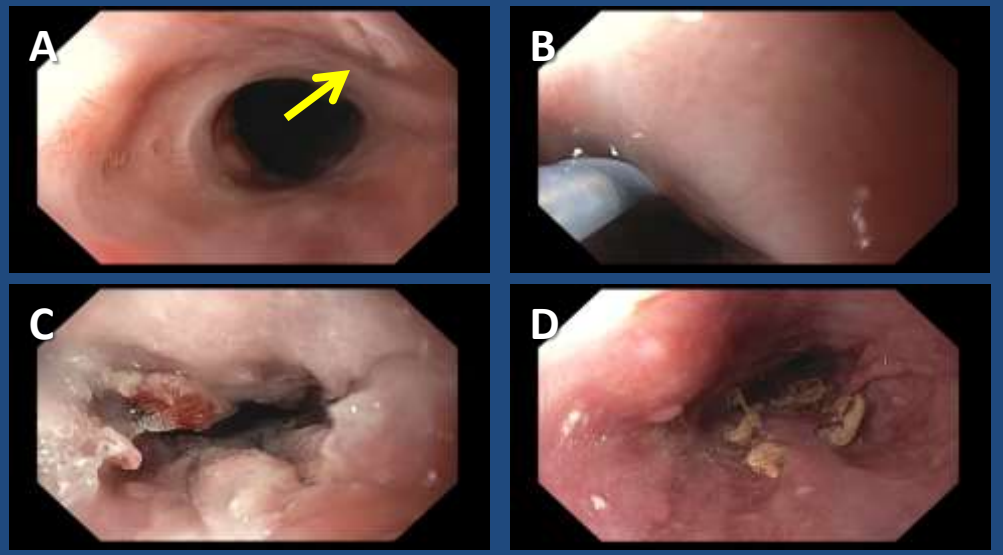


Sclerosing Agents

Agents	Max. volume per injection site (ml)	Max. volume per session (ml)	Relative tissue injury
Fatty acid derivatives			
Ethanolamine oleate, 5%	1.5-5	20	++
Sodium morrhuate, 5%	0.5-5	15	++
Synthetic agents			
STDS, 1% and 3%	1-2	10	+++
Polidocanol, 0.5-3%	1-2	20	+
Alcohols			
Ethanol, 99.5%	0.3-0.5	4-5	++++
Phenol, 3%	3-5	30	+

Cyanoacrylate Injection

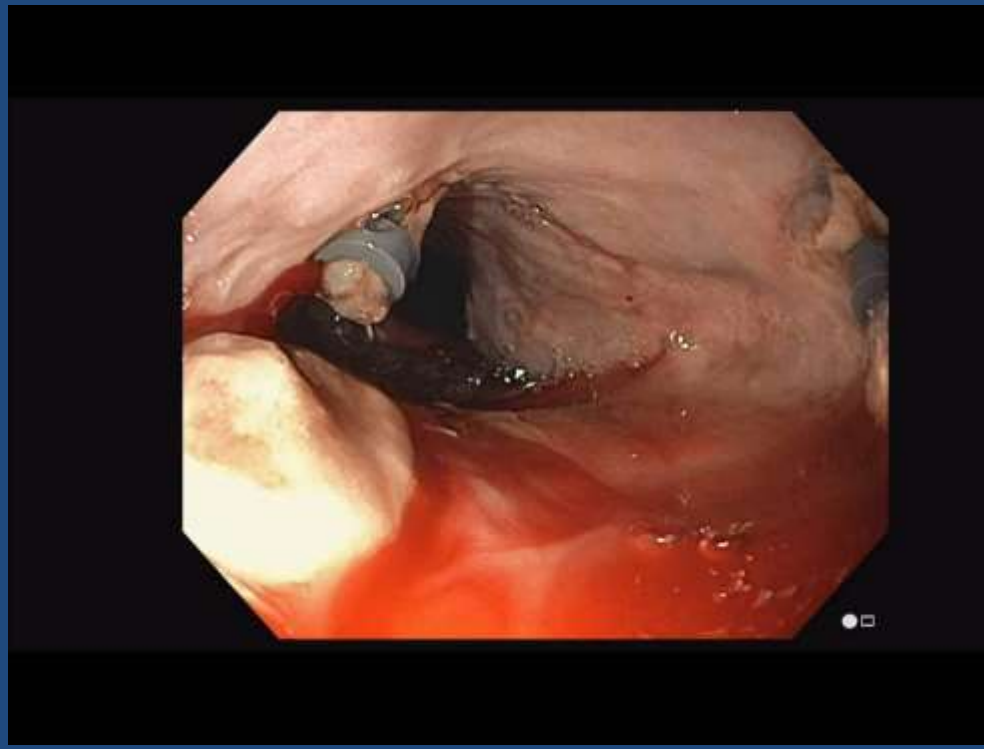
- Limited data for esophageal variceal injection
  - Case series*
- Risk of serious AEs
  - Intense inflammatory reaction, ulceration
  - Embolization
  - Fistula
- Last resort, off-label rescue therapy



Ribeiro JP et al. Endosc Int Open 2015;3:E584*

Hemostatic Powder

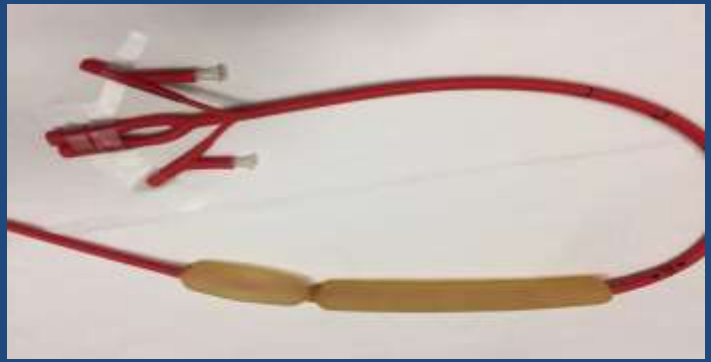
- **Off-label** but appears safe for variceal bleeding
- Role as bridge therapy
  - Improves early clinical and endoscopic hemostasis*
- Limited efficacy for control of torrential variceal bleeding
- Useful for post-banding bleeding



Ibrahim M et al. Gut 2019;68:844*

Balloon Tamponade

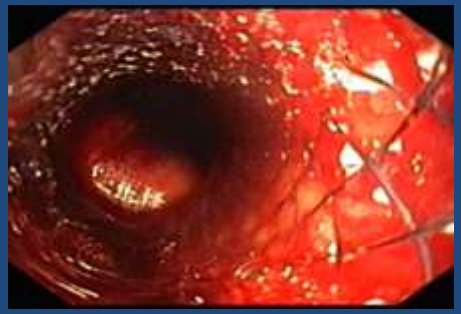
- Hemostasis in 60-90% of cases
- Deflate balloon <24 h due to pressure tissue necrosis
- Bridge (24 h max) to definitive therapy
  - 50% rebleeding rate on balloon deflation
- Up to 20% mortality rate due to serious AEs
  - Inexperienced personnel a contributing factor



When Feasible, Place Balloon Tamponade Device Endoscopically

BT-induced Perforation

Self-Expandable Metal Stent (SEMS) for Variceal Tamponade



SX-ELLA Stent Danis
(not FDA Approved)

- Dedicated 135 mm long X 25 mm wide fully covered metal stent (SX-ELLA Stent Danis)
- Can be placed without endoscopic or fluoroscopic guidance
  - However, wire-guided endoscopic placement preferred
- In situ for up to 14 days
- Atraumatic removal using a dedicated extraction device

SEMS

Systematic Review/Meta-analysis

N=12 studies; n=155 patients

	Rate	95% CI
Technical success	97%	0.91–1.00
Clinical Success Absence of bleeding within 24 hours of SEMS placement	96%	0.90–1.00
Adverse events Rebleeding after 48 hours Ulceration Stent migration	36%	0.23–0.50
30-day survival	68%	0.56–0.80
60-day survival	64%	0.48–0.78

McCarty TR et al. Dig Endo 2016;28:539

SEMS vs. Balloon Tamponade
Multicenter RCT

	SEMS (n=13)	BT (n=15)	p-value
Success of therapy (No bleeding + no SAEs + alive at day 15)	66%	20%	0.025
Bleeding control	85%	47%	0.037
PRBC transfusions	2	6	0.08
Serious Adverse Events	15%	47%	0.077
Use of TIPS	4	10	0.12
6-wk survival	54%	40%	0.46

Escorsell A et al. Hepatology 2016;63:1957

Tamponade and Refractory Bleeding

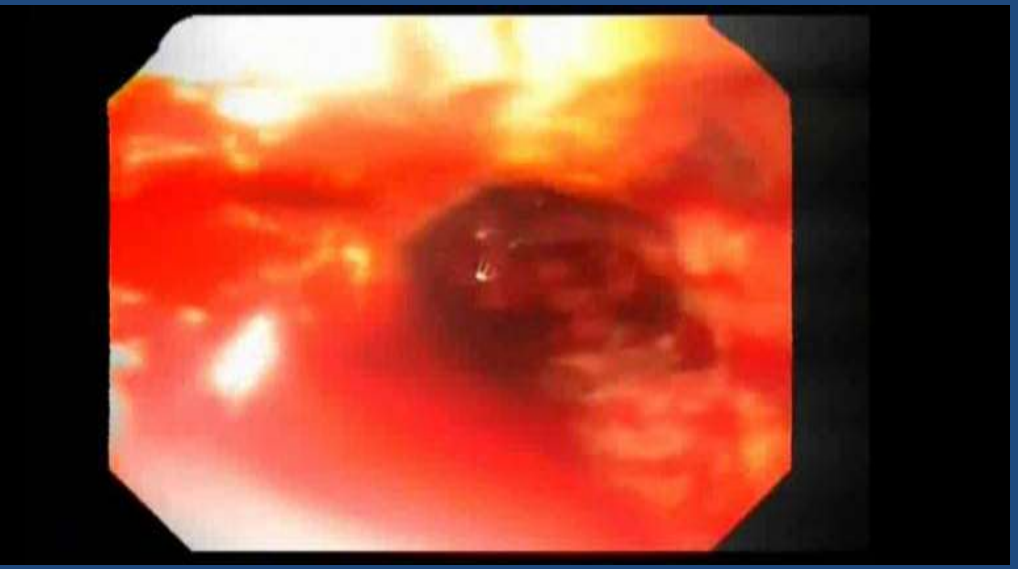
Baveno VI Consensus Statements

- **Balloon tamponade**, given the high incidence of its severe adverse events, should only be used in refractory esophageal bleeding, as a temporary "bridge" (for a maximum of 24 h) with intensive care monitoring and considering intubation, until definitive treatment can be instituted (5;D)
- Data suggest that **self-expanding covered esophageal metal stents** may be as efficacious and a safer option than balloon tamponade in refractory esophageal variceal bleeding (4;C)

Level of evidence: 1 (highest) to 5 (lowest)
Recommendation: A (strongest) to D (weakest)

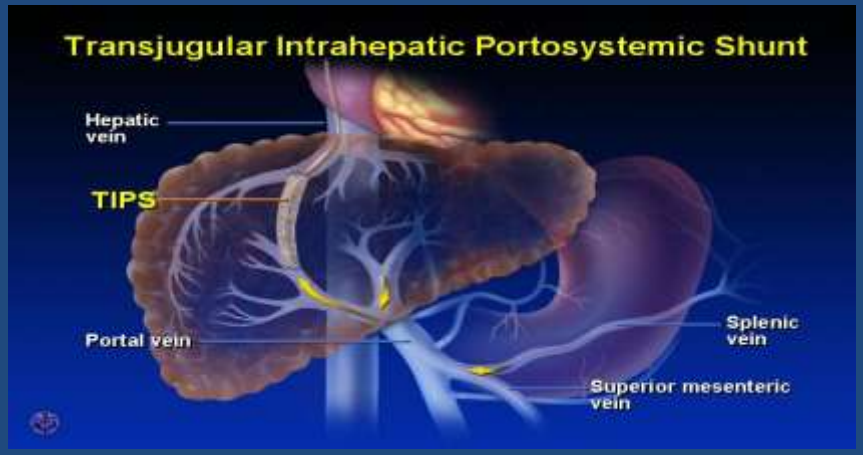
Baveno VI Consensus Workshop. J Hepatol 2015;63:743

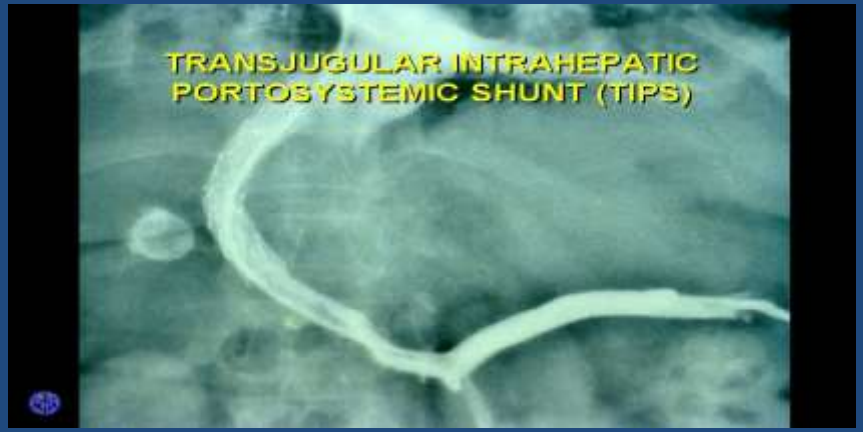
Can a Conventional Esophageal SEMS Be Used?



- Yes, but:
  - Not approved for this purpose
  - Tamponade may be suboptimal relative to dedicated SEMS due to stent configuration
  - Traumatic removal

TIPS





- PTFE-covered stents preferred over bare stents
  - Improved patency
  - ↓ encephalopathy
- As *rescue* therapy
  - Effective hemostasis (>90%)
  - Overall outcome remains poor (30-50% mortality)
- Risk of liver decompensation
  - MELD score >18-20, Child's C
- Risk of encephalopathy

TIPS and Refractory Variceal Bleeding

Baveno VI Consensus Statements

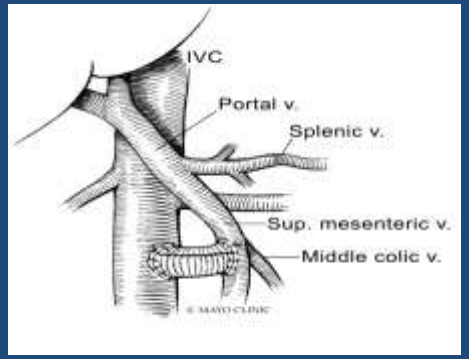
- Persistent bleeding despite combined pharmacological and endoscopic therapy is best managed by PTFE-covered TIPS (2b;B)
- Rebleeding during the first five days may be managed by a second attempt at endoscopic therapy. If rebleeding is severe, PTFE-covered TIPS is likely the best option (2b;B)

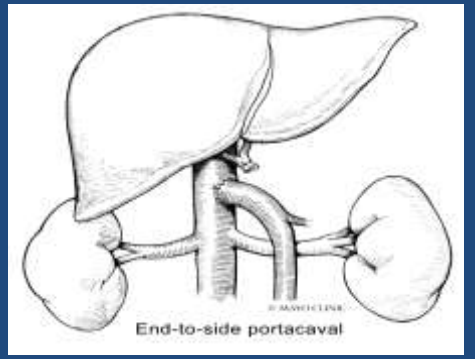
Level of evidence: 1 (highest) to 5 (lowest)
Recommendation: A (strongest) to D (weakest)

Baveno VI Consensus Workshop. J Hepatol 2015;63:743

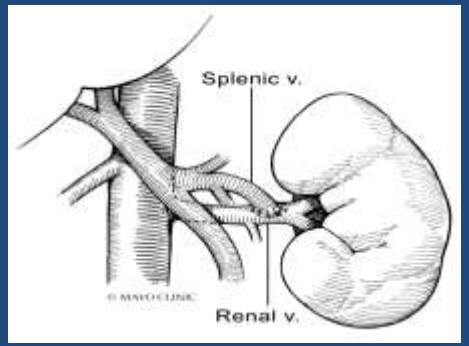
Surgery

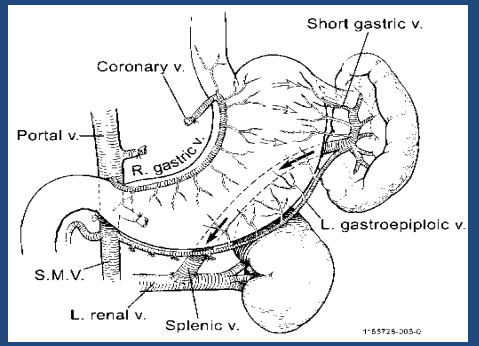
- **Shunt operations**
  - Nonselective
    - Portocaval shunts
  - Selective
    - Splenorenal shunts
- **Nonshunt operations**
  - Esophageal transection
  - Devascularization of the GEJ
    - Sugiura procedure





Portocaval Shunts





Splenorenal Shunts

Surgery

- Rarely performed as salvage therapy
- Up to 50% mortality rate
  - Liver failure
  - Surgical complications
- Potential surgical candidate
  - Well preserved liver function
  - No complications from the bleeding event
  - Contraindication to TIPS placement

Plug It Up! Managing Leaks and Fistulae

Hazem Hammad, MD
Assistant Professor of Medicine
Director of Advanced Endoscopy, Rocky Mountain Regional
VA Medical Center
Division of Gastroenterology & Hepatology
University of Colorado Anschutz Medical Campus
Aurora, Colorado

Plug it up! Managing leaks and fistulae

HAZEM HAMMAD, MD

ASSISTANT PROFESSOR OF MEDICINE

UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

DIRECTOR, ADVANCED THERAPEUTIC ENDOSCOPY

VA EASTERN COLORADO HEALTH CARE SYSTEM

- A surge in the evolution of luminal interventional endoscopic techniques (ESD, POEM, EFTR….)

- Widespread use of laparoscopic and bariatric surgical procedures with increased incidence of GI defects (anastomotic leaks, perforations and marginal ulcers)

Zhang LP. Surg Endosc 2014

Definitions

- Perforation: Full-thickness defect in the GI wall that occurs spontaneously or as a result of an injury (iatrogenic or traumatic)

- Fistula: Abnormal epithelialized communication between two or more GI lumens. They can be internal (between organs) or external

- GI leak: Abnormal communication between the GI lumen and the surrounding space due to a defect in the wall (e.g. surgical anastomosis)

Esophageal perforation

- 14% from re-operation for hiatal hernia, 4% from laparoscopic anti-reflux surgery

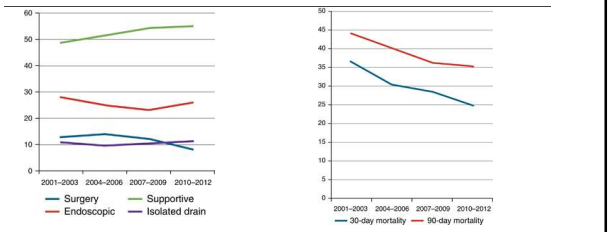
- 30 day mortality rate up to 12–30%.

Esophageal anastomotic leak

- 8–10% following esophagectomy
- Mortality 10–20%

Zhang LP. Surg Endosc 2014

Esophageal perforation



Markar SR. Am J Gastroenterol 2015

Bariatric surgery related defects

- Gastrojejunal leaks after RYGB procedures is seen in 0.3–8%
- Gastro-gastric fistula (1.2% cases)
- Gastric staple-line leak and fistula following sleeve gastrectomy

Carrodeguas L. Surg Obes Relat Dis. 2005

Diagnosis

- Chest and abdominal computed tomography (CT) scan

- Fistulogram with water-soluble contrast for definitive diagnosis and anatomic delineation

Approach to management

- Identification of the site of disruption (CT, fistulogram..etc)

- Drainage of any leaked fluid collections or abscesses

- Control the flow of luminal contents (diversion of luminal contents or closure of the disruption)

- Supportive management: Bowel rest, broad spectrum antibiotic therapy, fluid and electrolyte management, enteral/parenteral nutrition

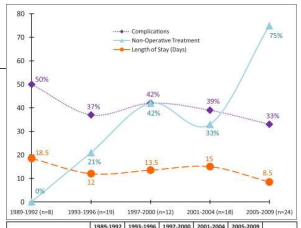
Rogalski P. World J Gastroenterol 2015

Management

- A trend towards non-surgical management of these defects.

- In esophageal perforations: Operative treatment decreased from 100% in 1989–1992 to 25% in 2005–2009.

- Increase in the use of endoscopic management techniques from 38% to 80%



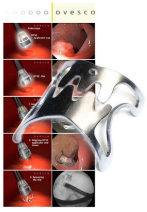
	1989-1992 (n=8)	1993-1996 (n=19)	1997-2000 (n=12)	2001-2004 (n=18)	2005-2009 (n=24)	P
Complications (%)	50	37	42	39	33	0.94
Non-Operative Treatment (%)	0	21	42	33	75	< 0.001
Median LOS (Days)	18.5	12.0	13.5	15.0	8.5	0.094

Kuppusamy MK.J Am Coll Surg. 2011

Endoscopic therapy

Endoclips:

- Through the scope (TTSC) can be used to close small defects <1 cm
- Over the scope clips (OTSC) can provide full-thickness closure of defects up to 2 cm



Endoscopic stents

- FCSEMS are the most commonly used

- 76–83% success for benign upper GI perforations or leaks

- Stent migration, can be reduced with large-diameter stents, endoclips or endoscopic sutures

Fuji LL. Gastrointestinal endoscopy. 2013
van Halsema EE. World J Gastrointest Endosc. 2015

Endoscopic suturing

- Endoscopic suturing can be used for stent fixation, closure of fistulas and perforations
  - - Technical success (97%)
  - - Clinical success:
    - 91.4% in stent anchorage
    - 93% in perforations
    - 80% in fistulas
    - 27% in anastomotic leak

- Particularly in fistula management, endoscopic suturing is typically combined with argon plasma coagulation (APC), through the scope clips, over the scope clips.

Sharaiha RZ. J Clin Gastroenterol. 2016

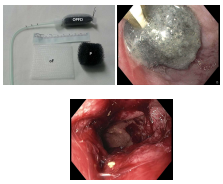
Suturing for GI fistulas

- 56 patients with different types of fistulas - gastrogastric fistulas (52%)
- Immediate success (100%).
- Durable closure in 22.4% at 12 months
- 17.1% ongoing closure rate of gastrogastric fistulas and 31.4% closure rate of other fistulas.

Mukewar S. Endoscopy 2016

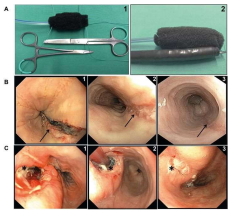
Endoscopic vacuum therapy (EVT)

- All patients with acute or chronic GI defects can be candidates
- The sponge is connected to a vacuum device with a constant pressure of 125–150 mmHg. The wound cavity collapses around the sponge with resulting evacuation of the cavity
- Multiple mechanisms: changes in perfusion, microdeformation, macrodeformation, exudate control, and bacterial control



Loske G. Chirurg. 2019
Panayi AC. World J Dermatology. 2017

Procedure



Video

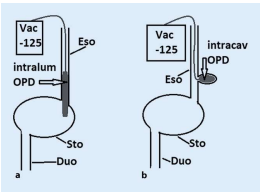
Laukoetter MG. Surg Endosc. 2017

- Placement

Intracavitary vs. Intraluminal EVT

- Sponge system exchanges

Every 3 to 5 days

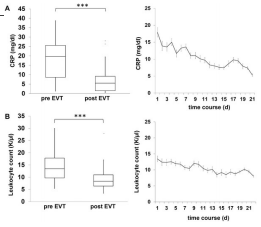


Loske G. Chirurg. 2019

Efficacy of EVT

- 67% to 100% success rate

- Clinical success of 90% in esophageal acute perforations with a mean sponge exchange of 5.4 (2 to 12) and a period of 19 ± 14 days



Heits N. Ann Thorac Surg. 2014
Laukoetter MG. Surg Endosc. 2017

EVT vs. Stents

EVT has:

- Higher leak closure rate, pooled OR 5.51 (95% CI 2.11–14.88).
- Shorter treatment duration, pooled mean difference −9 days (95% CI 16.6–1.4)
- Lower major complication and mortality

Rausa E. Dis Esophagus. 2018

EVT safety

- Typically safe procedure with a low rate of adverse events
  - Discomfort due to NGT.
  - Numerous repeat procedures
- Risk of major bleeding
  - Prospective study: 52 patients treated with EVT, two patients died due to major bleeding
  - Another smaller study: Patient with severe hemorrhage from an aorto-anastomotic fistula after dilation

Laukoetter MG. Surg Endosc. 2017
Ahrens M. Endoscopy 2010

EVT limitations

Defects larger than 5 cm

Multiloculated fluid collections

Complete dehiscence of surgical anastomosis

GI-cutaneous fistula

Defects in communication with tracheobronchial tree

Defects in close proximity of major vessels or therapeutic anticoagulation

Obesity Management: Gastroenterology's Role

Shelby Sullivan, MD
Associate Professor of Medicine
Director, Gastroenterology Metabolic and Bariatric Program
University of Colorado Anschutz Medical Campus
Gastroenterology, Hepatology, and Internal Medicine
Aurora, Colorado

University of Colorado **Anschutz Medical Campus**

Obesity Management: Gastroenterology's Role

Shelby Sullivan MD
Director of the Gastroenterology Metabolic and Bariatric Program
University of Colorado School of Medicine

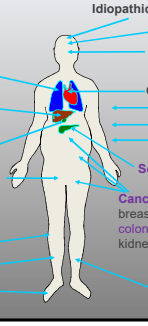
Anschutz Health and Wellness Center
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Disclosures

- Shelby Sullivan, M.D. has financial interests to disclose.
- Research Support / Grants
  - Aspire Bariatrics, ReShape Medical, GI Dynamics, USGI Medical, Obalon, BAROnova, Elira, Finch Therapeutics, ReBiotix, Allurion
- Consulting / Employment
  - USGI Medical, Obalon, Spatz, Elira Therapeutics, Aspire Bariatrics, GI Dynamics, NitiNotes Surgical, Endo Tools, Phenomix Sciences

Why Should Gastroenterologists Treat Obesity?

Treating Obesity Treats GI Diseases



Pulmonary disease
abnormal function
obstructive sleep apnea
hypoventilation syndrome

Nonalcoholic fatty liver disease
steatosis
steatohepatitis
cirrhosis

Gall bladder disease

Gynecologic abnormalities
abnormal menses
infertility
polycystic ovarian syndrome

Osteoarthritis

Skin

Gout

Idiopathic intracranial hypertension

Stroke

Cataracts

Coronary heart disease

Diabetes

GERD

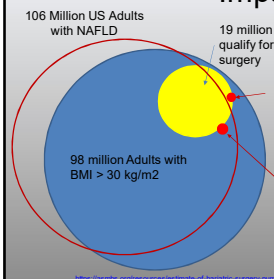
Hypertension

Severe pancreatitis

Cancer
breast, uterus, cervix
colon, esophagus, pancreas, liver
kidney, prostate

Phlebitis
venous stasis

Impact of Obesity

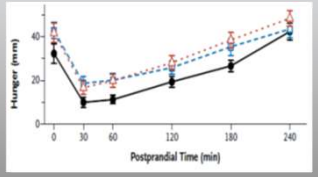


- Inadequate treatment for >95% of patients with obesity
  - Incremental costs of obesity: $1910 per person per year, adjusted to 2014
  - Incremental cost of diabetes: $9,600 per person per year, adjusted to 2017
- More therapeutic options and better access to care are needed

https://asmbs.org/resources/estimate-of-bariatric-surgery-numbers
Hales, CM. JAMA. 2018;319(23):2419-2429
ADA. Diabetes Care. 2018;41:917–928
Kushner R. Medical Clinics of North America. 2018;102(1):1-11

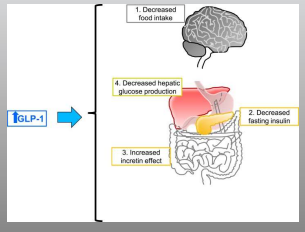
The GI Tract: Integral in Control of Food Intake

Ghrelin: 80% produced in the Fundus of the Stomach



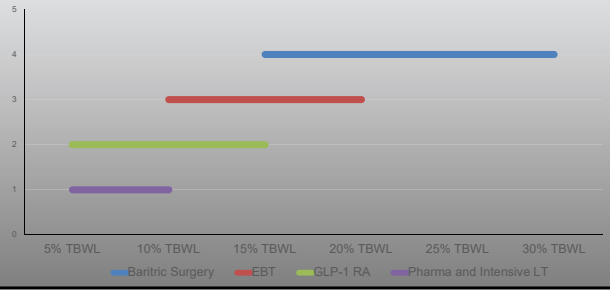
N Engl J Med 2011;365:1597-604

GLP-1: Produced in Enteroendocrine L Cells in the small bowel

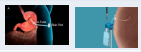


Hutch AR. Endocrinology. 2017;158(12):4139-4151

Most Effective Obesity Therapies Involve the GI Tract

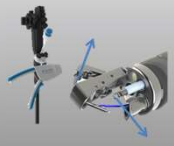


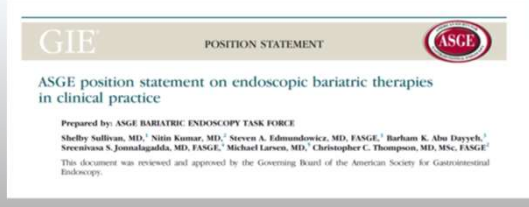
Devices with FDA Approval for Weight Loss Indications

Device Image	Device Name	Description	FDA Status
	Orbera Intragastric Balloon (Apollo Endosurgery, Austin, TX)	Silicone, single fluid filled balloon endoscopically placed for 6 months	Approved August 5, 2015
	AspireAssist System (Aspire Bariatrics, King of Prussia, PA)	Modified PEG made of silicone for aspiration of gastric content	Approved June 14, 2016 Open Label Study
	Obalon Balloon System (Obalon Therapeutics, Carlsbad, CA)	3 Swallowable Gas-filled Intragastric balloons removed endoscopically at 6 months	Approved September 8, 2016 (New Navigation system approved Feb 2019)
	Transpyloric Shuttle (BARONova, Gloeta, CA)	Silicone sheath filled with silicone cord, Endoscopic, in place 12 months	Approved April 16, 2019
	ReShape Dual Intragastric Balloon (Apollo Endosurgery, Austin, TX)	Silicone, two balloons, fluid filled endoscopically placed for 6 months	Approved July 28, 2015 *no longer commercially available

Endoscopic Sleeve Gastroplasty (ESG)

- Performed with the Apollo Overstitch (Apollo Endosurgery, Austin, Tx)
- FDA 510K clearance for tissue apposition in the GI tract
  - No specific indication for ESG
- Randomized controlled is pending




GIE POSITION STATEMENT

ASGE position statement on endoscopic bariatric therapies in clinical practice

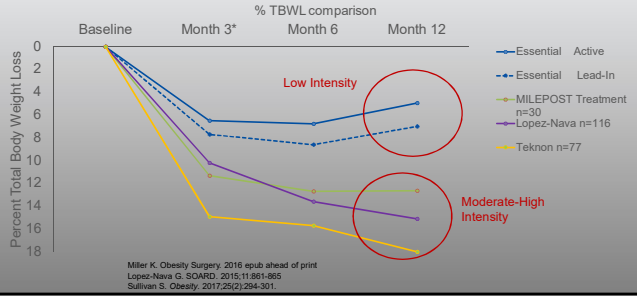
Prepared by: ASGE BARIATRIC ENDOSCOPY TASK FORCE

Shelby Sullivan, MD,[1] Nitin Kumar, MD,[2] Steven A. Edmundowicz, MD, FASGE,[2] Barham K. Abu Dayyeh,[3] Sreenivasa S. Jonnalagadda, MD, FASGE,[4] Michael Larsen, MD,[1] Christopher C. Thompson, MD, MSc, FASGE[2]

This document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy.

- Lifestyle therapy should be performed with at least the same frequency as in the trials for FDA approval and continue for a year
- It is advisable that endoscopists have a mechanism to enroll patients into long-term follow-up care for weight loss maintenance

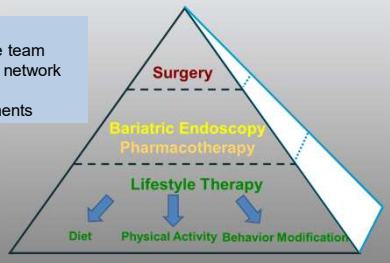
Effect of Intensity of Lifestyle Therapy on Weight Loss



Miller K. Obesity Surgery. 2016 epub ahead of print
Lopez-Nava G. SOARD. 2015;11:861-865
Sullivan S. *Obesity*. 2017;25(2):294-301.

Comprehensive Obesity Treatment

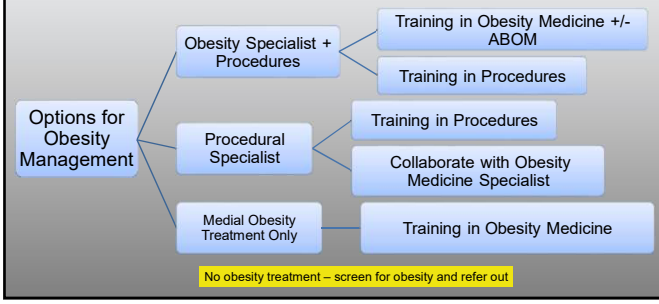
Options:
- ✓ In house team
- ✓ Referral network
- ✓ Virtual Components



What's a Gastroenterologist to do?

There are options

Gastroenterology and Obesity Treatment



Training in Medical Management of Obesity

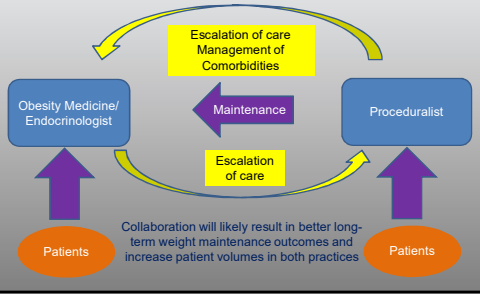
- Basic obesity education
  - Courses
    - Obesity Medicine Association Spring Conference
    - Obesity Medicine Association Fall Conference
    - Harvard Blackburn Course in Obesity Medicine
    - Columbia University/ Weill Cornell Obesity Course
    - Obesity Week
  - American Board of Obesity Medicine
    - Minimum of 60 credits of CME in obesity
      - 30 credits must be from attendance at a group 1 meeting listed above
      - 30 can be from attendance or online CME
      - Must be documented before time of application
    - Exam offered once a year
    - Registration required

AMERICAN BOARD of OBESITY MEDICINE

Training in EBT

- Device training
  - Industry sponsor training for certificate
  - Hands on courses
  - Rotations at Programs with EBT expertise
- In development: ASGE STAR program

Proceduralist– Obesity Medicine/Endocrinologist



Thank You!