ERCP

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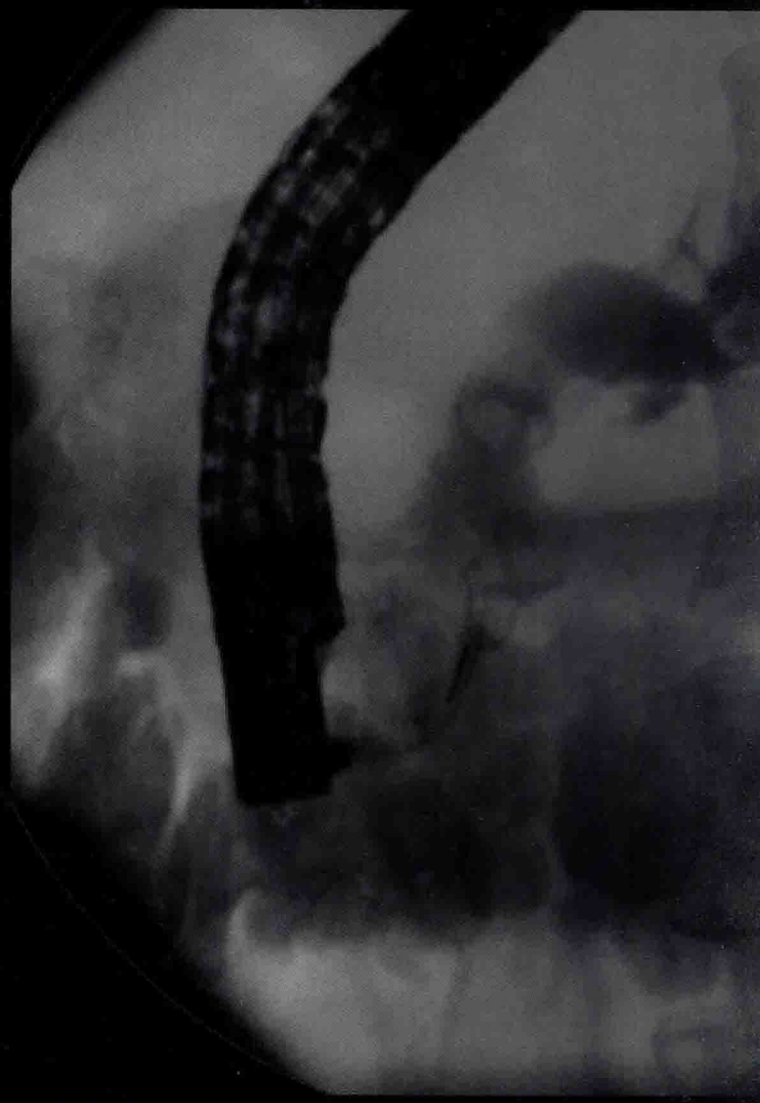

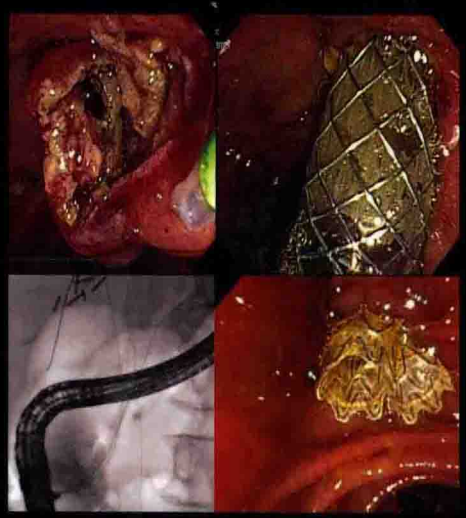

Second Edition

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This text is dedicated to our families, who have endured our long days at work and our evenings and weekends harassing tardy chapter authors, finessing verbiage, and adding images and references for a new, improved, non-fattening, and gluten-free text.

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Foreword

It has been 5 years since the first edition of *ERCP* was published. The original foreword, "ERCP Past, Present, and Future," may have been prescient. It recognized the importance of other technologies, including CT and MR scanning, and only touched upon EUS as a diagnostic supplement to these imaging techniques and to ERCP as well. In the intervening years, EUS has evolved as a complementary, and occasionally competitive, technique to retrograde cholangiopancreatography. The second edition of *ERCP* acknowledges this evolution with chapters devoted to EUS access of the pancreaticobiliary tree for diagnosis as well as transluminal and rendezvous therapy. As such, EUS has supplemented, and sometimes supplanted, traditional therapies such as interventional radiology and conventional surgery. However, as we are mindful of the past, we have included a chapter on the history of ERCP.

What else has happened over the past 5 years? The obesity epidemic has hit Western society and elsewhere in the developed world. As bariatric surgeries have flourished and long-length endoscopic (double/single balloon enteroscopes, spiral overtube-assisted) ERCPs have become commonplace, as have laparoscope-assisted transgastric approaches to the pancreaticobiliary tree (see Chapter 29). Our prediction is that although currently limited to tertiary care and referral institutions, transgastric ERCP and evolving methods to perform ERCP in gastric bypass patients will be performed by many more centers in the years to come.

What else? ERCP has become more globalized. ERCP is in the domain of developed countries, but the techniques described in the second edition of *ERCP* are replacing surgery throughout the developing world. Although "one-time-use" accessories may be repeatedly reprocessed until dysfunction, an issue of geography and economic resources will continue to evolve because of disposal of these accessories.

Finally, there have been studies over the past 5 years that discuss not only ERCP indications and techniques but also when other imaging procedures may be safer and more appropriate. The chapter on radiologic imaging by Morgan and Schueler now includes radiation safety. We are aware that EUS may be a better diagnostic tool for chronic pancreatitis than ERCP, that planning endoscopic therapy for complex hilar lesions without preceding MRCP or spiral CT for a roadmap is ill-advised, and that both EUS and MRCP can diagnose pancreas divisum in the majority of patients without need for direct pancreatography. Perhaps more importantly are studies suggesting that routine biliary decompression in resectable patients with distal malignant obstructive jaundice is unnecessary and may be associated with higher rates of adverse events than in individuals who undergo surgery alone. Likewise, differentiation between walled-off pancreatic necrosis (WOPN) and pancreatic pseudocysts has precluded therapeutic endoscopic misadventures. Finally, procedural techniques have evolved to minimize, but have not eliminated, the ERCPist's nemesis, acute post-ERCP pancreatitis. These techniques include guidewire cannulation, placement of small-diameter pancreatic duct stents, use of rectal NSAIDs, and most importantly, as defined in the chapter on indications and contraindications, avoiding use of this technology for marginal indications.

With the foregoing as background, the Editors and individual chapter authors proffer state-of-the-art information and imaging for *ERCP, second edition.*

Acknowledgments

The Editors acknowledge our medical colleagues (gastroenterologists, surgeons, and interventional radiologists) for their outstanding contributions to our patients' care, and the authors of this textbook for their excellence. In particular, we acknowledge Jane Babione for her tireless editing and organizational efforts. Single-handedly, she has made this a better text.

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Section I

General Topics

Chapter 1

Four Decades: The History of ERCP

Lee McHenry and Glen Lehman

Endoscopic retrograde cholangiopancreatography (ERCP) has been a remarkable technological advance over the past 40 years in the field of gastrointestinal endoscopy and has redefined the medical and surgical approach to patients with pancreatic and biliary tract diseases. Since its inception in 1968, the medical community has witnessed significant achievements by the pioneers in endoscopy who incrementally advanced ERCP techniques from their infancy to maturity. The "infancy" of ERCP focused on diagnosis, the "adolescence" on therapy of common biliary tract diseases such as bile duct stones and malignant strictures, the "early adulthood" on pancreatic endotherapy and prevention of post-ERCP pancreatitis (PEP), and the current "mature adulthood" on continued refinement of techniques to make ERCP safer and more effective. Numerous pioneers in the field of ERCP have played significant roles in developing new techniques and novel instrumentation, spearheaded innovative techniques to reduce adverse events, and trained generations of endoscopists to perform safe ERCP. We have now reached a 40-year milestone in ERCP and can look back and recall an exciting and enjoyable journey, replete with enthusiastic innovation that has benefited so many patients (**Boxes 1.1 and 1.2**). It would require an entire textbook to incorporate all of the important contributions made by the many ERCP clinicians over the past 40 years. We extend an apology in advance to any individuals omitted from this brief summary of the history of ERCP.

ERCP in Its Infancy

In the 1920s bile duct imaging was performed by surgeons Evarts Graham and Warren Cole with the use of intravenously administered iodinated phenolphthalein that was selectively excreted into the bile and recorded radiographically. Oral cholecystography and percutaneous skinny "Chiba" needle cholangiography were subsequently developed to improve the visualization of the bile duct.[1,2] What defied the clinician was a nonoperative technique to image the pancreatic duct. In 1965 two innovative radiologists, Rabinov and Simon,[3] fashioned a bendable catheter that was inserted through a peroral basket catheter. The medial duodenal wall was "blindly scratched" with the tip of the catheter and resulted in the first nonoperative pancreatogram (**Fig. 1.1**). In eight attempts, Ravinov and Simon obtained an interpretable pancreatogram in two patients. The gastrointestinal endoscopist now entered the arena. William McCune and his surgical colleagues at George Washington University (Washington, D.C.) are credited with the first report of endoscopic cannulation of the ampulla of Vater in living patients.[4] McCune used an Eder fiberoptic duodenoscope (Eder Instrument Company, Chicago), which had both a forward and side lens and an endotracheal-type cuff placed on the scope just beyond the lens. The balloon was inflated and deflated to enable adequate focal length for mucosal visualization. McCune taped a small-diameter plastic tube that served as a tract to the endoscope and could house a bendable cannula. The cannula was advanced to the major duodenal papilla under endoscopic guidance. McCune's cannulation success rate was only 25% (50% duodenal intubation and 50% pancreatic duct opacification) in his report of 50 patients. In his discussion of the first reported series, McCune stated: "Anyone who looks through one of these instruments has to have 2 personality characteristics. First, he has to be honest, and secondly, you have to have an undying, blind, day and night, uncompromising persistence." ERCP was born, and slowly grew to an established technique due to the honesty and persistence of endoscopic pioneers.

In March 1969 in Japan, Oi (**Fig. 1.2**) and colleagues—in close collaboration with Machida (Machida Endoscope, Ltd., Tokyo) and Olympus corporations (Olympus Optical Co., Ltd., Tokyo)—developed a side-viewing fiberoptic duodenoscope with a channel and an elevator lever to enable manipulation of the cannula. Initially, Oi was able to visualize the ampulla in about half of 105 cases.[5] In a subsequent report, Oi was able to cannulate the papilla in 41 of 53 patients (71%) without significant morbidity.[6] By 1972 Jack Vennes and Steven Silvis of the University of Minnesota had published the experience in their first 80 attempts at cannulation of the bile and pancreatic ducts, paving the way for acceptability in the American endoscopic wilderness (**Table 1.1**).[7,8] Over the next 5 years, pioneers with the names Safrany, Cotton, Geenen, Siegel, Classen, and Demling and the Japanese groups (**Fig. 1.3**) embraced this new technique and reported on the successes (cannulation rates >90%) (**Fig. 1.4**), the shortcomings (PEP), the nuances (variety of cannula types, cannulation angles), and the practical application of ERCP in our understanding of biliary and pancreatic disorders.[9–15] But what could we as endoscopists do with this newfound knowledge?

Simultaneously in 1973, in separate regions on the globe, ERCP investigators conceived the concept of a therapeutic