

The SAGES University Masters Program Series
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The SAGES Manual of Biliary Surgery

Horacio J. Asbun
Mihir M. Shah
Eugene P. Ceppa
Edward D. Auyang
Editors



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Preface

Although benign biliary disease is an area in which many surgeons have experience, there are many nuances to providing the highest quality of surgical care. The biliary anatomy is unique, asymmetric and can be distorted by benign pathology. Biliary surgery has been one of the earliest adoptors of minimally invasive techniques in the late 1980s. However, surgical technique has continued to evolve due to advanced fellowship training and improvement in surgical technology. The expertise, sage, and knowledge of the members of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) have prioritized the creation of this manual on modern biliary surgery. Many leaders and innovators in the field of biliary surgery have served as authors to the comprehensive and authoritative descriptions in the chapters included in this manual.

This text will provide the standard for the current state of biliary surgery in the twenty-first century. Both for the surgical trainee and senior surgeon, this manual will provide great insight into the modern evaluation and management. The highlights will emphasize what is both feasible and safe from a minimally invasive approach in biliary surgery. The concept of safe cholecystectomy will be defined and expounded in great detail. The most difficult cholecystectomies will be given ample coverage to include management of intraoperative bile duct injury, indications and techniques of subtotal cholecystectomy, and special attention to intraoperative diagnostic imaging that serves as adjuncts, including cholangiog-

raphy, ultrasound, as well as indocyanine green biliary fluorescence. We will review the updated international Tokyo Guidelines from 2018 for acute cholecystitis. Furthermore, the evolution of treatment of choledocholithiasis has evolved the most in recent years and thus requires an extensive discussion of the non-operative and operative management of bile duct stones.

This text will serve as an important contribution to the medical literature sponsored by SAGES, an international leading authority in gastrointestinal surgery with a keen interest in safe and proficient biliary surgery. Leaders in the field of biliary surgery will impart their profound insight and considerable experience in the chapters planned for this manual. The intent for this manual is to be the cited resource for high-quality and applicable knowledge for the treatment of benign biliary disease. The authors and editors hope you will find this all to be true.

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Chapter 1

Introduction to Biliary Manual



Dimitrios Stefanidis

Since its introduction approximately 30 years ago, laparoscopic cholecystectomy (LC) has become the gold standard for the surgical treatment of gallbladder disease due to its low morbidity and quick patient recovery [1]. Despite this, up to 8% of patients undergoing LC develop a complication, a rate that has not changed significantly in the past 30 years [2]. Importantly, an increase in the bile duct injury rate has been observed in patients undergoing LC compared to the era of open cholecystectomy [3]. At the present time, biliary complications after laparoscopic cholecystectomy occur in approximately 1 in 100 patients, while 2–4 out of 1000 patients experience a major biliary injury that requires biliary reconstruction [2]. Considering that approximately 90% of the 1,000,000 cholecystectomies each year are performed laparoscopically in the USA, this rate translates into approximately 3000 or more major biliary injuries in the USA annually.

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Patients sustaining bile duct injuries require numerous re-interventions and hospitalizations, suffer a diminished quality of life, and have an up to 8.8% increased risk of mortality [4, 5]. These injuries are the most common reason for medicolegal litigation against general surgeons and place a significant economic burden on our healthcare system with an estimated annual cost of more than 1 billion dollars [6, 7].

Given the frequency of this operation and a rate of bile duct injury that has not decreased despite accumulating experience with laparoscopy over time, improving the safety of laparoscopic cholecystectomy is an important priority in surgery. To address this issue and bring it to the attention of the surgical community, the Society of American Gastrointestinal and Endoscopic Surgery (SAGES) formed the Safe Cholecystectomy Task Force in 2014 with the mission of enhancing a universal culture of safety in LC in order to reduce biliary injuries. The group has created numerous educational materials and initiated several projects aiming to improve the safety of the laparoscopic cholecystectomy (<https://www.sages.org/safe-cholecystectomy-program>) [8]. More recently, with the introduction of the SAGES Masters program that aims to address existing needs of practicing surgeons for lifelong learning after training completion by providing them with the tools to achieve maintenance of certification, a biliary pathway has been created [9]. This pathway aims to educate surgeons in biliary tract surgery by offering curricula and educational material addressing three levels of performance (competency, proficiency, and mastery). Each level incorporates an anchoring procedure that is meant for training and assessment of surgeons.

The biliary manual you have in your hands provides you with an excellent resource for essential knowledge relevant to the care of patients with gallbladder disease. It is organized according to the levels of the SAGES Masters biliary pathway and addresses in-depth laparoscopic cholecystectomy and other related procedures all general surgeons should be familiar with when caring for this patient population.

In Sect. 1, at the competency level of the Masters program, the surgical anatomy of the biliary tree and the principles and

technique of safe cholecystectomy are described. Further, selection of appropriate preoperative imaging, patient optimization approaches for elective procedures, and optimal timing of cholecystectomy for acute cholecystitis, including use of cholecystostomy tubes, are addressed.

At the proficiency level, the technique, advantages, and disadvantages of intraoperative biliary imaging (including cholangiogram, ultrasound, and ICG) are discussed, while at the mastery level, the management of common bile duct stones is described (including endoscopic and surgical approaches).

In Sect. 2, the management of bile duct injuries is addressed, and a description of the indications and technique of advanced biliary procedures is provided.

We are confident that this biliary manual, written by experts in the field, will provide you with the requisite knowledge to offer excellent care to your patients with gallbladder disease and assist you in the development of mastery with biliary tract procedures.

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