Technical Aspects of Cholecystectomy

Alberto R. Ferreres, MD, PhD[a], Horacio J. Asbun, MD[b,*]

KEYWORDS

- Cholecystectomy • Laparoscopy • Alternative approaches
- Single-incision laparoscopy • Natural orifice transluminal endoscopic surgery

KEY POINTS

- Laparoscopic cholecystectomy (LC), introduced in the late 1980s and popularized in the early 1990s, is considered the gold standard for the treatment of symptomatic cholelithiasis.
- Even though LC is a very safe operation, the reported incidence of major bile duct injuries remains higher than that for open cholecystectomy. Safety steps should be routinely practiced during LC to prevent bile duct injuries.
- Adherence to sound surgical judgment and technique will result in better outcomes.
- Open cholecystectomy is mostly the result of conversion during LC, and conversion to open surgery should not be implicitly considered as a complication. Surgical trainees and young surgeons should also be adequately trained to complete a cholecystectomy in an open fashion.
- New approaches to even minimize LC have been proposed lately, including NOTES (Natural Orifice Transluminal Surgery), both transgastric and transvaginal, and single-incision laparoscopic surgery, but the benefits of these techniques over the traditional laparoscopic approach have yet to be proved.
- Special attention must be paid to intraoperative and postoperative complications so as to achieve early detection and management if a complication occurs.

The following videos: 1. Creation of pneumoperitoneum. 2. Insertion of trocars. 3. Take-down of adhesions. 4. Retraction and exposure of the gallbladder. 5. Opening the serosal layer that surrounds the cystic duct and artery. 6. Dissection of both structures and achievement of the critical view of safety. 7. Intraoperative cholangiogram. 8. Dissection clipping and section of the cystic duct and artery. 9. Dissection of the gallbladder from the liver bed. 10. Irrigation

The authors have nothing to disclose.

[a] Division of Gastrointestinal Surgery, University of Buenos Aires, Vicente Lopez 1831 PB, Buenos Aires 1128, Argentina; [b] Hepatobiliary and Pancreas Program, General Surgery, Mayo College of Medicine, Mayo Clinic, 4500 San Pablo Road, Jacksonville, FL 32224, USA
* Corresponding author.
E-mail address: asbun.horacio@mayo.edu

Surg Clin N Am 94 (2014) 427–454
http://dx.doi.org/10.1016/j.suc.2014.01.007 **surgical.theclinics.com**
0039-6109/14/$ – see front matter

and final assurance of hemostasis. 11. Extraction of the gallbladder. 12. Trocar retrieval and closure of incisions. 13. Umbilical laparoscopic approach. 14. Transvaginal access. 15. Gallbladder retraction. 16. Gallbladder retraction. 17. Dissection of the hepatic hilum and triangle of Calot. 18. Dissection of gallbladder from the liver bed. 19. Extraction of the gallbladder. 20. Vaginal Closure. 21. Incision and trocar placement. 22. Gallbladder retraction and exposure. 23. Dissection of the hepatic hilum. 24. Dissection of the gallbladder from the liver bed and control. 25. Extraction of the gallbladder. 26. Wound closure accompany this article at http://www.surgical.theclinics.com/

INTRODUCTION

Carl Langenbuch is credited as the first surgeon to perform an open cholecystectomy (OC) in 1882. He had done his research in animals and cadavers before performing the first human procedure. Langenbuch postulated that removal of the gallbladder would result in extraction of the gallstones and of the organ that produced them.[1] In 1985, E. Muhe from Boblingen, Germany performed the first laparoscopic cholecystectomy (LC), but was confronted by great opposition from his colleagues.[2] Three years later a French gynecologist, P. Mouret, performed an LC, which influenced F. Dubois and J. Perissat in developing their technique for this approach. The popularization of this technique in the United States should be credited to E.J. Reddick and D.O. Olsen from Nashville, Tennessee, who performed their first case in 1988 and established the principles of the operation as it is presently known.[3]

During the 1990s, attempts were described to further reduce the laparoscopic minimally invasive approach to a single incision.[4,5] The use of small-diameter 2- to 3-mm trocars and instruments, known as the needlescopic technique, was also tried. Neither of these techniques gained general acceptance because of the lack of proven benefit.

LC became the first procedure in a revolution that changed the way in which abdominal surgery was being performed. In the ensuing 15 years, a laparoscopic approach was reported as feasible for almost every abdominal procedure. This advance resulted in a significant benefit to the patient for most of the procedures, owing to the inherent advantages of the laparoscopic technique. For LC, however, there is still an increased risk of bile duct injury (BDI) in comparison with the now historical OC. The common denominator in the occurrence of BDI is a failure to clearly identify the anatomy of the triangle of Calot (**Fig. 1**). Although this lingering disadvantage to LC does not justify performing an OC, it needs to be continuously attended to. Steps to prevent BDI were described in the early years of LC,[6] and in 1995 Strassberg[7] described the term “critical view of safety” as the most important step in the avoidance of BDI during the procedure (**Fig. 2**).

NOTES stands for Natural Orifice Transluminal Endoscopic Surgery, and owes part of its development to Anthony Kalloo, a gastrointestinal endoscopist from Johns Hopkins, and Paul Swain, a British gastroenterologist. Both of these investigators favored a transgastric approach to NOTES endoscopic cholecystectomy, which, though initially embraced, showed potential disadvantages and difficulties for the performance of cholecystectomy. The proof-leak closure of the gastric opening, the retroflexion required to achieve good visualization to the Calot triangle and cystic structures, the technical challenges and the hazards in extracting the gallbladder through the gastric opening, and the esophageal junction all conspired against the adoption of this technique.[8] After an initial experience in transgastric cholecystectomy by one of the authors (A.R.F.), this approach was abandoned in favor of the