A Step-by-Step Guide to Laparoscopic Subtotal Fenestrating Cholecystectomy: A Damage Control Approach to the Difficult Gallbladder

Sharmila Dissanaike, MD, FACS

Damage control surgery is a concept that was pioneered in the field of trauma,[1] but has expanded over the past decades to emergency general surgery as well. This article describes a damage control approach to cholecystectomy, one of the most common general surgical procedures, by using a laparoscopic subtotal fenestrating cholecystectomy in cases of severe inflammation discovered intraoperatively in a patient admitted for acute cholecystitis.[2]

Cholecystectomy remains an operation with a significant incidence of complications, despite it being one of the most commonly performed procedures in the US. It is widely acknowledged that cases with dense inflammation may obscure the anatomy and increase the risk of major injury, including to the common bile duct; several groups, including the SAGES Safety in Cholecystectomy Task Force, have recently proposed approaches that reduce this risk.[3]

The traditional paradigm has been that in cases deemed technically difficult, the default should be to convert to open surgery. This approach is derived from historic precedent in that cholecystectomy morphed from an open operation to a predominantly laparoscopic procedure in a very short time. However, increasing concern about the lack of open cholecystectomy experience among recent and future general surgery graduates has called this algorithm into question.[4] In addition, there is evidence that conversion does not reduce rates of common bile duct injury, especially among surgeons less familiar with the open approach.[5] Philosophically, the proposal that the fallback option in a difficult case be a procedure that the surgeon is much less familiar with is fundamentally unsound.

One salvage option that has been described in the literature is the partial or sub-total cholecystectomy approach, both open and laparoscopic. A recent meta-analysis of more than 30 articles and 1,231 total cases of sub-total approaches showed an acceptably low morbidity and mortality rate, with only 1 case of common or hepatic bile duct injury. The biggest drawback of this approach was the 18% rate of bile leak, which occurred primarily when the cystic stump was left open. Interestingly, reoperation was necessary in only 1.8% of cases, with bile leaks usually managed successfully nonoperatively.[6] Although there have been many studies published on alternate surgical approaches to cholecystectomy, a drawback has been the inclusion of varying methods under the banner of "sub-total" or "partial" cholecystectomy, rendering it difficult to draw conclusions about any given approach. Lack of consistency in nomenclature has further worsened the problem. Strasberg and colleagues[2] recently attempted to clarify the nomenclature by dividing the surgical approaches into fenestrating and reconstituting sub-types.

This article describes 1 alternative to the traditional cholecystectomy, for use in situations in which there is dense fibrotic inflammation in the cystic triangle. The method described in this article is a version of laparoscopic fenestrating subtotal cholecystectomy. In my experience, the procedure described is a definitive operation for the patient's disease. Although the technique described here is laparoscopic, a similar open procedure has been described in Zollinger's Atlas of Surgical Operations,[7] indicating recognition that converting to an open operation does not always allow for safe standard dissection.

Because this procedure is reserved only for cases in which dissection in the Triangle of Calot is deemed too unsafe to proceed, this is a limited case series of 15 patients. Patients in this series were predominantly male, with a history of multiple episodes of cholecystitis before the procedure. There were no complications. To my knowledge, none of the patients has developed recurrent biliary symptoms or required reoperation, with time since operation ranging from 6 months to 8 years.

All patients underwent postoperative ERCP to speed the resolution of biliary drainage and therefore allow for faster drain removal based on author experience; a benefit of post-surgical ERCP has not been consistently demonstrated in the literature. The ERCP does carry a risk of pancreatitis; however, none of the patients in this series suffered this complication. The Jackson-Pratt drain was

Disclosure Information: Nothing to disclose.

Received March 21, 2016; Revised May 9, 2016; Accepted May 10, 2016.
From the Department of Surgery, Texas Tech University Health Sciences Center, Lubbock, TX.
Correspondence address: Sharmila Dissanaike, MD, FACS, Texas Tech University Health Sciences Center, Mailstop 8312, 3601 4th St, Lubbock, TX 79430.

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http://dx.doi.org/10.1016/j.jamcollsurg.2016.05.006
ISSN 1072-7515/16

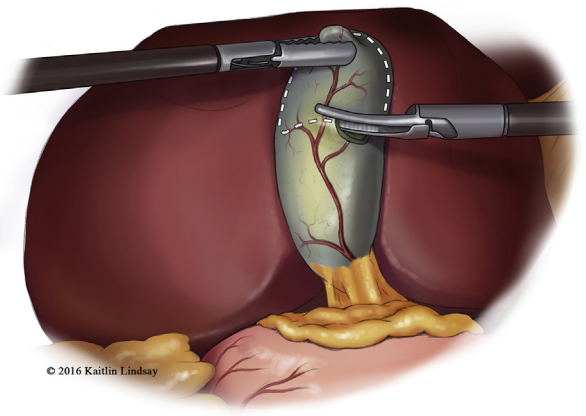

Figure 1. Initial incision into the gallbladder wall is made using a hemostatic device near the dome of the gallbladder, in order to minimize potential injury to vital structure. (© 2016 Kaitlin Lindsay, printed with permission.)

removed before discharge, and the Malecot drain was removed once bile output was minimal, with a median duration of 3.5 weeks and range of 5 days to 8 weeks. The patient who required 8 weeks of drainage was a gentleman with Down's syndrome who had a large duodenal diverticulum, precluding biliary stenting through ERCP. The Malecot drain removal at 5 days was unfortunately inadvertent due to an error in communication within the health care team; however this patient did well and had no adverse sequelae from the premature removal.

TECHNIQUE

The most important step is the decision to convert from a standard cholecystectomy technique to a damage control approach, by identifying situations in which attempts at further dissection in the cystic triangle, however careful, will be dangerous due to dense inflammation obscuring anatomic features and increasing the risk of iatrogenic biliary or vascular injury. Once a decision to proceed with a damage control operation has been made, the anterior wall of the gallbladder is incised near the dome in a clear safe zone using an ultrasonic dissector (Fig. 1) or similar device. Cautery may be used, but because hemostasis is essential for the safety of the operation, it is preferable to use a device that seals small vessels. Bile is evacuated using suction, and stones are removed. The dome of the gallbladder is then removed using the hemostatic device.

The remaining anterior wall is then incised superior-inferior, followed by lateral incisions above the infundibulum (Fig. 2), so that the gallbladder may be opened like a book. This dissection is kept above the infundibulum and aided by the visualization of both interior and exterior

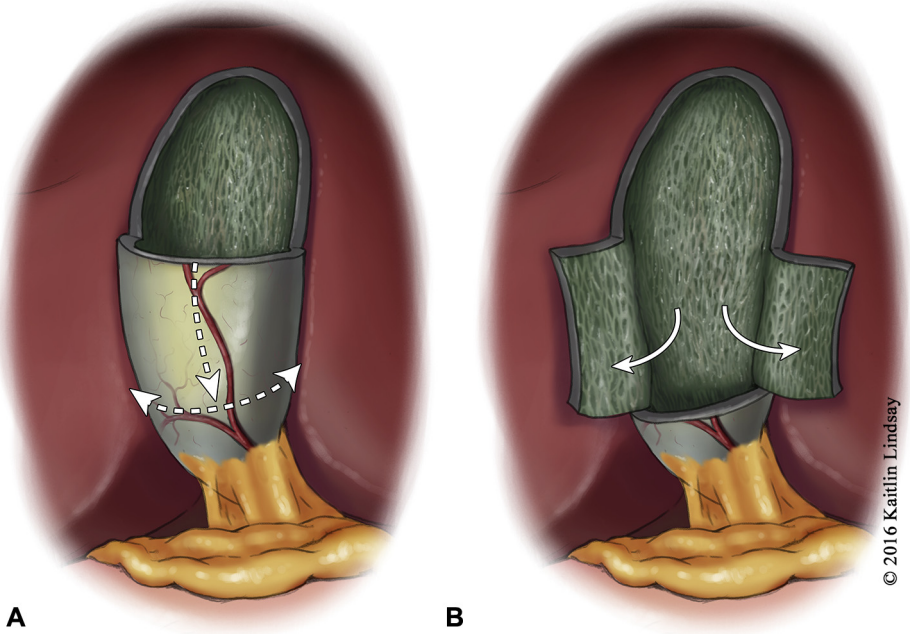

Figure 2. Incision is then extended superiorly and inferiorly, followed by lateral extension to the liver, in order to remove the anterior and lateral walls of the gallbladder safely. Concomitant visualization of both external and internal gallbladder anatomy helps prevent injury during this process. (© 2016 Kaitlin Lindsay, printed with permission.)

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