

A Simple Technique for Laparoendoscopic Management of Choledocholithiasis

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Laparoendoscopic surgical treatment of calculous disease of the gallbladder and biliary system has largely replaced the open surgical approach because of its well known and obvious advantages. This approach has also changed the traditional management of biliary duct stones. Formally, biliary calculous disease was managed by the surgeon in one setting usually by laparotomy with choledochotomy and common duct exploration. Referral for postoperative Endoscopic Retrograde Cholangiopancreatography (ERCP) and Endoscopic Sphincterotomy (ES) was most commonly done for retained stones.

If common duct stones are discovered at the time of laparoscopic cholecystectomy, the surgeon has three options: (1) convert to an open procedure for choledochotomy and common duct exploration; (2) complete the cholecystectomy laparoscopically and refer the patient for postoperative ERCP and ES; or (3) perform laparoscopic common duct exploration.

Because of the desire to extend the benefits of laparoscopic surgery to the widest range of patients, the first option of converting to an open duct exploration is not popular. The need for expensive ancillary equipment and familiarity in its use combined with the technical difficulty of laparoscopic common duct exploration are among the reasons presumed for the lack of widespread use of this technique. Referral for endoscopic management of com-

mon duct stones is the option preferred by most. In truly experienced centers, successful endoscopic extraction of common duct stones approaches 95% with morbidity and mortality comparable to that of choledochotomy and exploration performed by laparotomy.^{2,9} However, in less experienced hands, the success rate is lower with higher morbidity and mortality.⁵

The reluctance of surgeons and endoscopists to perform postoperative endoscopic management of those patients proven to have common duct stones is based upon the fear that the attempt may fail and the patient will have to undergo a second anesthetic and operative procedure.³ As a result, most patients who are suspected of harboring common duct stones undergo preoperative ERCP.

However, the majority of patients in

whom common duct stones are suspected will prove to have normal ducts^{1,4,8,9,10,11} possibly because preoperative reliability of liver chemistries and imaging techniques are not as accurate as desired.^{6,7} With increasing concern about cost-effective management of health care, a more efficient approach is desirable. We have found that transcystic placement of an internal biliary stent during laparoscopic cholecystectomy is easily done, provides drainage of the common duct, and enhances the ease of postoperative ampullary cannulation and endoscopic stone retrieval.

MATERIALS AND METHODS

A standard laparoscopic cholecystectomy utilizing four trocar sites is initiated. Intraoperative cholangiography is

performed through a self-sealing needle and sheath placed percutaneously in the right upper quadrant (Cook Surgical, Ellettsville, Ind.). An incision is made in the cystic duct so that approximately one-third of the lumen is opened. The cholangiogram catheter is passed through the introducer sheath and into

the cystic duct. The catheter is held with a loosely applied surgical clip both to secure the catheter and prevent extravasation of contrast material. If stones are confirmed with real-time digital fluoroscopy, a 7F Cotton-Leung internal biliary stent (Wilson-Cook, Winston-Salem, N.C.) is placed.

Table 1. Patient Data

<u>Patient</u>	<u>Age</u>	<u>Sex</u>	<u>L.O.S. (Days)</u>	<u>Operating Time</u>
1	31	F	1	1:35
2	54	F	1	1:20
3	65	F	1	0:55
4	47	M	1	1:05
5	52	F	1	1:10
6	54	M	2	1:20

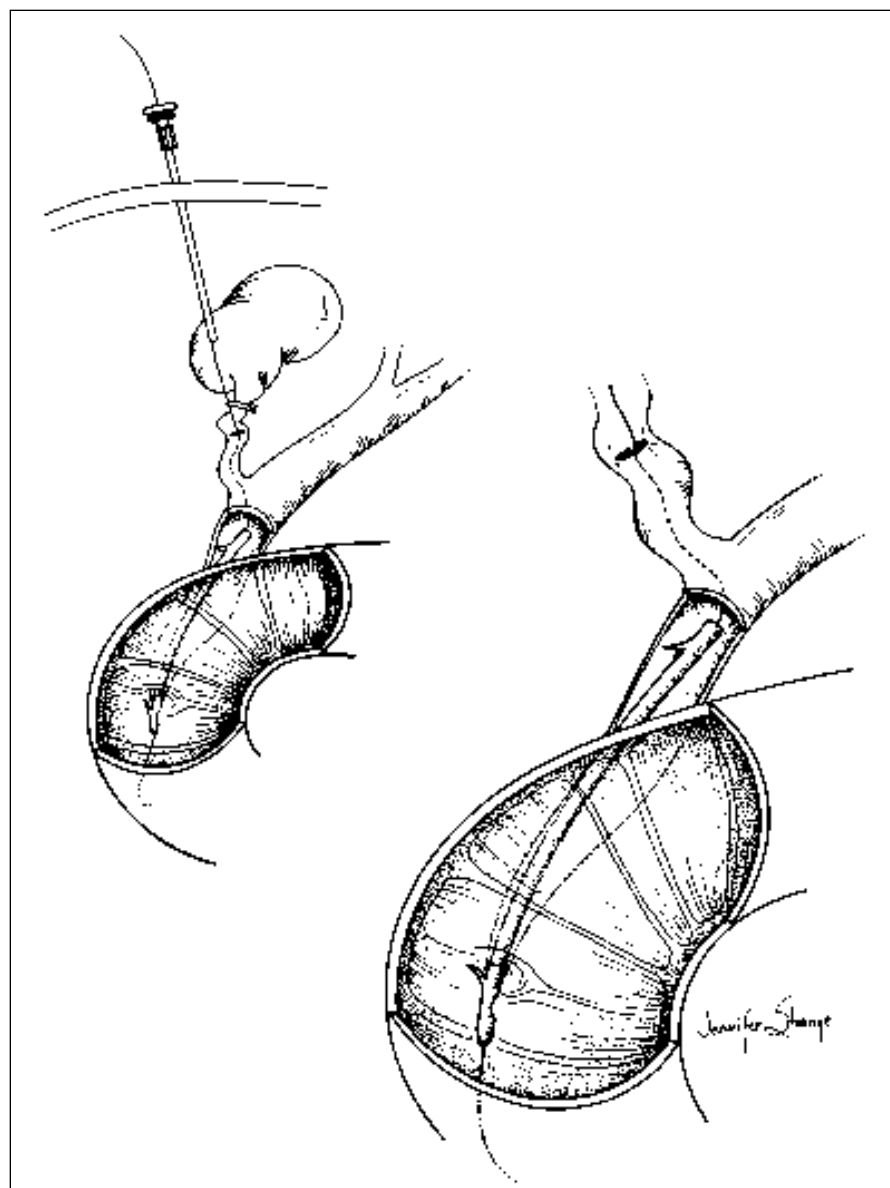


Figure 1. Final location of the stent with guidewire still in place and the distal antimigration flap in the duodenum.

A 0.35-mm soft tip guidewire (Cook Surgical, Ellettsville, Ind.) is passed through the sheath that was used for the cholangiogram catheter and into the opening previously made in the cystic duct. The guidewire is gently passed into the duodenum under fluoroscopic guidance. The biliary stent and following pusher are threaded onto the guidewire. The stent is manually pushed through the self-sealing cap of the cholangiogram sheath. The stent is then pushed with the pusher device along the guidewire into the cystic duct and on into the common bile duct. The stent is radiopaque, aiding visualization of its progress with fluoroscopy. An estimate of the length of the common bile duct can be obtained with the previously made cholangiogram. A stent that is approximately 2 cm longer than the common bile duct works well. The stent should be placed well into the common duct taking care that it is not passed totally into the duodenum. Once it is felt that a proper position is obtained, confirmation is obtained with cholangiography. A dual lumen catheter (Cook Surgical, Ellettsville, Ind.) serves both as the pusher; and, through the second channel, contrast material is injected for the completion cholangiogram. Although we have not found it necessary, direct visualization of stent position with intraoperative gastroscopy could also be used.

As can be seen in Figure 1, there are two fixation flaps to prevent stent migration in either direction. We have found that a distance of 5 to 7 cm between the two flaps provides a proper length. One end is tapered to ease passage through the ampulla, and obviously the stent should be oriented accordingly.

Once proper stent location is confirmed, we prefer to divide the cystic duct and secure the cystic duct stump with a loop ligature of absorbable material. Subsequent endoscopic stone retrieval may produce forces that could lead to dislodgement of standard surgical clips placed on the cystic duct. The cholecystectomy is then completed in a standard manner. Use of a subhepatic drain is at the discretion of the surgeon.

If the condition of the patient permits, the endoscopist can clear the common duct of the stone burden the following day. If desired, the stent retrieval and ERCP can be done on an outpatient basis, after the patient has

recovered sufficiently from the laparoscopic cholecystectomy.

RESULTS

The patient data is displayed in Table 1. There were 4 females and 2 males for a total of 6 cases. The average operating time for all cases was 74 minutes. The average length of stay of 1.16 days is believed to be much shorter compared to that obtained by performing ERCP and possible sphincterotomy prior to laparoscopic cholecystectomy. The only patient who was not discharged the first postoperative day had acute cholecystitis. All patients were managed with outpatient ERCP and ES. There is also a cost savings realized by avoiding ERCP and extra hospital days in those patients who are found to have normal bile ducts. In all cases, the postoperative endoscopy was successful in clearing the common duct, and there were no complications.

DISCUSSION

Consistent with the demand for cost-effective health, it makes more sense to refer only those patients for ERCP and possible sphincterotomy who are likely to need this treatment. Laparoscopic common bile duct exploration is gaining in use but is not yet widely practiced. If lack of equipment or familiarity with its use makes laparoscopic common duct exploration not feasible, then the technique presented is potentially a reasonable alternative.

The total number of cases is too small to permit unqualified endorse-

ment of the safety and efficacy of the technique proposed, but the promise is certainly present. We have tried to envision possible hazards or drawbacks to this procedure that we did not encounter. Possibly, a long tortuous cystic duct may impede passage of the stent into a proper position. The lack of a true lateral confluence of the cystic duct into the common duct may also represent a relative contraindication to this approach because of a difficult stent passage. An early concern was that the stent would be placed into the common duct but without being passed into the duodenum. This would have resulted in the stent lying in the common duct with no ready means of retrieval. The current stent is difficult to visualize with clarity because it tends to blend in with the residual contrast material from the initial cholangiogram which invariably lingers in the common duct. A stent with a dense radiopaque marker near the distal end is being developed. This should aid in fluoroscopic guidance and proper placement of the stent. However, in all cases a stent length provided by even the shortest stent used was adequate. There is no particular disadvantage if the stent is too long, and we recommend that the initial attempts be tried with the longer stents until sufficient experience is gained to make more precise judgments.

The postoperative visualization and cannulation of the ampulla was in all cases enhanced by the presence of the intraduodenal portion of the stent. After snaring and removal of the stent endoscopically, the ampulla remains dilated, greatly facilitating ampullary cannula-

tion. The internal stent is comfortably tolerated by the patient, and there is no risk of accidental dislodgement.

If this technique proves to be safe and effective in a larger series, the prevalent practice of preoperative screening of patients suspected of having common duct stones with ERCP can probably be altered. **STI**

REFERENCES

1. Carroll B, Phillips E, Daykhovsky L, et al. Laparoscopic choledochoscopy: an effective approach to the common duct. *J Laparosc Surg* 1992;2:15-21.
2. Cheung C, Leung J, Leong H, et al. *Br J Surg* 1991;78:1448-50.
3. Cotton P. Endoscopic retrograde cholangiopancreatography and laparoscopic cholecystectomy. *Am J Surg* 1993;165:474-478.
4. Cotton P, Baillie J, Pappas T, et al. Laparoscopic cholecystectomy and biliary endoscopy. *Gastrointest Endosc* 1991;37:94-97.
5. Cotton P, Lehman G, Vennes J, et al. Endoscopic sphincterotomy complications and their management. An attempt at consensus. *Gastrointest Endosc* 1991;37:383-393.
6. Cronan J. US diagnosis of choledocholithiasis: A reappraisal. *Radiology* 1986;161:133-134.
7. Hauer-Jansen M, Karesen R, Nygaard K, et al. Predictive ability of choledocholithiasis indicators. *Ann Surg* 1985;202:64-68.
8. Lambert M, Betts C, Hill J, et al. Endoscopic sphincterotomy. *Br J Surg* 1991;78:473-476.
9. Sivak, M. Endoscopic management of bile duct stones. *Am J Surg* 1985;158:228-40.
10. Southern Surgeon's Club: a prospective analysis of 1518 laparoscopic cholecystectomies. *N Engl J Med* 1991;324:1073-1078.
11. Surick B, Washington M, Ghazi A. Endoscopic retrograde cholangiopancreatography in conjunction with laparoscopic cholecystectomy. *Surg Endosc* 1993;7:388-392.