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Letter to the Editor

Laparoscopic common bile duct exploration versus endoscopic retrograde cholangiopancreatography for choledocholithiasis found at time of laparoscopic cholecystectomy

Dear Editor

We read with great interest the study of Dr Al-Temimi and colleagues regarding laparoscopic common bile duct exploration (LCBDE) versus endoscopic retrograde cholangiopancreatography (ERCP) for choledocholithiasis found at time of laparoscopic cholecystectomy in the December 2017 edition of *The American Journal of Surgery*.[1] We would like to express our appreciation of this report portraying data on a sizeable cohort of patients with choledocholithiasis found at time of cholecystectomy. We would be very interested to know why only 195 patients who had laparoscopic cholecystectomy (LC) followed by ERCP for common bile duct stones (CBDS) were included in the study out of a total 1285 patients during the same study period as the LCBDE cohort (2005–2015). The reasons for comparing a more recent cohort of post-operative ERCP patients (2014–2015) to the LCBDE cohort has not been explained especially when the majority of their LCBDE experience comes from the latter 5 years (2011–2015).

A potential weakness of this study, which has been identified by the authors, is its retrospective nature with the inherent selection bias of surgeons preferring LC/ERCP over LCBDE which may explain the higher clearance rate of LC/ERCP. This study includes 105 patients who underwent LCBDE over an eleven-year period across 13 hospitals. This would give an average of less than one case per hospital per year. Furthermore, it is unknown how many surgeons at each hospital took part in this study and were performing LCBDE. This low rate of performing LCBDE would undoubtedly influence the skills set needed to perform this procedure successfully. The authors state that LCBDE was performed with the transcystic approach and, according to surgeon preference, the transductal approach was utilised if the former failed. What proportion of their 105 LCBDEs was transcystic versus transductal? This information, in our opinion, is very relevant to their key message and discussion. Finally, the authors confirm in their discussion that not all surgeons in their study were comfortable with proceeding to laparoscopic choledochotomy when the transcystic approach failed thus decreasing the success rate of LCBDE. From our single-centre experience of almost 400 LCBDE it is our usual practice to explore the common bile duct via the transcystic approach, but failing this we would proceed to laparoscopic choledochotomy rather than subjecting the patient to a further procedure, which has no guarantee of success and may result in yet another surgical procedure (LCBDE or open CBDE) further down the line.

A further analysis of the reasons for failure of LCBDE in this study is warranted as we believe that a LCBDE failure rate of 11.4% can be improved upon by the adherence to basic principles. 5 out of twelve failed LCBDEs were due to 'failed stone extraction'. Further clarification of this phrase is required as this could mean that the stone was impacted or too large to be removed transcystically. In such cases, we describe the laser-assisted bile duct exploration by laparoendoscopy (LABEL) technique to achieve successful stone clearance.[2] So far, our group has successfully used the technique in 28 cases of choledocholithiasis where standard retrieval techniques had failed.

A further one failed LCBDE was due to inability to pass the choledochoscope through the ampulla with subsequent presentation with retained stone. Further clarification on this statement is also required from the authors as we do not believe this to be a cause for retained stone. Intubation of the second part of the duodenum through the ampulla is not a mandatory requirement of choledochoscopy and in fact can be a source of post-operative morbidity. If there is suspicion of a distal impacted stone, we would advocate using the LABEL technique if the stone is visible. Alternatively we recommend administering intravenous hyoscine butylbromide or glucagon prior to passing the basket through the ampulla under direct visualisation with the choledochoscope. One LCBDE failed due to a common hepatic duct stone, however, in experienced hands direct visualisation of the intrahepatic ducts with the choledochoscope is a routine part of choledochoscopy. Although this has previously been reported to be only possible in 40% of cases during transcystic choledochoscopy,[3] in our experience we have achieved higher rates of successful proximal choledochoscopy. A possible explanation is that we mobilise the gallbladder fully from the liver with optimal retraction of the proximal cystic duct with an Endoloop® (Ethicon, New Brunswick, New Jersey, U.S.A) along with its complete dissection to the junction of the CBD prior to intraoperative cholangiogram and choledochoscopy. This allows the choledochoscope to approach the CBD perpendicularly via the cystic duct whilst turning the tip of the choledochoscope upwards to gain entry into the CHD ('wiper blade manoeuvre'). In addition, we have found the LABEL technique to be useful in the management of intrahepatic stones.[2] In the event that intrahepatic choledochoscopy is not possible due to technical failure it is advisable to perform a completion cholangiogram. A further two cases failed LCBDE due to equipment failure/non-availability, another case due to the surgeon aborting the procedure given prolonged operative time and two cases were converted to open CBDE due to a guidewire becoming stuck through the cystic duct and aberrant biliary

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anatomy. What is unusual about the last case is that LCBDE was completed successfully prior to conversion to open but further clarification on the reason for conversion has not been included. As it reads, we believe that this case should not be included as a 'LCBDE failure' as this was not the cause for conversion to open CBDE. Therefore, had there been the appropriate expertise and equipment available, this cohort may have had a LCBDE failure rate of just 1–2% (1–2 cases out of 105).

After the first 200 cases of LCBDE our group published its results and found that we utilised the transcystic approach in just 8.3% of cases.[4] Our practice has evolved over time to increase the use of transcystic choledochoscopy and reduce stone clearance failure rates. From our prospectively collected database of LCBDE (n = 376) our rates of transcystic choledochoscopy in blocks of 100 patients in chronological order have been: 7%, 5%, 42% and 86%. Furthermore, our stone clearance failure rates have been: 11%, 2%, 3%, 1% (complete series failure rate 3.7%). The single cause of failure in our last 100 cases was due to a CBD stricture which did not allow safe passage of the choledochoscope distally to permit the laser to fragment the stone. Major and minor complications in the last 100 cases were 3% and 4% respectively. After advanced laparoscopic training in bile duct exploration we believe that there are four contributing factors to achieving a high rate of transcystic LCBDE and reduced failure rates. Firstly, we find that mobilising the gallbladder fully from the liver with optimal retraction of the proximal cystic duct along with its complete dissection to the junction of the CBD, modifying the angle between the two, creates the ideal setting for successful transcystic LCBDE as previously mentioned. Secondly, the availability of a 3 mm choledochoscope increases the surgeons' ability to negotiate a narrow cystic duct and/or tight ductal junctions. Thirdly, the use of a transinfundibular approach (TIA) to the CBD via the cystic duct through the infundibulum of the gallbladder is indicated when the hilum is 'frozen' with inflammation making dissection of the cystic duct and artery not a safe option.[5] This strategy still enables exploration of the CBD without the need for choledochotomy. To date, we have successfully used this technique in 8 cases of LCBDE which in other circumstances may have resulted in failure. Fourthly, use of the LABEL technique enables larger CBD stones to be broken down and extracted through the cystic duct which otherwise would have required choledochotomy or indeed failure of stone extraction in cases of impaction. Furthermore, in our series of LABEL, holmium laser lithotripsy via the transcystic route has been successfully used in 22 out of 28 cases.

In conclusion, with the appropriate experience in advanced laparoscopic techniques and the use of additional techniques, we recommend proceeding to LCBDE all cases of choledocholithiasis found at time of laparoscopic cholecystectomy. If transcystic LCBDE fails, we advocate proceeding to laparoscopic choledochotomy rather than referring the patient for post-operative ERCP. Experienced surgeons performing LCBDE at high volume centres should aim for transcystic choledochoscopy in over 80% of all cases with a stone clearance failure rate of less than 2%.

Conflict of interest

No authors (JA, LN and AI) have any conflict of interests to declare.

Ethical statement

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Consent statement

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.amjsurg.2018.02.007.

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