Instrumental detection of cystic duct stones during laparoscopic cholecystectomy

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ABSTRACT: **Residual cystic duct stones (CDSs) after cholecystectomy have been recognized as a cause of post-cholecystectomy pain. This study was undertaken to determine the incidence of CDSs during laparoscopic cholecystectomy (LC). A cohort of 330 consecutive patients (80 males and 250 females) undergoing LC between November 2006 and May 2010 was studied. Their age ranged between 16 and 88 years (median 50, IQR: 36.62). The data were prospectively collected of preoperative liver function tests, imaging, the presence of intraoperative CDSs, and common bile duct stones at on-table cholangiogram. CDSs were detected intraoperatively in 64 of the 330 patients (19%). Ultrasound failed to detect CDSs in any of these cases. Deranged liver function tests were noted in 73% of the patients with CDSs and in 57% without CDSs. Common bile duct stones were detected in 9% (29) of the 330 patients. CDSs occur commonly at routine cholecystectomy, and preoperative investigations are not helpful in their diagnosis. As CDSs may lead to postoperative morbidity, they should be actively sought out during surgery if present.**

(***Hepatobiliary Pancreat Dis Int 2014;13:215-218***)

KEY WORDS: **biliary tract diseases; laparoscopic cholecystectomy; complications; cystic duct stones; gallstone diseases**

Introduction

Laparoscopic cholecystectomy (LC) has lead to loss of tactile feedback impairing the digital detection of cystic duct stones (CDSs). These stones are implicated in post-cholecystectomy pain,[1, 2] failure of insertion of on-table cholangiogram (OTC) catheter and the subsequent development of common bile duct (CBD) stones.[3] Mirizzi syndrome is another possible complication where large stones impact in the cystic duct, causing external compression and possibly erosion of the CBD.[4-6] This study aimed to quantify the frequency of CDS during LC.

Clinical summary

Three hundred and thirty consecutive patients undergoing LC performed by a single surgeon during the period of November 2006 to May 2010 were included. These patients comprised 80 males and 250 females. Their age ranged from 16 to 88 years (median 50, IQR: 36.62). The data were prospectively collected in terms of preoperative liver function tests (LFTs) and ultrasound which were performed in all patients. Twenty-two patients had additional magnetic resonance cholangiopancreatography (MRCP) to exclude CBD stones. Our institute employed a selective OTC policy for evaluating ultrasound and LFT findings. Patients with normal LFTs or mild transient derangement were subjected to surgery without a pre-planned OTC. When LFT was abnormal, abnormal CBD dilation and biliary pancreatitis were normally subjected to either MRCP followed by endoscopic clearance or to OTC followed by laparoscopic CBD clearance if CBD stones were detected.

Written informed consent was obtained from all patients. The cystic duct was dissected intraoperatively and the critical view of safety was observed before the placement of an endo-clip at the junction of the

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doi: 10.1016/S1499-3872(14)60034-5

gallbladder-cystic duct. An antero-lateral incision was made in the cystic duct and a partially closed endo-clip was then used to milk the cystic duct towards the gallbladder. Any encountered CDS was retrieved and documented (Fig. 1).

No CDS was detected in 81% (266) of the 330 patients. In 19% (64) of the 330 patients CDSs were identified and retrieved intraoperatively. Twenty-eight of the 64 patients (44%) had a single stone, and the remaining 36 (56%) had multiple stones, even more than 7 stones. Preoperative ultrasound failed to detect CDS in all patients. Of the 64 patients with CDS, 47 (73%) had deranged LFTs at some stage prior to surgery. LFTs were also deranged in 152 (57%) of the 266 patients without CDS (Fig. 2). Using a Chi-square test for these data, a statistically positive association between the presence of CDS and abnormal LFTs was noted (P=0.03). The sensitivity of LFTs to detect CDS was 73%, and their specificity was 43%.

Although OTC was only performed in 25% (83) of the 330 patients, CBD stones were found in 29 (9%) patients, of whom 59% (17) also had CDS. About 50% (17) of 34 patients with CDS were also found to have CBD stones on OTC, compared to 29% (14) of the 49 patients without CDS. The Chi-square test showed that this difference was not statistically significant (P=0.27).

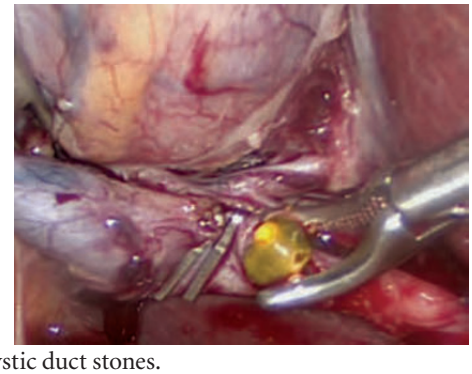

Fig. 1. Cystic duct stones.

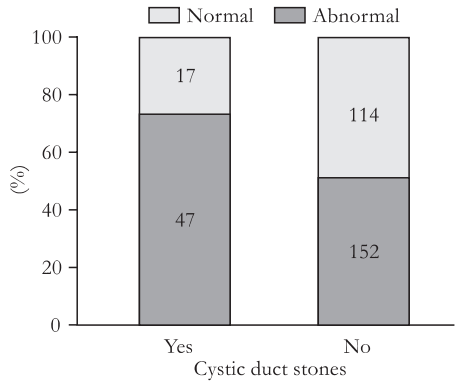

Fig. 2. Abnormality of liver function tests in cystic duct stones.

Discussion

Pain after cholecystectomy usually presents a diagnostic conundrum to clinicians with a wide range of possible causes. Residual CDSs are thought to be accountable in 17%-25% of cases.[7] This group of patients have a theoretically preventable condition if attention is paid at surgery to detect all CDSs.

CDSs are said to be associated with more pain in the month before surgery,[8] which could alert the surgeon towards this complication. In our study, pre-operative LFT abnormalities were commonly detected in the presence or absence of CDS, with a significantly higher incidence in patients with CDS. This is consistent with the findings of Sezeur and Akel, where LFTs were deranged more commonly in association with CDS (47.6% vs 24.5%; P<0.05).[8] In practical terms, however, the sensitivity of LFT to detect CDS was only 73%. More importantly, the test has a poor ability to exclude CDS with a specificity of only 43%. This shows that pre-operative investigations are not helpful in detection of CDS, and intraoperative vigilance is the only method to ensure recognition and removal of CDS.

Our study demonstrated CDS in 19% of LCs. This figure is based on operative milking of the cystic duct. It is likely that the true incidence is higher; however, this can only be fully answered if an OTC policy is applied to all cases. A prospective study from St James University Hospital (Leeds, UK), presented alongside our study at the Association of Surgeon of Great Britain and Ireland 2012 International Conference found sludge or CDS shown on OTC during LC at an incidence of 20%.[9] The similarity in incidence at this independent study affirms our finding and supports the notion that CDS is a common condition in the Western world. Furthermore, previous retrospective studies[3, 8] from Scotland and Japan found incidences of 12.3% and 14.7%, respectively.

The relationship between the anatomy of the cystic duct and the development of CDS has been previously studied. Castelain et al[10] showed a positive correlation between a wider diameter cystic duct and the passage of stones. Caroli-Bosc et al[11] rejected length of the cystic duct as a risk factor for CDS but suggested the site of insertion into the CBD to be contributory, with insertions on the left being more lithogenic. Aberrant anatomy has also been shown to be associated with the development of CDS.[12]

CBD stones are known to occur more frequently in association with CDS. The reported rates in the literature varied from 23.8% to 5.7% in the absence of CDS,[8] which were consistent with our findings. Selective policy of OTC resulted in an incidence of 35% (29/83) for CBD stones at OTC, and the incidence was