Effectiveness of Laparoscopic Bile Duct Ultrasound

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Aims

Laparoscopic ultrasound (LUS) can be used during laparoscopic cholecystectomy (LC) to detect common bile duct stones (CBDS). Despite being in use for over three decades, there still appears to be reluctance for the uptake of LUS over alternative imaging modalities. Intraoperative cholangiogram (IOC) remains the most used intraoperative imaging study to identify CBDS at time of LC. However, there is growing evidence to suggest that LUS is a legitimate alternative to IOC and may be superior in many ways. LUS is extremely accurate at detecting CBDS and studies suggest it is safe to use, fast, and cost-effective. We aimed to add to this growing bank of data and record sensitivity and specificity of LUS at detecting CBDS.

Methods

A prospective database of all patients undergoing laparoscopic cholecystectomy at a Benign Specialist Unit between 2015 – 2018 was maintained. Both elective and emergency cases, with suspicion of CBDS, that underwent LUS, were included in our study. All ages and both genders were included. Suspicion of CBDS was defined as dilated CBD pre-operatively on trans-abdominal ultrasound (US), history of pancreatitis or cholangitis, and or deranged serum liver function tests (LFTs). Cases with known CBDS identified by preoperative specialist imaging other than US were excluded. Where CBDS were detected, cases were treated by either intraoperative laparoscopic common bile duct exploration (LCBDE) or postoperative endoscopic retrograde cholangiopancreatography (ERCP). Follow-up data was maintained until 90 days post-operatively.

Table 1: Number of patients who underwent laparoscopic cholecystectomy for each nationally recognized indication

Indication for laparoscopic cholecystectomy	Number of cases
Obstructive jaundice	7
Biliary colic (with deranged LFTs)	117
Cholecystitis (with deranged LFTs)	197
Cholangitis	20
Gallstone pancreatitis	79
Total	420

Table 2: Accuracy of laparoscopic ultrasound at detecting common bile duct stones

	Number of patients
True-positive	122
True-negative	290
False-positive	6
False-negative	2
Total	420
	Accuracy indices (%)
Sensitivity	99.3
Specificity	95.3

Results

LUS was performed in 420 patients. Of these patients, CBDS were detected in 128 cases. In 6 cases, no stones were found. 292 patients were categorised as having no stones detected at time of LC but 2 of these represented within 90 days with missed CBDS requiring ERCP. In our unit's hands LUS had a false positive and false negative rate of 4.7% and 0.7% respectively. Specificity was 95.3% and sensitivity was 99.3%. Median time for LUS, 5 minutes.

Conclusion

LUS is an accurate, safe and non-irradiating investigation for detection of CBDS at time of laparoscopic cholecystectomy. It has many additional benefits to its use over its alternatives, such as IOC, and should therefore be considered as an alternative study.

Key Statement

Laparoscopic ultrasound is extremely accurate at detecting common bile duct stones at time of laparoscopic cholecystectomy and should be considered the performance standard.

References

1. Halpin, V., Dunnegan, D., Soper, N.: Laparoscopic intracorporeal ultrasound versus fluoroscopic intraoperative cholangiography. Surgical Endoscopy And Other Interventional Techniques 16(2), 336-341 (2002).
2. Tranter, S., Thompson, M.: A prospective single-blinded controlled study comparing laparoscopic ultrasound of the common bile duct with operative cholangiography. Surgical Endoscopy And Other Interventional Techniques 17(2), 216-219 (2003).
3. Li, J.-W., Feng, B., Wu, L., Wang, M.-L., Lu, A.-G., Zang, L., Mao, Z.-H., Dong, F., Zheng, M.-H.: Intraoperative cholangiography in combination with laparoscopic ultrasonography for the detection of occult choledocholithiasis. Medical Science Monitor 15(9), MT126-MT130 (2009).
4. Machi, J., Oishi, A., Tajiri, T., Murayama, K., Furumoto, N., Oishi, R.: Routine laparoscopic ultrasound can significantly reduce the need for selective intraoperative cholangiography during cholecystectomy. Surgical endoscopy 21(2), 270-274 (2007).
5. Catheline, J.-M., Rizk, N., Champault, G.: A comparison of laparoscopic ultrasound versus cholangiography in the evaluation of the biliary tree during laparoscopic cholecystectomy. European journal of ultrasound 10(1), 1-9 (1999).