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Routine Magnetic Resonance Cholangiography Compared to Intra-Operative Cholangiography in Patients with Suspected Common Bile Duct Stones

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In this prospective study, Magnetic Resonance Cholangiography (MRC) and Intra-Operative Cholangiography (IOC) were compared for the diagnosis of suspected CBD stones. Thirty patients with gall stones and suspected CBD lithiasis (abnormal serum liver tests and CBD size >7 mm on ultrasound) had MRC followed by open cholecystectomy and IOC. All MR imaging was done using a 1.5-T whole body scanner (Signa, General Electric Medical Systems). A torso phased-array coil with a 4-channel receiver was used for data acquisition. Over a period of 18 months, 30 patients (average age, 53.93±13.3 years; range, 38-76 years) were enrolled in this study. There were 11 males (36.7%) and 19 females (63.3%). On MRC, CBD stones were diagnosed in 19 patients, while on IOC, CBD stones were diagnosed in 22 patients. In the present study, the sensitivity of MRC for diagnosing CBD stones was 81.8%, the specificity was 87.5%, the positive predictive value was 94.7% and the negative predictive value was 63.3%. Pre-operative MRC may obviate the need for intra-operative cholangiography. MRC reduces operating time, is less invasive and may also reduce damage to the CBD that can occur during IOC. MRC can identify CBD stones pre-operatively and can help surgeons plan safe procedures. Pre-operative MRC should be done routinely in patients whose clinical or biochemical findings suggest the possibility of CBD stones.

Key words: Cholelithiasis, MRC, cholangiogram

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INTRODUCTION

In patients with suspected Common Bile Duct (CBD) stones, their identification before open or laparoscopic cholecystectomy plays an important role in extrahepatic biliary tree surgery. The clearance of CBD before or during cholecystectomy prevents many postoperative complications (Barkum and Barkum, 2004; Nathanson and Martin, 2005).

There are numerous options for pre-operative diagnosing of suspected CBD stones, including conventional ultrasonography (US), Liver Function Tests (LFT), Magnetic Resonance Cholangiography (MRC), Endoscopic Retrograde Cholangiopancreatography (ERCP) and Intra-Operative Ultrasound (US).

The optimal method for investigating suspected common bile duct stones has not yet been determined (Dalton *et al.*, 2005; Basili *et al.*, 2000).

Magnetic Resonance Cholangiography (MRC) is a non-invasive method for imaging the biliary tract that requires no contrast medium, sedation, or analgesics. The major issue with MRC is whether its diagnostic accuracy for CBD stones matches that of IOC and endosonography for CBD stones and thus, whether it will become a routine diagnostic procedure (Zidi *et al.*, 1999; Basili *et al.*, 2000).

In previous studies comparing IOC and MRC, the samples were small. It has still not been determined whether pre-operative MRC can obviate the need for IOC (Dalton *et al.*, 2005).

The aim of the present study was to compare the MRC and IOC results in patients with suspected CBD stones.

MATERIALS AND METHODS

Of 285 consecutive patients with symptomatic gall stones in our Institute (Sari, Imam Hospital), 30 patients suspected of having CBD stones who underwent cholecystectomy with IOC following a pre-operative MRC were prospectively included in this study over a period of 18 months starting on February 1, 2005. The patients were referred for MRC within the 72 h preceding their cholecystectomy on the basis of Liver Function Tests (LFT) and the diameter of the common bile duct as measured on ultrasonography (US).

There was no policy about the timing of the LFT and US in relation to surgery.

The inclusion criteria consisted of the presence of abnormal LFTs and a greater than normal CBD diameter on US.

The exclusion criteria included US-proven cholelithiasis or the presence of jaundice and acute pancreatitis and acute cholecystitis. Liver function tests

were defined as abnormal if the alkaline phosphatase was above 150 IU L^{-1} , the ALT and AST were above 100 IU L^{-1} and the bilirubin was above 1.5 mg dL^{-1} .

The CBD diameter was defined as normal if it was less than 7 mm an extra 1 mm was allowed for each decade above 50 years.

All patients gave their written informed consent to participate in this study and to be followed-up. The study was approved by our institutional ethics committee.

All MR imaging was performed using a 1.5-T whole body scanner (Signa, General Electric Medical Systems). A torso-phased array coil with a 4-channel receiver was used for data acquisition.

Axial localizer images were acquired using a T1-weighted spin echo (TR, 300 MS, TR, 8 MS) pulse sequence. Then, MRC was acquired in the coronal plane, using a two-dimensional Single-Shot Fast Spine-Echo (SSFSE) pulse sequence with the following imaging parameters: effective TE, 880 MS, echo train length 128, matrix size 256×256 , field of view $35 \times 35 \text{ cm}$, slice thickness 60 mm, single slice, number of excitations: 0.5 (half Fourier) and a receiver bandwidth of 132 KHz. The acquisition time for each thick slab was 2 s, which allowed all patients to have a comfortable breath-hold.

Open cholecystectomy was performed in the standard manner by one surgeon.

IOC was performed with contrast (Omnipaque, Nycomed, Oslo, Norway), diluted to half strength with normal saline and given via a 1.5 mm, soft plastic catheter (operative cholangiogram catheter, ref. 20018-M55, Taut, Geneva, IL, USA). Images were captured using a Philips image intensifier.

One radiologist reported all MRC. The operating surgeon initially assessed the IOCs and the film was subsequently reported by one, blinded radiologist.

In patients whose IOC revealed a filling defect or cholelithiasis, CBD exploration was performed. Patients with negative MRC and IOC were treated by postoperative ERC and sphincterotomy.

For each patient, information about patient characteristics, preoperative ultrasound and LFT results, whether the IOC was successful, interpretation of the IOC results and the final outcome was recorded prospectively onto a data collection sheet at the time of surgery. All information was entered onto a computer for analysis using SPSS.

RESULTS

Among the 30 patients included in this study, there were 11 males (36.7%) and 19 females (63.3%); their mean age was 53.93 ± 13.3 years (range, 38-76 years).

All patients had elevated alkaline phosphatase levels (above 150 IU L⁻¹) and CBD dilatation. The AST level was increased in 4 cases (13.3%) and the ALT level was increased in 2 cases (6.7%). All patients had normal serum amylase and bilirubin levels. All patients had CBD dilatation on MRC (mean: 10±2.7) and at IOC (mean: 11±3.1).

IOC and CBD exploration confirmed choledocholithiasis in 22 patients; on pre-operative MRC, a filling defect was seen in 19 of these 22 patients. MRC could detect stones smaller than 5 mm in 2 patients.

The sensitivity of MRC was 81.8%, the specificity was 87.5%, the positive predictive value was 94.7% and the negative predictive value was 63.3%.

Eight patients in whom no filling defect or obstruction was detected on MRC and IOC underwent post-operative ERCP and sphincterotomy, because of abnormality in LFT and CBD diameter and suspected missed CBD stones or microlithiasis.

All patients were followed-up for 18 months.

DISCUSSION

The pre-cholecystectomy clinical diagnosis and management of CBD stones has been studied during the last decade. Several diagnostic and therapeutic strategies have been suggested, ranging from selective ERCP with sphincterotomy to routine MRCP and selective ERCP. Recently, routine IOC or EUS with CBD exploration have been suggested. Some of these options have been used in isolation or in combination, but there is as yet no single, universally endorsed, management strategy (Katz *et al.*, 2004; Paul *et al.*, 2002; Jenderson *et al.*, 2002).

Clearly at present, there is no right answer. Thus, individual centers must develop their own management strategies based on local factors (Dalton *et al.*, 2005), such as the operative setting (geographical location, equipment, personnel and local facilities such as ERCP or MRC), the economic context (time, resources, staffing, private or teaching hospital) and the experience and skills of the operating team (Amott *et al.*, 2005).

Trans cutaneous ultrasound is a highly sensitive and accurate method for detecting bile duct dilatation and is generally used to initially evaluate CBD stones; however, its diagnostic yield is low (Zidi *et al.*, 1999; Prat *et al.*, 1996; Miletic *et al.*, 2006) ERCP is reserved for the removal of confirmed CBD stones (Dalton *et al.*, 2005). The diagnostic accuracy of endoscopic ultrasound for biliary tract stone disease is greater than 95%, which compares favorably with ERCP; however, the accuracy of both techniques is highly dependent on the operator

(Zidi *et al.*, 1999; Plazzo *et al.*, 1995). The role of routine IOC during cholecystectomy remains controversial (Amott *et al.*, 2005).

MRC is a safe and sensitive imaging technique for common bile duct pathology, when used to exclude CBD stones. Miletic *et al.* (2006) reported that MRC has the potential to replace diagnostic ERCP in all patients with suspected choledocholithiasis due to its high accuracy. Dalton *et al.* (2005) reported that MRC should be the only investigation used to exclude CBD stones, which would obviate the need for IOC.

In this study of patients in whom there was a high index of suspicion that CBD stones were present, 22 (73.3%) actually had biliary tract stone disease and 19 of these were diagnosed on MRC. The present study showed that MRC had a sensitivity of 81.8%, for CBD stones, but the sensitivity for diagnosing choledocholithiasis was much lower than in previously reported series. This may be because the stones missed by MRC were less than 3 mm in size or were microlithiasis.

CONCLUSION

MRC may obviate the need for intra-operative cholangiography, and, if used pre-operatively, MRC can reduce the time for surgery, is less invasive and may also reduce IOC-related. MRC can identify CBD stones pre-operatively and can help surgeons plan safe procedures. Pre-operative MRC should be routinely performed in all patients with clinical or biochemical features suggestive of CBD stones.

REFERENCES

- Amott, D.A. Webb and B. Tullo, 2005. Prospective comparison of routine and selective operative cholangiography. *ANZ J. Surg.*, 75: 378-382.
- Barkum, J.S. and A. Barkum, 2004. COMMON PRESENTING PROBLEM, 16 Jaundice. *ACS*, pp: 256.
- Basili, L. *et al.*, 2000. Magnetic resonance cholangiography comparative study with direct cholangiography. *Acta Gastroentrol. Latinoam*, 30: 487-490.
- Dalton, S.J., S. Balupuri and J. Gust, 2005. Routine magnetic resonance cholangiopancreatography and intra-operative cholangiogram in the evaluation of common bile duct stones. *Ann. R. Coll. Surg. Engl.*, 87: 469-470.
- Jenderson, M.B., J.E. Thorbol and S. Adamsen *et al.*, 2002. Preoperative routine magnetic resonance cholangiography before laparoscopic cholecystectomy: A prospective study. *Eur. J. Surg.*, 168: 690-694.

- Katz, D., M. Nikfarjam, A. Sfakiotaki and C. Christophi, 2004. Selective endoscopic cholangiography for the detection of common bile duct stones in patients with cholelithiasis. *Endoscopy*, 36 (12): 1045-1049.
- Miletic, D., M. Uravic and M. Mazur-Brabac *et al.*, 2006. Role of magnetic resonance cholangiography in the diagnosis of bile duct lithiasis. *World J. Surg.*, 30: 1705-1712.
- Nathanson, L.K. and I.J. Martin, 2005. Postoperative ERCP versus laparoscopic choledochostomy for clearance of selected bile duct calculi. *Ann. Surg.*, 242 (2): 188-192.
- Paul, A., B. Milat and U. Holthausen *et al.*, 2002. Diagnosis and treatment of common bile duct stones: Results of Consensus Development Conference. *Surg. Endoscopy*, 12: 856-864.
- Plazzo, I., P.P.M. Girollet and Salmeron *et al.*, 1995. Value of endoscopic ultrasonography in the diagnosis of common bile duct stones: Comparison with surgical exploration and ERCP. *Gastrointestinal Endoscopy*, 42: 225-2231.
- Prat, F., G. Amoyal and P. Amoyal *et al.*, 1996. Prospective controlled study of endoscopic ultrasonography and endoscopic retrograde cholangiography in patients with suspected common bile duct lithiasis. *Lancet*, 347: 75-79.
- Zidi, S.H., F. Prat and O.L. Guen, 1999. Use of magnetic resonance cholangiography in the diagnosis of choledocholithiasis: Prospective comparison with a reference imaging method. *Gut*, 44: 118-122.