

# EXTRACTABILITY OF COMMON BILE DUCT STONES AT ENDOSCOPIC CHOLANGIO-PANCREATOGRAPHY: A LOCAL EXPERIENCE

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## ABSTRACT

**Background:** Common bile duct stones are the treatable cause of obstructive jaundice. We aimed to determine the extractability of these at endoscopic cholangio-pancreatography in terms of size, number and location, using standard techniques. **Methods:** This descriptive study was conducted at Gastroenterology Unit, Hayatabad Medical Complex Peshawar from January 1997 to August 2009. Patients with common bile duct stones were included. Olympus JF-130 side-viewing video duodenoscope with Olympus CV-160 image processor and Toshiba CS-11 fluoroscope were used. After a scout film, contrast was injected to demonstrate stones. The number, size and location in common bile duct were noted. Sphincterotomy was performed using Olympus diathermy unit. Stone removal attempted using balloon-tip catheter and/or Dormia basket. **Results:** Total 170 patients with common bile duct stones were studied; 72(42%) males and 98(58%) females, mean age  $48.86 \pm 13.4$  years. Stone size was  $\leq 1.5$ cm in 147(86.5%), and  $> 1.5$ cm in 23(13.5%) patients. Average number of stones was 2.1, range 1-5. In 123(72.4%) patients stones were confined to distal, in 25(14.7%) to proximal duct, and in 22(12.9%) to the entire length. Stones were successfully retrieved in 147(86.5%) patients with size  $\leq 1.5$ cm, regardless of number or location. The failure rate was 13.5% (n=23) with stone size  $> 1.5$ cm. **Conclusion:** Common bile duct stones  $\leq 1.5$ cm can easily be extracted at ERCP, using standard techniques, regardless of number or location in the duct.

**KEY WORDS:** Common bile duct stones, Endoscopic Cholangio-pancreatography.

## INTRODUCTION

In 6% to 15% of patients with symptomatic cholelithiasis common bile duct stones are present, whereas in patients who had cholecystectomy for acalculous biliary disease 1-2% are found to have common bile duct stones.<sup>1</sup> Common bile duct stones are one of the important and treatable causes of obstructive jaundice which may occur as a result of either primary formation of the stones in situ or it may result from passage of the gallstones from the gall bladder through the cystic duct into the common bile duct.<sup>2</sup> The presence of stones in the common bile duct not only complicates the workup of cholelithiasis, it also requires additional diagnostic and therapeutic procedures and adds to the burden of morbidity and mortality from gallstones.<sup>3</sup> Modifications of the endoscopic procedures, recent advances in laparoscopic techniques and the introduction of innovative lithotripsy methods over the past several years have made the management of common bile duct stones a topic of much debate.

It has been estimated that in about 20% cases with choledocholithiasis, the stones would pass out spontaneously particularly when their size is  $< 3$  mm, whereas the majority of cases (80%) would

ultimately require a therapeutic intervention.<sup>4</sup> Failure to clear the common bile duct of stones renders the patient susceptible to the risk of recurrent cholangitis, pancreatitis and obstruction which adds further to the toll of morbidity and mortality from choledocholithiasis.<sup>2,5,6</sup> Endoscopic approach using ERCP has largely replaced surgical exploration of common bile duct for stone extraction.<sup>7</sup> Endoscopic removal of common bile duct stones has been regarded as an excellent modality for retained or recurrent CBD stones in patients after cholecystectomy; it has also been considered an acceptable treatment in patients with a gallbladder in situ.<sup>8</sup> In experienced hands, the risks associated with endoscopic treatment are lower than those with surgical exploration of the common bile duct.<sup>9</sup> The standard technique of CBD stone extraction comprise of endoscopic biliary sphincterotomy which widens the biliary orifice using electro-coagulation current, followed by removal of stones with balloon-tip catheters and /or Dormia basket.<sup>10</sup>

Our unit is a tertiary care referral centre where ERCP is routinely performed for CBD stone extraction. We designed this study to determine the extractability of common bile duct stones at ERCP

in terms of stone size, number and location in the CBD using standard techniques of removal.

## MATERIAL AND METHODS

The descriptive study was conducted in Gastroenterology Hepatology & GI Endoscopy Unit, Postgraduate Medical Institute Hayatabad Medical Complex Peshawar, from January 1997 to August 2009.

A total of 170 patients with documented common bile duct stones as evidenced by biliary ultrasound, MRCP or biliary CT were included in the study after informed consent. Patients with advanced cardiac or respiratory tract disease were excluded from the study. ERCP was performed using Olympus JF-130 side-viewing video duodenoscope with Olympus CV-160 processing unit and Toshiba CS-11 fluoroscope with under-couch tube. Intravenous midazolam was used for conscious sedation and intravenous hyocine as smooth muscle relaxant to facilitate cannulation. Medications were given in incremental doses based on the patient's response and condition in order to avoid overdosage. Vital signs were monitored continuously during the procedure. Urograffin was used as contrast agent during the procedure. A control or scout film was obtained in all cases with the scope in place prior to contrast injection. Stones in the common bile duct were identified initially as meniscus sign after contrast injection and latter on as filling defects. The number, size and location of stones in common bile duct were noted in each and every case. Stone size was adjusted for magnification. Standard endoscopic sphincterotomy was performed and extended as needed, using an electro-coagulation current from Olympus diathermy unit. Wire-guided sphincterotomies were carried out as and when needed. Balloon-tip catheter and/or Dormia baskets were used for stone extraction. Dormia basket is sturdier and provides better traction therefore stone extraction was first attempted with it. Balloon-tip catheters are more fragile and were reserved for removal of small stones (0.5 cm or less in size). In cases where multiple stones were present in CBD, stones were removed individually, beginning with the lowermost stone. Successful stone extraction was confirmed under direct vision by passage through the sphincterotomy.

## RESULTS

A total of 170 patients with evidence of common bile duct stones were recruited in the study. Out of these, males were 72 (42%) and females 98 (58%). The age range was 20 to 80 years, with mean of  $48.86 \pm 13.4$  years.

The common bile duct stone size was  $\leq 1.5$  cm in 147 patients (86.5% cases), whereas 23 pa-

tients (13.5% cases) had stone size  $> 1.5$  cm. The mean number of stones was 2.1 with a range of 1 to 5. In majority of patients (72.4%,  $n=123$ ) the stones were confined to distal common bile duct, whereas 25 cases (14.7% cases) had stones in the proximal common bile duct, and 22 cases (12.9% cases) had stones along the entire length of common bile duct. The stones were successfully retrieved in 147 (86.5%) cases with common bile duct stone size  $\leq 1.5$  cm using balloon-tip catheter and/or Dormia basket following sphincterotomy. The stone extraction rate of 86.5% ( $n=147$ ) was not affected by the location of stones in common bile duct, neither was it affected by their number as long as the stone size was  $\leq 1.5$  cm. The failure rate was 13.5% ( $n=23$ ) with the stone size  $> 1.5$  cm being the major determinant.

## DISCUSSION

Many studies have reported that 80% to 90% of common bile duct stones can be safely and effectively removed at ERCP using the standard techniques of endoscopic biliary sphincterotomy followed by retrieval with balloon & /or basket.<sup>11</sup> A clearance rate of  $>99\%$  has been reported by some expert centers where advanced endoscopic facilities are available.<sup>12</sup> However, most expert endoscopists can now be expected, and truly so, to achieve a clearance rate of  $>85\%$  with conventional methods of CBD stone extraction.<sup>13</sup> Our success rate of 86.4% for CBD stones of  $\leq 1.5$  cm using standard techniques of removal is comparable to that reported in the literature.

Failure to extract CBD stones successfully at ERCP is the result of many factors, such as size of stone ( $>2$  cm), multiple impacted stones, stones proximal to a CBD stricture, and difficult anatomy including periampullary diverticulae and Billroth II surgery.<sup>4,9</sup> These problematic stones can be removed by second line therapy comprising of mechanical lithotripsy which has been reported to have a success rate of 88% to 92% in expert hands.<sup>13</sup> Mechanical lithotripsy can be performed using non-endoscopic lithotripter devices or through-the-scope method utilizing a Teflon-protected crushing basket.<sup>14</sup> In cases where mechanical lithotripsy fails, cholangioscopic intraductal shockwave lithotripsy, laser lithotripsy with or without a stone-tissue discriminating system or intracorporeal electrohydraulic lithotripsy can be used to crush the stones to small pieces before removal.<sup>15-17</sup>

The importance of CBD stone size and its relation to the success of endoscopic sphincterotomy and duct clearance has been emphasized in many other studies and other groups in their work have also shown difficulties with large CBD stones.<sup>18</sup> Silvis et al have determined that in

cases where CBD stone size was >2 cm, it was beyond the limit of a successful endoscopic sphincterotomy to extract such stones at ERCP.<sup>19</sup> Kiil et al and Moss et al have suggested that stenting should be used with stones over 1.5 cm in diameter.<sup>20,21</sup> The success rate of CBD clearance in our study was 86.5%, which is lower than reported from some other centers. This may reflect our lack in facilities such as those of lithotripsy including intra and extracorporeal shockwave and laser, and mother-baby scope units etc.

Our study has clearly shown that common bile duct stones  $\leq 1.5$  cm in size can safely and successfully be removed at ERCP using standard techniques of stone extraction and this should therefore be the procedure of choice for small stones. CBD stones >1.5 cm in diameter cannot be removed with standard techniques at ERCP, which suggests that additional or alternative forms of treatment should be considered at an earlier stage in patients with duct stones of this size.

## CONCLUSION

We conclude that common bile duct stones  $\leq 1.5$  cm in diameter can safely and successfully be extracted at ERCP using the standard techniques of sphincterotomy followed by balloon or basket removal regardless of their number or location in the duct whereas stones >1.5 cm in size need additional measures for removal.

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