

ENDOSCOPIC STENTING IN THE MANAGEMENT OF BILIARY STONES

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ABSTRACT

Introduction: Endoscopic sphincterotomy and stenting are established modes of treatment in the management of bile duct stones and cholangitis. It is the first choice of treatment when the patients are elderly and have other medical conditions rendering them unfit for surgery.

Aims: We studied the immediate and long-term outcome of endoscopic stenting in patients who underwent Endoscopic Retrograde Cholangiopancreatography (ERCP) for ductal stones.

Patients and Methods: From January 1990 to December 1992, 366 patients had ERCP done for biliary stone disease. Fifty-five of these patients received a 10 French biliary stent for the treatment of bile duct stones. Most of these patients (60%) had an advanced age of more than 70 years and 45% had co-existing medical conditions rendering them high risk for surgery. Ninety-one percent had stones greater than 1.2 cm in diameter and 82% had multiple stones.

Results: Eighty-nine percent of the patients had relief of jaundice and cholangitis resolved in 96% of the patients after stenting. None required immediate surgery after ERCP. Temporary bile drainage was achieved in 19 patients who went for surgery at a later date when they became more stable. Twenty-nine patients were on long-term follow-up for a mean period of 13 months. Nineteen patients still have their stents in place and remained well. The stents were repeatedly changed in 15 patients after an average duration of 5.5 months. Late complications were cholangitis in 2 patients and stent migration in one patient. There was no related mortality. In 5 patients, the stones have either disappeared spontaneously or become smaller and have been removed at subsequent ERCP.

Conclusion: Endoscopic stenting is a valuable alternative to surgical bile duct exploration. It can be the definitive mode of treatment for large or multiple bile duct stones in the elderly and patients with multiple medical problems who are unfit for surgery.

Keywords: large stones, multiple stones, endoscopic stenting

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INTRODUCTION

Endoscopic Retrograde Cholangiopancreatography (ERCP) was first described by Oi in 1970⁽¹⁾. Endoscopic sphincterotomy (ES) and bile duct stones extraction were described four years later^(2,3). By this method, diagnostic and therapeutic works could be carried out for common bile duct lesions. In general, bile duct stones of about 1 cm in diameter can be readily extracted at ERCP but those which are bigger than 1.5 cm pose problems for the endoscopists⁽⁴⁾. ES alone with standard baskets and balloon catheters is sufficient to relieve the biliary obstruction in about 90% of cases provided the stones are small and few in number^(5,6). Endoscopic alternatives for the management of the remaining

difficult large common bile duct stones include insertion of a nasobiliary drain for temporary bile drainage and dissolution therapy⁽⁷⁾, mechanical lithotripsy⁽⁸⁾, laser lithotripsy⁽⁹⁾, extracorporeal shockwave lithotripsy (ESWL)⁽¹⁰⁾ and electrohydraulic lithotripsy (EHL)⁽¹¹⁾. However, these procedures are complicated, time-consuming and require expensive high-technology equipment and trained endoscopists.

Since the advent of the large channel duodenoscope, an alternative to the management of difficult bile duct stones became available in the form of endoscopic stenting⁽¹²⁾. It is a simple, rapid and efficient way of managing difficult bile duct stones, especially when stone clearance failed with other methods and biliary drainage is in doubt. It is also the definitive treatment of choice for the elderly and frail patients who are unfit for surgery or other complicated endoscopic procedures.

The aim of our study is to analyse the clinical outcome of patients who were stented for bile duct stones.

MATERIALS AND METHODS

A retrospective study of case notes from the Department of Medicine II, Singapore General Hospital showed that from January 1990 to December 1992, 366 patients had ERCP done for biliary stones disease. Within this group of patients, 55 patients received endoscopic stenting for the treatment of complicated bile duct stones. This comprised 30 males and 25 females, with a mean age of 71 years, range 37 to 89 (Table I). All patients were admitted with obstructive jaundice. Most of them also had features of cholangitis with fever, right hypochondrial pain, raised total white cell count and abnormal liver function tests. Ninety-six percent of the patients also received antibiotics prior to ERCP.

ERCP was chosen as the mode of therapy because of its easy availability in the hospital and other reasons including elderly age, co-existing illnesses and high surgical risk. Thirty-three patients (60%) were older than 70 years of age. Twenty-

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Table I – Patient characteristics

	Number of patients (%)
Total number of patients	55
Sex distribution	30M : 25F
Age of patients (years)	37 – 89
(Mean age)	71
Age > 70 yrs	33 (60)
Medical conditions:	
Diabetes mellitus	8
Hypertension	8
Ischaemic heart disease	4
Recent acute myocardial infarction	1
Chronic obstructive airway disease	3
Decompensated liver cirrhosis	1
Total	25 (45)
Refused operation	7 (13)
Previous cholecystectomy	13 (24)

M : Male
F : Female

Table II – Stone characteristics

	Number (%)
Common bile duct stones alone	29 (53)
Multiple stones	45 (82)
Stones > 1.2 cm in diameter	50 (91)

five patients (45%) had medical conditions such as diabetes, hypertension, ischaemic heart disease, chronic obstructive airway disease and decompensated liver cirrhosis. Seven patients (13%) refused operation. Thirteen patients had prior cholecystectomy. All patients had common bile duct stones. Eighty-two percent had multiple stones and 91% had stones greater than 1.2 cm in diameter (Table II).

The duodenoscope used routinely was an Olympus TJF 20. (Olympus, Japan). Sphincterotomy was performed in all patients. Attempts at removal of stones were made in 13 patients either by mechanical or electrohydraulic lithotripsy, but complete clearance was not achieved.

The stents used were either Cook (Wilson-Cook, USA) or self-made 10 French stents of mean length 12.5 cm (Range: 9 to 16 cm). Stents were placed in the common bile duct. Multiple stents were inserted in 3 patients.

RESULTS

All 55 patients were stented successfully and immediate outcome was good. After stenting, 89% had relief of jaundice and 95% recovered from cholangitis. One patient recovered from disseminated intravascular coagulation as a complication of severe cholangitis. There was no procedure-related morbidity or mortality. Twenty-six patients were excluded from follow-up after a month because of elective surgery (n=19), unrelated death (n=3) and lost to follow-up (n=4) (Table III).

Nineteen patients were sent for surgery electively ranging from 4 days to 1 month after stenting. The indications for surgery were: unresolved sepsis in 2, persistent jaundice in 6, large impacted stones in 3 and elective cholecystectomy in 8 patients. All had cholecystectomy and exploration of common bile duct done. All patients with previous cholecystectomy did not require any further surgical intervention (Table IV).

Table III – Immediate outcome (up to one month) after stenting

	Number of patients (%)
Jaundice relieved	49 (89)
Cholangitis resolved	53 (96)
DIVC resolved	1
Elective surgery	19
Unrelated death	3
Lost to follow-up	4

Table IV - Indications for elective surgery

	Number of patients
Persistent jaundice	2
Unresolved sepsis	6
Large impacted stones	3
Cholecystectomy	8
Total number of patients	19

Table V - Long term outcome after stenting

	Number of patients
Change of stents	15
No change of stent	4
Stents removed	5
Unrelated death	5
Total on follow-up	29
Late complications:	
Recurrent cholangitis	2
Stent migration	1

Twenty-nine patients were followed up for a mean period of 13 months. The long-term outcome of stenting was analysed (Table V).

Five patients died of unrelated illnesses during the follow-up period. Fifteen patients had repeat ERCP for change of stents. Twelve patients had their stents changed once and 3 patients changed twice. The average duration of each stent was 5.5 months. Indications for change of stents were blockage in 14 patients, recurrent cholangitis in 2 patients, elective stent exchange in 3 patients and stent migration in one patient. Five patients had their stents removed during subsequent ERCP because stones had either disappeared (n=1) or decreased in size, enabling complete removal (n=4).

In our series, the only late complication was migration of stent in one patient, occurring 4 months after stenting. Blockage of stents with recurrent cholangitis in 2 patients were easily treated by prompt exchange of stents. Pancreatitis was not observed. There was no procedure-related mortality.

Twenty-four patients are still on follow-up. Nineteen of them still have their stents in place and remain asymptomatic. The 5 patients with stent removed also remained well and there has been no evidence of recurrent stones.

DISCUSSION

Endoscopic sphincterotomy (ES) and duct clearance via ERCP is the treatment of choice for common bile duct stones in patients with cholecystectomy or intact gall bladder as compared to biliary surgery^(13,14). Biliary surgery can have a mortality rate of up to

6% to 8% and complication rate of up to 46%⁽¹⁵⁾. In contrast, ES with stone clearance has a low mortality of about 1.5% and complication rate of about 10%⁽¹⁶⁾.

ES with standard Dormia baskets and balloon catheters are sufficient for extraction of common bile duct stones in 90% of patients with intact gall bladder or prior cholecystectomy^(5,6). In the remaining 10% of patients, additional endoscopic methods are needed for complete duct clearance. In these patients, the stones are usually large (>1.5 cm diameter), multiple in number or impacted^(4,17).

Mechanical lithotripsy was first introduced for large unextractable stones after ES failed to clear the duct⁽¹⁸⁾. However, to be successful, the stones must firstly be securely captured by the basket for crushing. This may fail if stones are too large, firmly impacted or poorly accessible⁽¹⁹⁾. The use of mechanical lithotriptors in a community hospital is also questioned because of their expense and cumbersome nature⁽²⁰⁾. Moreover, only about 80% of large difficult stones can be removed in this way⁽¹⁹⁾. Electrohydraulic lithotripsy (EHL) of common bile duct stones was introduced in 1982⁽⁹⁾. Initial experience with fluoroscopic guidance had a high risk of bile duct damage including bleeding and perforation⁽²¹⁾. EHL with the Olympus 'mother-baby' scope system was much safer and more efficient⁽²²⁾. However, the procedure is time-consuming, requiring an average of 45 to 90 minutes per session and 2 to 5 sessions are needed for complete duct clearance⁽²³⁾. The stone clearance rate is about 87%⁽²⁴⁾. Laser lithotripsy, an alternative mode of treatment, requires advanced training of endoscopists and more sophisticated and expensive equipment. The widespread use of these systems is therefore limited⁽⁴⁾. ESWL of common bile duct stones has been reported by a few workers^(10,25). However, repeated sessions are needed and a complication rate of 8% was reported in one study⁽²⁵⁾. In addition, the complete stone clearance rate is only 80%⁽²⁴⁾. Lastly, dissolution therapy was also attempted by a few workers but overall results were poor with intolerable side effects and a complete clearance rate of only 54%^(7,26). There is also a high recurrence rate after initial successful treatment.

In summary, although there are alternative endoscopic procedures available for the treatment of difficult bile duct stones, these methods are not ideal. The main disadvantages include: costly and complicated equipment, excessive manpower, time-consuming and repeated sessions, high complication rate and poor results of complete duct clearance. An easier and efficient method is needed, especially in the developing countries where expensive equipment and high technology are not available and in the treatment of old and frail patients who cannot tolerate prolonged and complicated procedures. In addition, there is still a significant percentage of difficult stones that cannot be removed even after mechanical lithotripsy, EHL or ESWL^(27,28).

Endoscopic stenting for the treatment of common bile duct stones was first described in 1982 by Cotton et al⁽¹²⁾.

It is a simple and rapid endoscopic procedure that requires minimal training and equipment. The complete stenting procedure is done by a single endoscopist taking an average of 5 minutes. This is in great contrast to complicated procedure like EHL which takes an average of 45 to 90 minutes each session and requires 2 endoscopists and repeated sessions. Studies by various workers have shown that it is effective for large retained common bile duct stones^(29,30). It is also the treatment of choice for unextractable bile duct stones when all other endoscopic methods failed in achieving complete duct clearance⁽³⁰⁻³²⁾. In the treatment of elderly and frail patients with large bile duct stones, both morbidity and mortality are high if these patients are subjected to long and complicated procedures. Endoscopic stenting has been shown to be one of the safest and effective method available for these patients⁽³³⁻³⁵⁾. Moreover, surgical

exploration of the common bile duct in the elderly and unfit patients has a high complication rate of 12% to 28%⁽³⁶⁾.

In our study, 55 patients were stented. Only 8 patients went on for elective surgery because stenting failed to relieve jaundice or improve cholangitis. In the remaining 85% of patients, endoscopic stenting was successful and this included all those with recurrent stones post-cholecystectomy. The majority of the patients were elderly and unfit or high risk for surgery due to co-existing illnesses.

In our long-term follow-up, outcome was favourable in all patients who received stenting as a definitive treatment for bile duct stones. This result was comparable to that achieved by other workers^(32,37,38). The only complications were stent migration and recurrent cholangitis. Long stents were used in our study to decrease the incidence of stent migration. Recurrent cholangitis was treated easily by antibiotics and prompt exchange of stents. Stent exchange was performed at an average duration of 5.5 months. Prophylactic exchange of stents was not necessary. In some patients, stent exchange was not required and stones actually decreased or disappeared, enabling extraction on repeat ERCP. This is because a blocked stent can still act as a strut to prevent stone impaction, thus allowing adequate unobstructed bile flow.

Stent patency is not as important in the treatment of biliary stones as compared to malignant biliary obstruction. However, it is still essential to achieve good bile flow so as to decrease the frequency of stent exchange and prevent recurrent cholangitis. In order to prolong stent patency and reduce stone size and number more effectively, a combination of stenting and medical dissolution therapy was introduced for the treatment of difficult common bile duct stones. The overall result using chenodeoxycholic acid (CDCA) was poor⁽³⁹⁾. However, in a more recent controlled study, a combination of stents and oral ursodeoxycholic acid (UDCA) was shown to be more effective than stents alone in the treatment of large bile duct stones⁽⁴⁾. In places where advanced and costly lithotripsy methods are not available, this combined method is the most effective alternative. UDCA can also be given when stenting is done for stones located above strictures or when long-term stenting is chosen as the definitive treatment.

CONCLUSIONS

Endoscopic stenting is a safe and effective therapy in the management of difficult bile duct stones and stones that remain unextractable by other endoscopic methods. Both morbidity and mortality are reported to be low. Biliary drainage can be achieved temporarily, thus allowing definitive surgery to be postponed in those otherwise high-risk patients. Endoscopic stenting is also the treatment of choice in patients with retained or recurrent bile duct stones post-cholecystectomy. In patients who are elderly or medically unfit for surgery, endoscopic stenting is the definitive mode of treatment with good long-term outcome.

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