

## Postoperative Intrahepatic Calculus: The Role of Extracorporeal Shockwave Lithotripsy

### Abstract

Bile duct stones are a known complication after a Roux-en-Y hepaticojejunostomy. Different minimally invasive stone extraction techniques, including endoscopic retrograde cholangiopancreatography with basket removal or the use of a choledocoscope through a mature T-tube tract, can be used. However, in some cases, they are unsuccessful due to complicated postsurgical anatomy or technical difficulty. In this report, we present a case where extracorporeal shockwave lithotripsy was used in conjunction with standard interventional techniques to treat bile duct stones.

**Keywords:** *Biliary tract calculus, extracorporeal shockwave lithotripsy, post-Roux-en-y hepaticojejunostomy*

**Asad Irfanullah,  
Kamran Masood,  
Yousuf Memon,  
Zakariya Irfanullah**

*Department of Radiology, Indus Hospital, Karachi, Pakistan*

### Introduction

Bile duct stones and anastomotic strictures are known complications of Roux-en-y hepaticojejunostomy. Due to the postsurgical anatomy, conventional endoscopic retrograde cholangiopancreatography (ERCP) techniques are often not possible.

In this specific case, we treated a large bile duct stone using a combination technique of extracorporeal shockwave lithotripsy (ESWL) along with a percutaneous angioplasty of the anastomotic stricture, followed by stone removal. We feel that this specific technique provided a minimally invasive method to treat a complex problem, thus saving the patient from major surgery and its associated morbidity and mortality.

### Case Report

A 45-year-old female presented to our Interventional Radiology (IR) Department from an outside hospital with a diagnosis of recurrent ascending cholangitis and obstructive jaundice. At presentation, she had an elevated WBC count of  $29.3 \times 10^9/L$  with a total bilirubin of 4.4 mg/dl. Her liver enzymes were as follows: alkaline phosphatase 618 U/L, gamma-glutamyltransferase 440 U/L, alanine transaminase 48 U/L, and aspartate transaminase 49 U/L. Her

medical history was significant for an open cholecystectomy complicated by iatrogenic injury to the common bile duct and subsequent creation of a Roux-en-y hepaticojejunostomy (REHJ). A magnetic resonance cholangiopancreatography was performed which demonstrated a significant intrahepatic biliary dilatation with the formation of hepatic microabscesses. She was initially treated with antibiotics for 2 weeks in order to treat her acute infection. Later, percutaneous cholangiogram demonstrated a large filling defect (stone) within the duct with a high-grade anastomotic stricture [Figure 1]. The stone was causing intermittent obstruction of the duct. A 10 Fr internal-external biliary drain was then left in place to decompress the biliary system. The patient was then referred to the gastroenterology (GI) service. Endoscopy was performed to identify the anastomosis and attempt stone retrieval through endoscopic approach. The anastomosis, however, could not be identified, and the procedure was abandoned. After further discussion with the GI service, the patient was brought back to the interventional radiology department. The plan was to attempt percutaneous retrieval of the stone through the percutaneous transhepatic cholangiography tract. The internal-external biliary drain was removed over a 0.035 inch wire, and a 12 French vascular sheath was placed. Through the sheath, a

#### Address for correspondence:

*Dr. Kamran Masood,  
A-40/2, Madina House,  
6<sup>th</sup> Gizri Lane, Phase 4, DHA,  
Karachi, Pakistan.  
E-mail: masood.kamran@gmail.com*

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3 cm Trapezoid RX Wireguided Retrieval Basket (Boston Scientific) was advanced. The stone, however, was too large and slippery and could not be successfully engaged [Figure 2]. The procedure was abandoned, and the biliary drain was replaced. The patient was then referred to the urology service to use lithotripsy to fragment this stone. A total of two ESWL sessions 1 week apart were performed using a STORZ lithotripter model SLX-F2 with a discharge rate of 65 shocks/min under mild sedation. The patient was then brought back to the IR department, and a repeat cholangiogram demonstrated a significant reduction in the size of the stone [Figure 3]. Under general anesthesia, the existing internal-external drain was removed over a Rosen wire, and a short 12 Fr vascular sheath was placed. The surgical anastomosis was then dilated with a 12 mm × 4 cm balloon [Figure 4]. Repeat cholangiogram demonstrated a widely patent anastomosis with free flow of contrast into the jejunum. A 1 cm free-floating stone was identified. Initial attempts at engaging the stone with

a 3 cm basket were unsuccessful. Finally, a 10 mm balloon was inflated with the stone positioned between the balloon and the anastomosis. The balloon was then advanced through the anastomosis, successfully pushing the residual stone into the jejunum. A 12 Fr internal-external drain was placed and capped [Figure 5]. After 3 weeks, a final cholangiogram demonstrated a widely patent anastomosis with no definite residual stone. The tube was removed, and the patient was instructed to follow-up with liver function tests (LFTs) and an abdominal ultrasound (US) in 1 week. The patient remains symptom free at 2 years follow-up with no evidence of biliary dilatation on US and normal LFTs.

## Discussion

For patients who require bilioenteric anastomosis in cases of bile duct injury, the REHJ is a procedure of choice with appropriate biliary reconstruction.<sup>[1]</sup> However, the postoperative complication rates for residual/recurrent stones and some degree of cholangitis are significant.<sup>[2]</sup> The development of stenosis at the site of anastomosis may

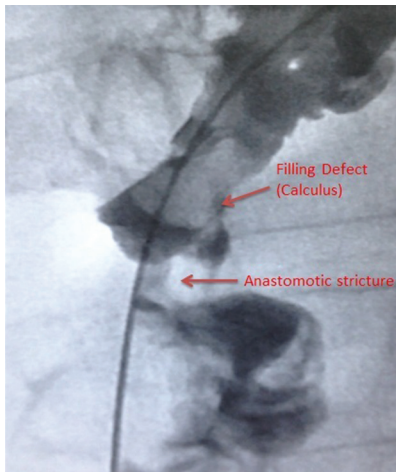


Figure 1: Initial presentation with a filling defect (stone) in distal bile duct causing ball valve obstruction at the anastomosis resulting in the patient's symptoms of obstruction with ascending cholangitis

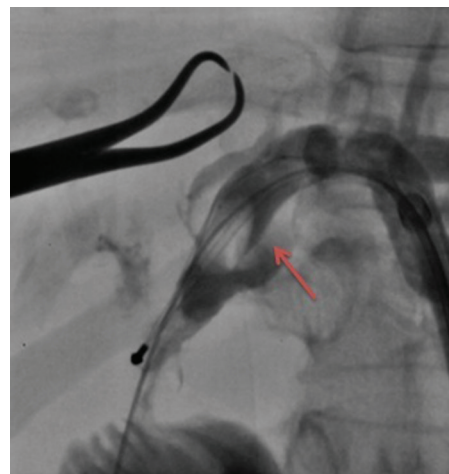


Figure 2: Attempted stone retrieval with a Dormier basket which was unsuccessful at engaging the large and slippery stone

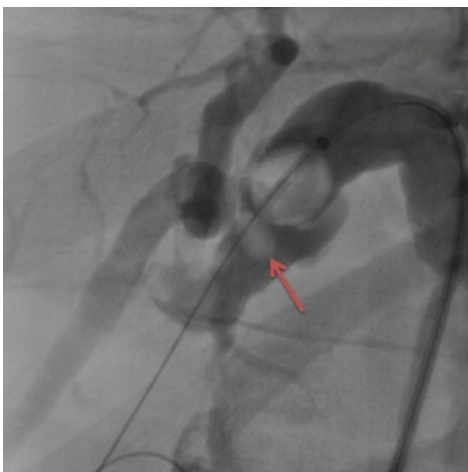


Figure 3: Status postextracorporeal shockwave lithotripsy showing fragmentation of the calculus. The small residual fragments seen were pushed distally using a balloon



Figure 4: Balloon plasty of anastomotic stricture



Figure 5: Postprocedure internal-external drain placed

also necessitate reoperation.<sup>[3]</sup> Interestingly, our patient had a myriad of aforementioned REHJ complications when she was referred to the IR service. An initial attempt by endoscopy and ERCP was unsuccessful likely due to complicated postsurgical anatomy. Percutaneous removal of intrahepatic stones using an angulated catheter and/or Dormier basket is a useful complementary procedure to surgery.<sup>[4]</sup> Percutaneous basket removal was attempted; however, the stone could not be extracted. Thereafter, the use of ESWL to help fragment stone was considered. ESWL is a noninvasive technique initially described for the treatment of urolithiasis.<sup>[5]</sup> It was first used to fragment bile duct stones in 1985.<sup>[6]</sup> The efficacy of ESWL in achieving common bile duct stone disintegration in 90% cases with minimal side effects was described by Sauerbruch *et al.*<sup>[6]</sup> ESWL also showed excellent results for intrahepatic calculi in postoperative cases.<sup>[7]</sup> There are reports of cases where ESWL was not successful as the intrahepatic duct stones were small and the shockwaves caused them to move.<sup>[8]</sup> It is postulated that this approach is suitable in cases of large impacted/immobile calculi.<sup>[9]</sup> The use of ESWL for the treatment of gallstones was vastly researched in the late 1980s, and Food and Drug Administration trials were also conducted; however, there were many complications associated with ESWL, including downstream bile duct obstruction due to the smaller stone fragments and pancreatitis.<sup>[10]</sup>

Many authors have different experiences in regard to the number of ESWL sessions required. Okada *et al.*<sup>[7]</sup> recommended at least five sessions whereas Senyüz *et al.*<sup>[8]</sup>

reported a patient undergoing seven sessions of ESWL for multiple intrahepatic calculi. Our patient required only two sessions.

## Conclusion

ESWL to fragment large impacted biliary calculi is a helpful adjunct therapeutic modality in complex patients when they fail percutaneous or endoscopic approaches.

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## Conflicts of interest

There are no conflicts of interest.

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