

Successful Removal of the Common Bile Duct and Left Hepatic Duct Stones Using a Combination of Extracorporeal Shock Wave Lithotripsy and Spyglass-Guided Laser Lithotripsy

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Received: 10 Feb 2022

Accepted: 21 Feb 2022

Published: 28 Feb 2022

J Short Name: JJGH

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Citation:

Yang J, XiaoFeng Z, Successful Removal of the Common Bile Duct and Left Hepatic Duct Stones Using a Combination of Extracorporeal Shock Wave Lithotripsy and Spyglass-Guided Laser Lithotripsy. Japanese J Gastro Hepato. 2022; V8(7): 1-3

Keywords:

ESWL; Spyglass-Guided Laser Lithotripsy; Refractory Cholelithiasis

1. Abstract

Conventional ERCP is difficult for the treatment of refractory choledocholithiasis. This paper reports a case of giant stones in the common bile duct and left hepatic duct treated by ESWL combined with SpyGlass-guided laser lithotripsy.

2. Introduction

Currently, the overall stone clearance rate with ERCP for choledocholithiasis has reached 90%-95% [1]. However, the success rate of conventional ERCP is not that much higher for refractory choledocholithiasis, especially for stones with a diameter greater than 3cm. In the past, after ERCP failure the only choice for patients was surgical laparotomy or laparoscopic lithotomy. Patients not suitable for surgery were treated with plastic stenting but have to undergo multiple ERCPs and show success rate of only 44-96% [2].

Recently, choledochoscopic laser, electrohydraulic lithotripsy or extracorporeal shock wave lithotripsy (ESWL) have been applied for the treatment of huge bile duct stones, that improve the success rate of difficult bile duct stones. But such cases are rare.

3. Case Report

A 65 years old female suffering from persistent epigastric pain with yellow skin and urine color, chills and body temperature 38.5°C. She was diagnosed with choledocholithiasis at local hospital and underwent ERCP treatment but was unable to remove larger stones, so two plastic stents were applied. 6 months later, symptoms recurred and stents were replaced.

Later on, the symptoms recurred again and she was transferred to our hospital. Her body temperature was 38.7°C, yellow skin and WBCs 8x10¹²/L. She has history of cholecystectomy, choledocholithotomy, left hemihepaticolithotomy, hypertension and meningioma. We performed an emergency ERCP and found stones in left hepatic duct (about 3.5 X 4 cm) and choledocholithiasis (about 4 X 6.5cm) (Figure 1). Due to failure of basket opening and stent (implanted half year before) incarcerated with stones, nasobiliary duct was inserted into left hepatic duct. After infection control, ESWL for choledocholithiasis was performed 3 times (Figure 2). 2nd ERCP shows common bile duct stones were divided into multiple small pieces, that were removed by the basket. However, one large stone was difficult to be

crushed and removed. Therefore, SpyGlass-guided laser lithotripsy was performed under direct vision and stones were removed with mesh basket after complete lithotripsy (Figure. 3-4).

Later on, ESWL was performed twice for left hepatic bile duct stones (Figure 5). During third ERCP, SpyGlass-guided laser lithotripsy was performed for larger stones. Stones were removed by mesh basket or extraction balloon. Angiography shows no stones and nasobiliary drainage tube was placed. (Figure 6-7). On 2nd day after 3rd ERCP patient suffered from fever with WBCs $1.8 \times 10^{12}/L$. She was given 300 UG of human granulocytes stimulatory factor. 5 days later, vital signs were stable with $7.6 \times 10^{12}/L$ WBCs. Nasobiliary cholangiography shows no residual stones (Figure 8), so after extubation, the patient was discharged. No recurrence of symptoms was found.

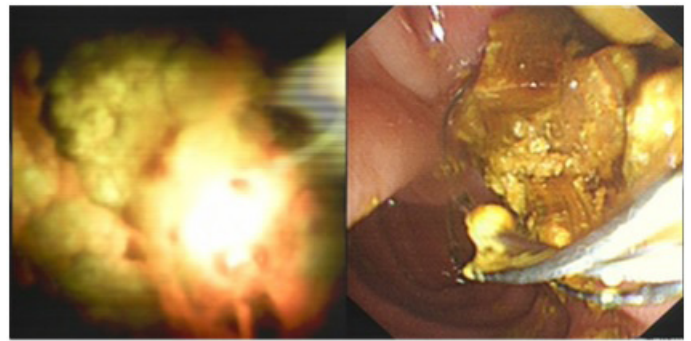


Figure 3-4: Under Spyglass direct vision, laser lithotripsy was performed, and a large number of yellow stones were removed with a mesh basket.



Figure 1: The first ERCP showed huge stones in the common bile duct and left hepatic duct

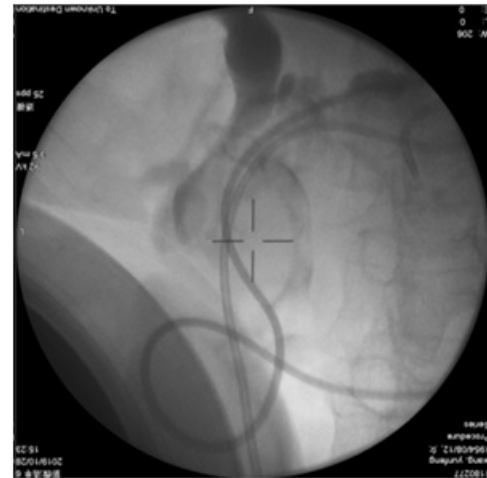


Figure 5: ESWL was performed twice for left hepatic duct stones

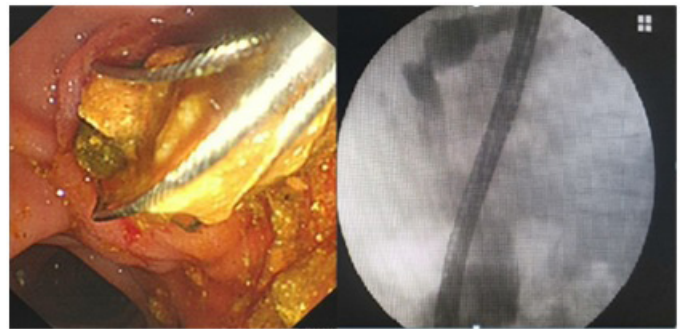


Figure 6-7: ERCP and SpyGlass-guided laser lithotripsy was performed again. No residual stones were found after lithotomy



Figure 2: After infection control, three times extracorporeal shock wave lithotripsy was performed for choledocholithiasis



Figure 8: No residual stones were found by nasobiliary cholangiography

4. Discussion

ESWL was first used for the removal of renal calculi and ureteral calculi however, now it has been improved for biliary calculi. It has the advantages of low cost, simple operation and higher safety. Tao et al [3] divided the patients (with common bile duct stones who failed in the first ERCP) into ESWL + ERCP group and simple ERCP group. Compared with simple ERCP, ESWL + ERCP group not only showed a higher (96.0% - 86.0%) stone removal rate, among which the removal rate of huge stones was (40%-80%), but the procedure time was also shorter and the utilization rate of mechanical lithotripsy was effectively reduced. The incidence of complications was also reduced.

It is difficult for ESWL to break the stones larger than 3cm into small pieces. Due to this limitation, some of the stones were still large after ESWL in our case, so we combined SpyGlass-guided laser lithotripsy. Spyglass has been used in clinics for more than ten years, especially after the development of the second generation Spyglass, its application range is more extensive. Recently, Maydeo et al [4] reported 156 patients with difficult bile duct stones who were treated with SpyGlass-guided laser lithotripsy. The one-time stone extraction success rate was 80.0%, the final removal rate was 87.2%, and the complication rate was 1.9%. Compared with laser lithotripsy under X-ray monitoring, there is no significant difference in stone removal rate and complication rate between the two methods. However, the effect of lithotripsy under Spyglass direct vision is better, which can break large stones into smaller pieces, thus making it easier to take stones.

In our case, the patient underwent ESWL 5 times and ERCP 3 times since her admission. It may be exposed to X-ray for a long time, resulting in a white blood cell count decrease. Therefore, for patients with more ERCP and longer operation times, the lead coating is expected to be used to protect the non-liver area. Reduce the X-ray exposure time as far as possible, and dynamically monitor the leukocyte count after the operation.

In conclusion, ESWL combined with SpyGlass-guided laser lithotripsy is an effective and safe treatment for huge bile duct stones that cannot be treated by conventional ERCP. However, it is necessary to pay attention to the level of white blood cells during the whole treatment process.

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