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# Surgical treatment of basket impaction, a rare complication of ERCP. Single centre experience

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**Abstract**

Basket impaction is a rare complication of Endoscopic Retrograde Cholangiopancreatography (ERCP). This complication is usually treated non-operatively. Surgery is required when non-operative methods fail. In this study, we retrospectively evaluated the results of five patients who underwent surgery for basket impaction between January 2017 and December 2021. The median mean age was 50 (21-82) years. Basket impaction was in the common bile duct in three patients and the pancreatic duct in two. There was no operative complication. Wound infection developed in one patient and evisceration in one in the postoperative period. The length of hospital stay was 10 (7-12) days. The overall morbidity rate was 33.3%. There was no postoperative mortality. Basket impaction can usually be treated with non-operative interventions. Surgical intervention should be preferred last.

**Keywords:** biliary stone, pancreatic stone, basket, impaction, surgery, endoscopic retrograde cholangiopancreatography

## 1. Introduction

Endoscopic Retrograde Cholangiography (ERCP) is an invasive method used to treat bile duct and pancreatic duct stones (1, 2). The overall complication rate after ERCP has been reported as 5-10% (3).

Basket impaction/wire fracture is a rare complication usually treated with non-operative methods. Surgery is the only treatment option when endoscopic treatment fails (4). This study aimed to present the results of patients who had failed endoscopic interventions and underwent surgery due to basket impaction.

## 2. Materials and Methods

The local ethics committee approved this study (OMU KAEK 2022/233). We obtained informed consent from all patients. We included in the study five patients who underwent surgery with the diagnosis of basket impaction between January 2017 and December 2021 and performed surgery in all patients when non-operative methods failed.

We retrospectively analyzed clinico-demographic characteristics, concomitant diseases, ERCP indications, previous ERCP attempts, stone size, basket type, basket impaction location, surgical type treatment, postoperative complications, mortality, and length of hospital stay from patient medical records.

### 2.1. Surgical technique and postoperative care

We conducted antibiotic prophylaxis with 3rd generation cephalosporin 30 minutes before incision. Three hepatopancreaticobiliary surgeons performed two different surgical methods according to the localization of basket impaction.

If the impacted basket is in the common bile duct, we fully achieved duodenal mobilization by performing the Kocher maneuver for a tension-free anastomosis and applied 2 cm longitudinal choledochotomy to the common bile duct and then extracted the basket with the stone. We irrigated the bile duct with saline and checked common main duct for stone clearance and the passage from the choledochus to the duodenum via a bougie. We performed cholecystectomy routinely if not done previously and choledochodoudenostomy anastomosis with continuous PDS (Polydioxanone) monofilament suture 5.0 for single-layer anastomosis. We placed an abdominal drain under the choledochodoudenostomy routinely.

If the impacted basket is in the main pancreas duct, we performed duodenotomy from the second part of the duodenum and then removed the stone and basket. We repaired the

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duodenum over a double layer. We placed an abdominal drain under the duodenum.

Oral intake started on the third postoperative day. When the amount was below 100 cc/day, we removed the drain and then discharged the patients. If T-tube was applied, we removed it on the 14th postoperative day after control cholangiography.

## 3. Results

The median mean age was 50 (21-82) years. Three of the patients were women. The clinico-demographics and surgical characteristics of the patients are shown in table 1. We performed ERCP in three due to bile duct stones and two due to pancreatic duct Stones (Fig. 1). ERCP features are shown in table 2. There were no intraoperative complications. Postoperative wound infection developed in one patient and evisceration in one. The length of hospital stay was 10 (7-12) days. The overall morbidity rate was 40%. There was no postoperative mortality.

**Table 1.** Characteristics of the patients

| Age | Sex | Stone localization | Surgery | Complication | Length of stay | Comorbidity |
|---|---|---|---|---|---|---|
| 59 | F | Common bile duct | Stone and basket extraction+ Choledochoduodenostomy+Cholecystectomy | None | 11 | Hypertension |
| 59 | M | Pancreas | Duodenotomy and basket extraction from the pancreatic duct | Wound infection | 8 | Diabetes mellitus |
| 82 | F | Common bile duct | Stone and basket extraction+ Choledochoduodenostomy | Evisceration | 10 | Hypertension+ coronary artery disease |
| 21 | F | Pancreas | Duodenotomy and basket extraction from the pancreatic duct | None | 7 | None |
| 50 | M | Common bile duct | Common bile duct exploration+T tube+ Cholecystectomy | None | 12 | None |

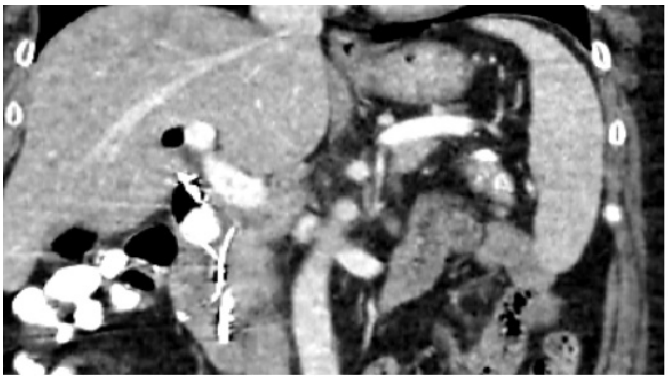

**Fig. 1.** Computed tomography image of the impacted basket in the common bile duct

**Table 2.** ERCP features

| | Indication | Number of ERCPs | Duct Diameter | Basket type | Stone diameter |
|---|---|---|---|---|---|
| 1 | Common bile duct Stone | 3 | 20mm | Dormia | 20mm |
| 2 | Pancreatic Stone | 5 | 7mm | Dormia | 6mm |
| 3 | Common bile duct Stone | 4 | 20mm | Dormia | 20mm |
| 4 | Pancreatic Stone | 2 | 6mm | Dormia | 5mm |
| 5 | Common bile duct Stone | 2 | 10mm | Dormia | 20mm |

## 4. Discussion

ERCP is the primary choice for the treatment of common bile duct stones. The success rate of ERCP is 85-95% (5). The European Society for Gastrointestinal Endoscopy (ESGE) recommends sphincterotomy and balloon dilation for the first treatment of common bile duct stones. ESGE recommends mechanical lithotripsy (ML) as a secondary treatment (6). ML is recommended if the stone size exceeds the CBD diameter after balloon dilation. The success rate of ML was reported as 79-96% and the complication rate as 3.5%. These complications are trapped/broken baskets, wire fracture, and broken handle perforation/duct injury (7-12).

Dormia basket entrapment/fracture is a rare complication and usually a problem of high-volume centers (4). The basket impaction/wire fracture frequency has been reported as 0.8-5.9% (13-15). If the biliary stone is over 20 mm, it is a significant risk factor for basket impaction (16). This problem is usually resolved with non-operative methods. Non-operative methods are extracorporeal shockwave, intracorporeal electrohydraulic lithotripsy, and laser lithotripsy catching the basket with a second basket. If non-operative interventions are failed, surgical intervention is required (17-19).

Pancreatic duct stones usually develop in the background of chronic pancreatitis. Removal of pancreatic duct stones is recommended because of the potential to cause persistent duct obstruction and recurrent pancreatitis. Endoscopic removal of pancreatic stones includes pancreatic duct sphincterotomy, reduction of stone with balloon or basket, ML, and pancreatic stent placement (20). Pancreatic stones are less common than biliary tract stones. However, it has been reported that the complication rate in pancreatic stones is three times higher than in the common bile ducts. Several rescue methods are available in basket impaction, including open surgery, salvage lithotripters, sphincterotomy lengthening, stent placement, EHL (electrohydraulic), and ESWL (extracorporeal shockwave lithotripsy). In the past, open surgery was the most commonly used salvage option (21).

ERCP is at the forefront in treating both common bile duct stones and pancreatic duct stones. Basket impaction can

usually be treated with non-operative interventions. Surgical intervention should be preferred last.

**Conflict of interest**

None to declare.

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None to declare.

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None to declare.

**Authors' contributions**

Concept: K.K., İ.G., Design: K.K., Data Collection or Processing: K.K., Analysis or Interpretation: K.K., İ.G., Literature Search: K.K., Writing: K.K., İ.G.

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