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Case Report

# Proximal Migration of Biliary Stent: Case Report

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## Abstract

A 34-year-old female patient goes to emergency room on August 19 with colicky abdominal pain in the right hypochondrium and jaundice, reports biliary colic 3 times since 3 months prior to admission in August 2017.

According to laboratory studies and ultrasound high risk of choledocholithiasis is obtained by performing endoscopic retrograde cholangiopancreatography (ERCP) which reports choledocholithiasis and biliary stenosis of the middle third, it is tried to remove the stones on multiple occasions without achieving it, with which it is decided to perform open cholecystectomy and exploration of the bile duct the day after the endoscopic study.

The cholecystectomy was partial with complete stone extraction and intraoperative cholangiography and placing Kher catheter drainage. On the second day of surgery, bilirubin elevates and, not having NMR, it is again indicated that ERCP reports benign stenosis of the middle third, self-expandable biliary stent. She was discharged in September 2017.

In August 2018 it is decided to perform endoscopy to remove the biliary stent in which there is proximal migration of the same, which despite repeated attempts is not achieved removal of the stent, is programmed to remove the stent by open surgery. Approach was made by right subcostal incision, choledochotomy of 2 cm finding the prosthesis with distal and proximal fibrosis and by means of traction and acute dissection, complete removal was achieved by placing a Kehr-type probe, with discharge 7 days after surgery. One month after the patient is asymptomatic, and in the cholangiography by probe, there are no filling defects.

Biliary endoprosthesis endoscopic placement is a therapy for the management of biliary obstruction, usually due to lithiasis or tumors. Complications can be cholangitis, cholecystitis, duodenal perforation, bleeding, pancreatitis, fracture of the prosthesis, proximal or distal migration and stent occlusion due to recurrent biliary obstruction, with an incidence ranging from 8% to 10%. The migration of the endoprosthesis can be proximal or distal and is associated to certain factors such as the type of malignant or benign pathology, diameter, length, duration, among others. Stent extraction is usually performed by ERCP with various techniques such as balloon, Dormia basket or Sohendra retractor. There are few reports of extraction in which open surgery were used.

***Keywords:*** *Proximal Migration; Biliary Stent; Endoscopic Retrograde Cholangiopancreatography (ERCP)*

## Introduction

Endoscopic biliary stenting is a therapy for the management of biliary obstruction secondary to malignant or benign disease [1]. The most frequent indication is the decompression of the biliary tract obstructed, usually by lithiasis or tumors. They are also indicated in biliary fistulas, prevention of pancreatitis after ERCP, and hemorrhage after sphincterotomy or papillary dilation. Endoscopic retrograde

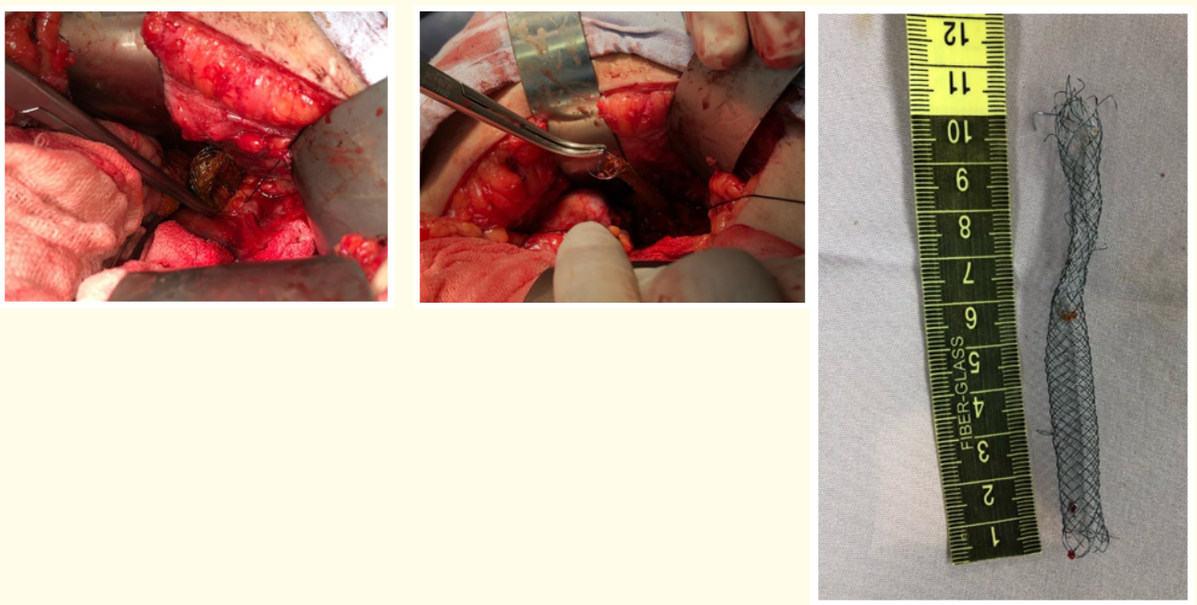
cholangiopancreatography (ERCP) is the procedure for its placement [2]. The prosthesis can be made of plastic with a half-life of 3 - 5 months or metallic with a half-life of 8 months, but its use is limited due to its high cost over plastic ones [7]. There are complications associated with the placement of the stent with an incidence ranging from 8% to 10% [16-18] and include cholangitis, cholecystitis, duodenal perforation, bleeding, pancreatitis, fracture of the prosthesis, proximal or distal migration and occlusion of the stent [19-29]. The migration of the endoprosthesis can be proximal or distal and is associated with certain factors such as the type of malignant or benign pathology, diameter, length, duration, among others [30,31,40]. Stent extraction is usually performed by ERCP with various techniques such as the use of a balloon, Dormia basket or Sohendra retractor [15]. There are few reports of extraction in which open surgery was used. In the present report, open surgery was necessary to remove the stent, despite multiple attempts to remove it by endoscopy [14].

## Clinical Case

A 34-year-old female patient with colicky abdominal pain in the right hypochondrium and jaundice, as a history of importance, reports biliary colic 3 times since 3 months prior to admission in August 2017.

Goes to the emergency room on August 19 for abdominal pain and jaundice, according to laboratory studies and ultrasound high risk of choledocholithiasis is obtained by performing endoscopic retrograde cholangiopancreatography (ERCP) which reports choledocholithiasis and biliary stenosis of the middle third, it is tried to remove the stones on multiple occasions without achieving it, with which it is decided to perform open cholecystectomy and exploration of the bile duct the day after the endoscopic study. The cholecystectomy was partial due to the presence of intrahepatic gallbladder as well as great fibrosis at the level of the Calot triangle with complete stone extraction, corroborated by intraoperative cholangiography and placing Kher catheter drainage. On the second day of surgery, bilirubin elevates and, not having NMR, it is again indicated that ERCP reports benign stenosis of the middle third, minimal leakage of contrast in what appears to be the cystic insertion, self-expandable biliary stent partially covered 10 Fr of 10 cm in the area of stenosis. In the week after surgery, she developed biloma, requiring laparoscopic drainage and she was discharged in September 2017, with control in the outpatient clinic, both in General Surgery and in Endoscopy, however, the patient did not attend since January 2018.

In August 2018 it is presented again to the endoscopy service for assessment, clinical and laboratory, and is clinically asymptomatic and the liver function tests are within adequate values. It is decided to perform endoscopy to remove the biliary stent, taking place the August 2, 2018 in which there is proximal migration of the same, which despite repeated attempts is not achieved removal of the stent, and the suspicion of post-ERCP pancreatitis is hospitalized confirming it. Medical management is given and when the pancreatitis is remitted, it is programmed to remove the stent. Approach was made by right subcostal incision, choledochotomy of 2 cm finding the prosthesis with distal and proximal fibrosis and by means of traction and acute dissection, complete removal was achieved by placing a Kehr-type probe, with discharge 7 days after surgery, as it again presented elevation of pancreatic amylase and lipase. One month after the extraction surgery the patient is asymptomatic, and in the cholangiography by probe, there are no filling defects, with adequate passage of the contrast medium to the duodenum, so the Kehr-type probe is removed in the office without incident or pain. other symptoms




***Figure***

## Discussion and Conclusion

Endoscopic biliary stent placement is a therapy for the management of biliary obstruction secondary to malignant or benign disease [1]. Biliary stents are tubular plastic or metal devices designed to recanalize the flow of a duct. The most frequent indication is the decompression of the biliary tract obstructed, usually by lithiasis or tumors. They have also been indicated in non-obstructive conditions such as biliary fistulas, the prevention of pancreatitis after retrograde cholangiography and hemorrhage after sphincterotomy or papillary dilation. Endoscopic retrograde cholangiopancreatography (ERCP) is the procedure by which most are placed and removed [2]. Endoscopic prosthesis placement is successful in 95% of cases, with a low morbidity and mortality rate [3]. Despite not having an impact on the survival of patients with neoplastic disease, studies have shown an improvement in quality of life [4].

### Description and classification of biliary stent

According to the material with which they are made, they can be made of plastic or metal (Table 1).

| Features | Plastic Prothesis (PP) | Metal Prothesis (MP) |
|---|---|---|
| Material | Polyethylene, polyurethane or Teflon. | Nitinol (nickel and titanium alloy) and platinol (platinum plus nitinol). |
| Size | 7 - 11 Fr. | |
| Length | 3 - 15 cm. | |
| Shape | Lines: Angled or curved. With flaps.<br><br>Pigtail | Self-expandable<br><br>Expandable by means of the ball.<br><br>Covers:<br><br>• Partially covered: less prone to migration<br><br>• Completely covered.<br><br>Not covered. |
| Duration | 3 - 5 months. | 8 months. |
| Indications | Benign pathology | Malignant pathology, life expectancy greater than 6 months. |
| Cost | Lower cost. | Higher cost. |
| Disadvantage | | Growth of granulation tissue or tumor inside. |

***Table 1:*** *Classification of biliary stents.*

**Plastic prosthesis (PP):** They can be polyethylene, polyurethane or Teflon, their size goes from 7 to 11 French (Fr) and length 3 - 15 cm. They have different forms, straight (angled or curved) or with ends in the shape of pig tail (Figure 1). Straight prostheses are anchored by one or two wings (flaps) located at the ends, which prevent migration, while those of pigtail type do so by a curved section of more than 360° at one or both ends. They are marketed individually or preloaded (introductory system). They are radiopaque and some have proximal and distal markers.

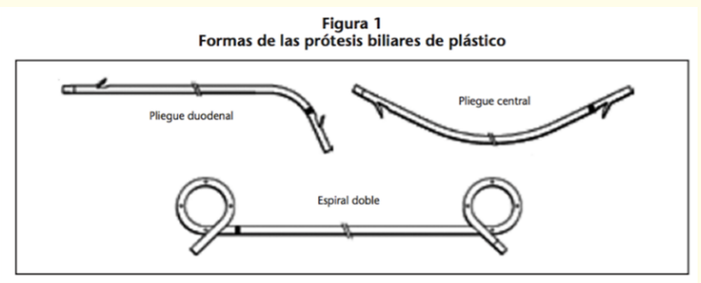



***Figure 1:*** *Forms of plastic biliary prostheses.*

The permeability of the stent depends on several factors such as the viscosity of the bile and the properties of the stent. The decrease in permeability results from the deposition of sludge, which contains bacteria, calcium bilirubinate and calcium palmitate crystals, usually after 3 - 5 months, which can cause acute cholangitis [5]. The length and the caliber influence the permeability. Always place the prosthesis of the highest caliber possible with respect to the stenosis. The length of the prosthesis should be adjusted to that of the stenosis, since, if it is excessively long, distal displacement may occur [6].

**Metal prostheses (MP):** Used with the objective of delaying the occlusion of the endoprosthesis and minimizing the need for reoperation, compared with plastic ones. The average duration is 8 months [7]. The MP are built with nitinol [8], a very elastic alloy of nickel and titanium that expands by recovering its structure through heat and does not deform. Others are made of steel, Elgiloy (an alloy based on cobalt) or platinol, based on platinum and nitinol. They have different designs, self-expanding or expandable by means of a ball. One limitation of MP is the growth of tissue inside, which can induce restenosis or obstruction. For this reason it is very difficult to extract them once placed, and the risk of migration is also reduced.

There are MP covered in plastic material to prevent the growth of tissue through the mesh. This coating can be total or partial. MP covered, in particular, fully covered, are prone to early migration, being able to occlude the cystic duct or contralateral hepatic duct, thus predisposing to secondary complications [9]. When the mesh is permeable (not covered), the possibility of obstruction of the cystic and pancreatic duct is low, with less possibility of cholecystitis and pancreatitis. Partially covered endoprostheses, although less likely to migrate, are prone to develop a bacterial biofilm in the covered area and mucosal hyperplasia in the uncovered area, which induce occlusion [7]. Covered prostheses are more expensive. Some studies [10,11] do not find significant differences in the average survival of patients between covered and uncovered prostheses, the time of permeability and complications.

## Choice of type of stent

The use of MP is limited by its high cost over PP. There is no universal recommendation when choosing between a MP or a PP in malignant biliary obstruction. A criterion for the decision to use one or the other depends on the prognosis of the patient's life. MP is more cost-effective in patients with a life expectancy of more than 6 months [9,12].

In patients who do not respond to conventional endoscopic treatment with PP, metallic ones are an alternative, with similar results and the need for fewer endoscopies.

Coated MP are being used more and more frequently in benign pathology of the bile duct, replacing the classical strategy of sequential placement of multiple PP [13].

## Biliary stent extraction techniques

The success of recovery of the endoprosthesis by endoscopy, according to the literature, is 86% of cases [14]. The approach technique used will depend on the position of the distal end of the prosthesis, its relationship with the papillary orifice, the degree of dilatation of the bile duct and the existence of a previous sphincterotomy.

When the distal portion follows the axis of the common bile duct and is located near the papilla, the most suitable way to recover it is by indirect traction, by a balloon catheter that is placed to one side or above the distal end and a careful drag Allows the prosthesis is observed in the duodenal lumen.

When the bile duct is dilated and the distal edge of the prosthesis is free, the best form of extraction, the Dormia basket is used. It is introduced into the bile duct and when it is close to the prosthesis, assessed by fluoroscopy image, the basket opens completely in order to catch one of its ends and thus bring it to the duodenal lumen. In these cases, it is convenient to mobilize by means of traction with a balloon catheter, perform an adequate orientation and achieve capture, since it is mandatory to have both ends of the stent free.

Another technique described is to introduce a guidewire into the lumen of the prosthesis and then, through the guidewire, slide the Soehendra retractor into contact with the distal end of the stent [15]. A rotating movement is initiated at the distal end of the retractor, allowing it to penetrate the light of the prosthesis, thereby trapping it, and then extracting it through the working channel of the duodenoscope. It has the advantage of keeping the guidewire in place for placing a new prosthesis, or performing different therapeutic maneuvers. The disadvantages of this technique is that it requires proper alignment to introduce the wire, and, despite having a correct alignment, the wire cannot always be placed in the desired place to capture the prosthesis and remove it.

In conclusion, most prostheses that have migrated proximally can be removed endoscopically, using some of the techniques described. In patients with dilated biliary tract, the prosthesis can be captured with a Dormia basket, a polypectomy loop clamp for foreign bodies, and in some cases by indirect traction with the balloon catheter.

There are few cases reported where the removal of the endoprosthesis was by surgery or by interventionism [14].

### Complications associated with the use of endoprostheses

The complication rate of this treatment ranges from 8% to 10% [16-18] and include cholangitis, cholecystitis, duodenal perforation, bleeding, pancreatitis, prosthesis fracture, proximal or distal migration, and stent occlusion due to Recurrent biliary obstruction [19-29].

Antibiotics have been used for the purpose of inhibiting and/or preventing bacterial colonization, in addition, choleretic agents can be administered to improve the flow of bile by promoting the permeability of the stent.

The migration of the endoprosthesis is a rare complication [21,22,25] and late, occurs in 5% - 10% of patients undergoing this procedure, it can be proximal or distal [14,21,22,28,30,31,32-37], it is reported that the incidence is 3.1% - 4.9% and 3% - 6% respectively [14,19,20,30,33,34,38,39].

Migration may be due to biliary obstruction, it is important to determine the risk factors for this complication [30,31,40]. Cholangiocarcinoma, short or large diameter stents, the presence of sphincterotomy or not, the placement of multiple stents, rupture, location of the stenosis, duration and shape, could influence migration.

Migration is less frequent in malignant biliary stenosis than in benign stenosis, may be due to extrinsic compression by malignant tissue and inflammation [41,43].

The data on whether to undergo an EST (endoscopic sphincterotomy) before the placement of a biliary stent affects the risk of migration are scarce. In previous studies, EST does not contribute to migration [30,36,38,42].

Proximal migration is associated with distal stenosis and vice versa [43].

The design of the biliary stent can also affect the risk of migration.

Straight stents with side flaps can be used to reduce the risk of migration or in the form of pig tail. The migration frequency of the stent was significantly higher with straight stent compared with the pigtail [43]. We noticed that the presence of lateral flaps or barbs was not enough to prevent the migration of the endoprosthesis. The diameter and length of stents can also be associated with the risk of migration [30]. With respect to the diameter of the endoprosthesis, migration was significantly greater in cases with 10-Fr stent compared to 7-Fr [43].

Smaller stents tend to migrate proximally, while longer stents tend to migrate distally, in cases of benign biliary stenosis [43]. In addition, longer stents in the bile duct are less likely to migrate because a longer portion is fixed in the common bile duct, limiting proximal movement [30].

Kawaguchi., *et al.* (present studies) do not report patients undergoing surgery to remove the stent, but there are reports of cases where the extraction was by percutaneous catheterization and surgery [14].

It is noteworthy that in our case the endoprosthesis was not exclusively plastic but an expandable endoprosthesis, with 11 months old and it should be taken into account that the patient stopped attending control consultations for almost 6 months, also stopped taking deoxycholic acid which favored the impaction of biliary material inside and outside the light of the endoprosthesis.

### Analysis

There are multiple factors involved in the migration of endoprostheses, they can be classified into risk factors associated with the patient and factors associated with the endoprosthesis. In this case some factors were found such as the presence of benign disease, it is documented that malignant disease decreases the frequency of migration when compressing the stent, the patient underwent sphincterotomy and the location of the stenosis in the middle third of the duct, not they are factors that influence. Regarding the factors of the endoprosthesis, the patient presented two associated factors, such as the presence of 10 Fr endografts and the duration of the endoprosthesis for more than one month. The presence of the aforementioned factors and poor follow-up of the case in the outpatient clinic determined that the prosthesis would migrate proximally.

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