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Research Article

Laparoscopic Transanastomotic Dilatation of Stennosed Biliodigestive. Description of the Approach Technique

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Abstract

Biliodigestive bypass is the surgical establishment of a bypass between some portion of the biliary tree and the digestive tract and has played an integral role in the surgical management of biliary tract disease. Stenosis of the hepatojejunal biliary-enteric anastomosis, defined as the reduction in the caliber of the anastomosis that leads to partial or total obstruction and consequently biliary retention, represents more than 50% of these complications. Stenosis recurrence is reported in 10% of patients and is a serious complication that can lead to recurrent episodes of cholangitis, biliary cirrhosis, liver failure, and death. When it is not possible to perform the endoscopic or percutaneous approach, or they have failed, surgical management of the stenosis is considered, for which we describe the use of the transanastomotic laparoscopic dilation technique of biliodigestive stricture, which consists in disarming the 50% of the anastomosis and dilate it under direct vision using a Maryland dissector controlled and selectively either to the common duct or to both ducts separately. Also through this approach it allows us to accurately visualize if the stenosis is from the duct bile duct or jejunal loop and the presence of biliary sludge or stones inside the bile duct. This approach offers the advantages of minimally invasive surgery while reducing the injury and devascularization to the perihilar biliary tissue that occurs during a reconfection.

Keywords: Anastomosis; Stricture; Biliodigestive; Hepaticojejunostomy; Laparoscopy

Introduction

The biliodigestive derivation is the surgical establishment of a bypass between some portion of the biliary tree and the digestive tract, these shunts pursue one of the following objectives: curative or palliative, depending on the nature of the obstacle and the location of the lesion; and have played an integral role in the surgical management of biliary tract disease over the past century [1,2].

Specific complications of bilioenteric anastomoses include early postoperative anastomotic leak and late biliary stenosis. Both complications have an adverse impact on patient outcome and may contribute to long-term morbidity or mortality. The reported incidence of complications after biliary reconstruction ranges from 3% to 43% [3].

Strictures in bilioenteric anastomosis are initially approached by minimally invasive access by interventional radiology through

the transpercutaneous hepatic approach, where the intrahepatic bile duct is accessed and then balloon dilation and transanastomotic biliary stent placement. The endoscopic route is also a method of approach of choice, however, accessing the bile duct in this condition is hindered by the length of the bilioenteric loop, its angulation and the absence of specialized endoscopic devices that have a working channel for such a procedure [4]. In case of procedural failures, the combined laparoscopic or open surgical approach should be used. However, the surgical revision of bilioenteric anastomoses is complex due to the accumulation of extensive scar tissue in the hepatic hilum, the difficulty in obtaining adequate exposure and the lack of adequate length of the healthy bile duct necessary to build a new anastomosis [5]. What makes repair increasingly difficult becoming a vicious circle: dissection – biliodigestive disarmament- ischemia- restenosis.

Objective

To describe the approach technique for performing laparoscopic transanastomotic dilation of stenosed biliodigestive tracts.

Materials and description of the technique

It is a surgical technique designed for those patients who meet the following criteria

- Benign strictures of biliodigestive anastomosis demonstrated by imaging studies.
- Upper biliodigestive shunts (Hepato-jejununoanastomosis).
- Failure in percutaneous and endoscopic procedures.
- Haemodynamically stable and non-septic patients.

The surgical technique of approach for transanastomotic dilation of stenosed biliodigestive is presented, as an alternative to laparoendoscopic approaches and conventional techniques of repreparation of biliodigestive anastomosis, to provide the patient with all the benefits of minimally invasive surgery, without increasing morbidity and decreasing the rate of re-stenosis.

The necessary instruments for its realization and the surgical procedure step by step are described.

Surgical equipment and instruments used

- Full HD laparoscopy tower
- 30º optics
- 2 trocars of 10-11mm and 1 trocar of 5mm
- Vessel sealing device type Ligasure 5mm
- Hook type electrocautery
- Croce-Olmy clamp 5mm
- Maryland Dissector 10mm
- Metzenbaum scissors 5mm
- 5mm vacuum cleaner/irrigator
- Needle holder
- Suture PDS or Prolene 5-0 needle RB-1
- Closed aspirative drain

Description of the technique

With the patient in the French position (Figure 1), a 1cm incision is made at the umbilical level and a 10-11mm trocar is placed according to the Hasson technique for the insufflation of the pneumoperitoneum until reaching intra-abdominal pressure of 12 mmHg and the introduction of 30º optics. A mapping of the supramesocolic compartment is performed, visualizing the existing adhesion syndrome and the conditions of the organs found there. Subsequently, under direct vision, 2 more trocars are placed, one of 10-11mm and another of 5mm, located in the left and right clavicular midline respectively, two centimeters above the plane of the umbilical scar. Additionally, one 5mm auxiliary trocar can be placed at the level of the right flank with anterior axillary line for hepatic retraction in case the adhesions do not suspend the liver and its elevation is necessary, or for the introduction of the irrigation/aspiration cannula (Figure 2). Then, adherenciolysis is performed until reaching the prehilar zone with electrocoagulation and vessel sealing device type Ligasure 5mm (Figure 3,4), until identifying the hepatic hilum and the jejunal loop fixed to the hilar plate and, once at that level, due to the proximity of the hepatic pedicle and to avoid inadvertent thermal injuries, the anastomosis is partially dismantled by its anterior face with Metzenbaum scissors, releasing 50% of its circumference. The site of the stenosis is observed and identified, either at the level of the biliary confluence (more frequent) or the jejunal loop (Figure 5 and 6), and with a Maryland dissector of 10 mm the dilation is proceeded with the introduction of the tip of the dissector until the penetration of the instrument is achieved, generating the first visualization of the confluence, confirming with the exit of biliary fluid and being able to visualize also the exit of stones or biliary mud (Figure 7 and 8). Dilation is continued by opening the jaws of the dilation until the patency of the right and left hepatic ducts is obtained and an approximate diameter of 15 mm is achieved (Figure 9 and 10).

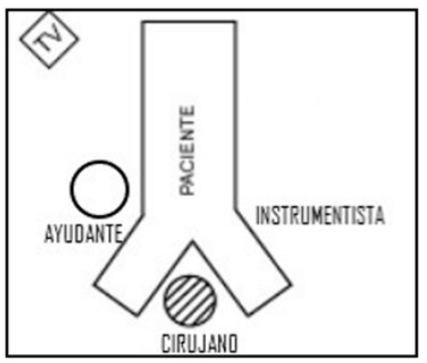

Figure 1: Relationship of the patient and the surgeon in the French position.

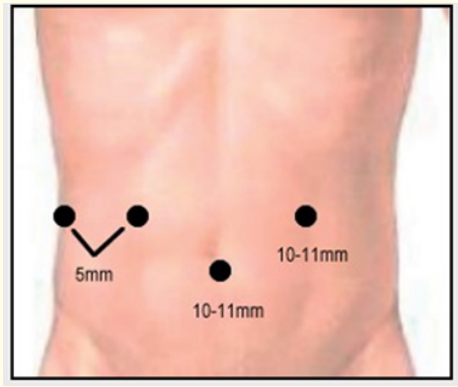

Figure 2: Location of the trocars for performing the technique.

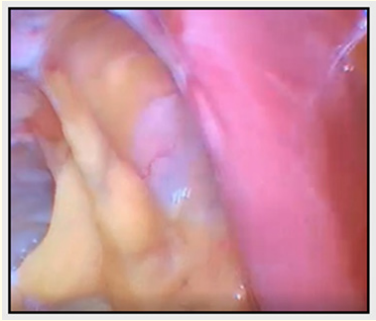

Figure 3: Adhesion syndrome.

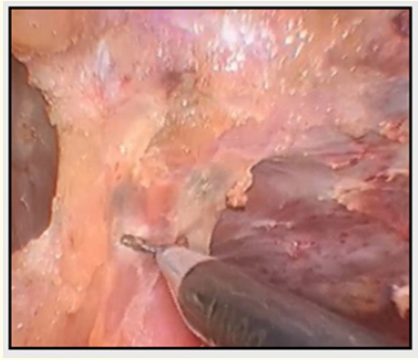

Figure 4: Adhenciolysis using hook-type electrocautery.

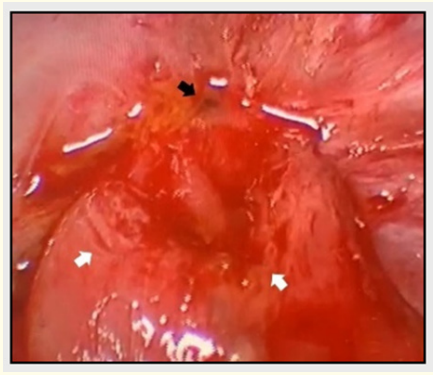

Figure 5: 50% disarticulation of the jejunal loop (white arrows) from the anastomosis and identification of the stricture site (black arrow).

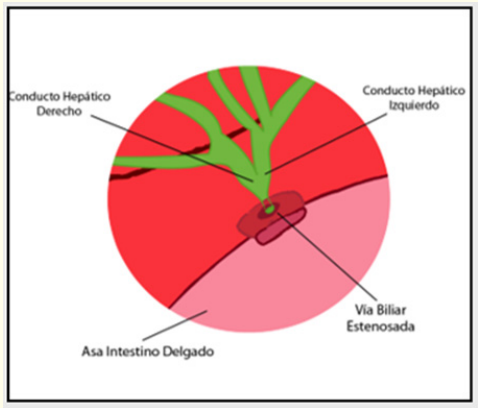

Figure 6: Diagram of 50% of the biliodigestive disarticulated and identification of the site of the stanosis.

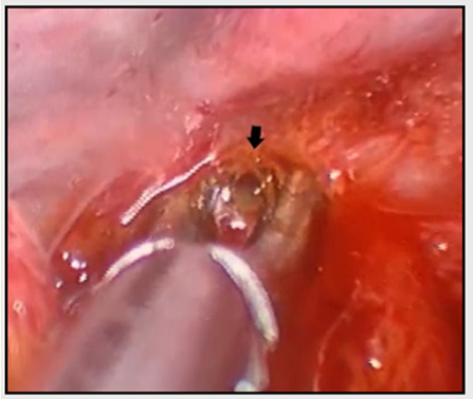

Figure 7: Insertion of the tip of the Maryland dissector into the stricture (black arrow) with opening of its jaws.

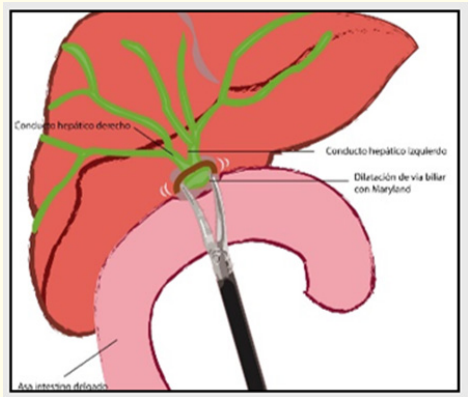

Figure 8: Diagram of stricture dilation with the Maryland dissector.

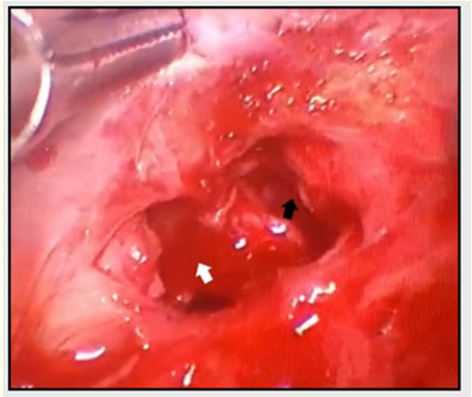

Figure 9: Dilated stenosis approx. 15mm and identification of the right (white arrow) and left (black arrow) hepatic ducts.

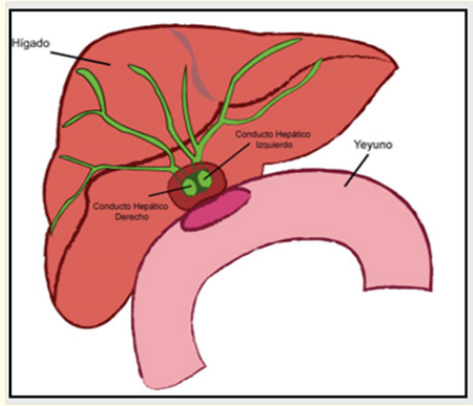

Figure 10: Diagram of the dilation performed with visualization of the right and left hepatic ducts.

Once the dilation is done, the bile ducts are inspected in search of intrahepatic gallstones, for this purpose washes are carried out with physiological solution until clear and fluid bile is evidenced (Figure 11). If necessary, a choledochoscope can be introduced for direct intraductal visualization. Subsequently, the anterior aspect of the anastomosis is closed by fixing on the surrounding liver tissue, without touching the bile ducts and taking care not to injure adjacent vascular structures, with PDS suture or Prolene 5-0 needle RB-1 to separate points (Figure 12) The abdominal cavity is washed and a perianastomotic aspirative abdominal drain is left. Finally, the instruments, trocars and pneumoperitoneum are extracted; and the holes of the ports are closed by planes to skin.

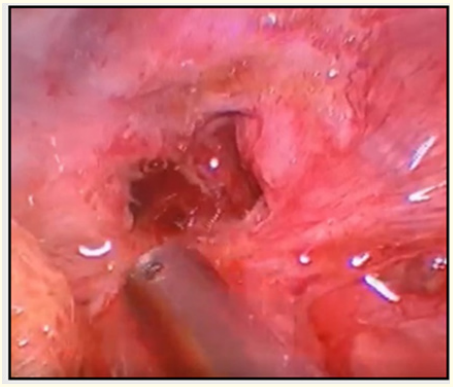

Figure 11: Lavage of hepatic ducts with physiological solution.

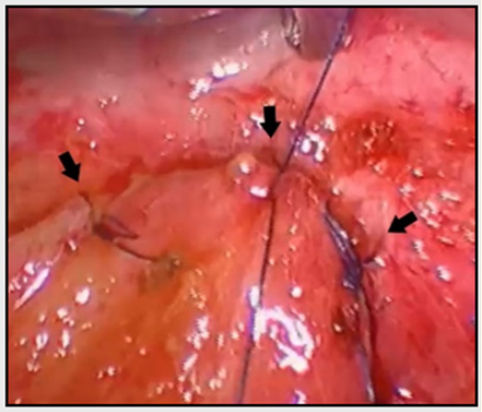

Figure 12: Closure of the anastomosis with Prolene 5-0 to separate sutures fixed in the surrounding liver tissue (black arrows).

The procedure lasts approximately an hour and a half and must be performed by surgeons who have training in hepatobiliary and pancreatic surgery and advanced laparoscopy.

Discussion

Hepatojejunal bilioenteric anastomosis stenosis, defined as narrowing of the anastomosis leading to biliary obstruction and retention, accounts for more than 50% of these complications. Unfavorable prognostic factors for the success of biliary repairs have been reported

- Less success the higher the initial bile duct injury.
- Early repair attempts while the patient is suffering from sepsis and peritonitis.
- Associated vascular lesions.

Injuries repaired in inexperienced centers.

Anastomosis stenosis is a serious complication that can lead to episodes of repeated cholangitis, biliary cirrhosis, liver failure and death. In fact, currently the hepaticojejunostomy should meet the following requirements

- Precise creation of a tension-free anastomosis.
- Be widely permeable.
- Mucosa-to-mucosal anastomosis using well-vascularized bile ducts.
- Drain all parts of the liver.

Otherwise, it often results in fibrosis in the surgical anastomosis [6-8].

Recurrence of stenosis is reported in 10% of patients and requires balloon dilation and in some cases dismantling and a new hepatic-jejunostomy.

Endoscopic management is the least invasive method, but its main obstacle is the extremely difficult access of the endoscope to the bilioenteric shunt due to the altered anatomy of Roux's Y reconstruction. A wide variety of surgical procedures with biliary access loops have been used in order to facilitate endoscopic interventionism, for which many authors have been given the task of designing a series of procedures[8], from the Hutson-Russell loop to gastrojejunostomies for biliary access. As well as the use of endoscopes of greater length or that are supported by balloons has also been studied, as is the case of the double balloon enteroscope (EDB) of Fujinón and the single balloon (BS) of Olympus used for the realization of strictureplasties through endoscopic retrograde cholangiography (CRE). EDB allows diagnosis and therapy after surgical procedures that complicate the anatomy and limit access to the area of bilioenteric diversion [9].

Endoscopic biliary-enteric strictureplasty to treat anastomotic stenosis appears promising, but only limited case reports and case series on this technique are available. The largest series in liver transplant patients was reported by Sanada., *et al*. Using double-balloon enteroscopy in 25 patients between 2003 and 2009, the success rate for achieving bilioenteric anastomosis was 68% (17/25). It is noteworthy that the success rate for achieving bilioenteric anastomosis had increased significantly to 93% after 2008. When anastomosis was reached, the success rate for therapeutic intervention was 88% [13].

In the endoscopic approach technique are the 4 typical complications related to CRE (acute pancreatitis, hemorrhage, biliary sepsis and perforation), as well as those related to the use of the enteroscope that include intussusception, perforation, dysphagia, odynophagia and abdominal pain not related to pancreatitis [13,14].

The percutaneous approach remains the approach of choice where percutaneous balloon dilation and stenting form the basis of

treatment of bilioenteric anastomosis stenosis. It is accomplished by inserting an angioplasty balloon catheter through the stenosis and inflating it gradually. Subsequently, stenting is achieved by internal-external biliary drainage or stenting into the abdominal wall. Multiple procedures are often required, over a period of several months, to achieve good long-term patency. However, a proportion of patients inevitably requires a surgical revision of your anastomosis. In small series, percutaneous transparietohepatic biliary drainage has shown resolution rates for anastomosis stenoses of up to 94% [5,6,11-13].

Multiple dilation sessions are usually performed with a maximum of three to six sessions depending on the institution. The time interval between each dilation session also varies from 1 day to 3 weeks. Complications related to the percutaneous approach include sepsis, bleeding, and inflammatory/infectious complications [15,16].

When the endoscopic or percutaneous approach is not possible or has failed, combined or open laparoscopic surgical management of the stricture is considered.

However, surgical revision of bilioenteric anastomoses is complex due to the accumulation of extensive scar tissue in the hepatic hilum, the difficulty in obtaining adequate exposure, and the lack of adequate length of the healthy bile duct needed to construct a new anastomosis [5].

Laparoscopic surgery and synchronous therapeutic endoscopy have modified the diagnostic and therapeutic approach to biliary pathologies in patients with altered anatomy, providing the advantages of minimal access, being carried out simultaneously, cooperatively and/or as a meeting point4. Achieving access to the bile duct transjejunally by enterotomy or transgastric by gastrostomy.

Based on the above, we have designed an easily reproducible alternative technique, which does not cause injury to the jejunal loop to perform a transjejunal-endoscopic laparoscopic approach[9] and also allows to resolve the stenosis, without causing further damage to the tissues. Naturally, when an open-air approach to biliodigestive stenosis is performed, more bloody surface is generated at the time of adherenciolysis, as well as greater devacularization of tissues and greater inflammatory reaction when completely dismantling the anastomosis and obtaining healthy tissue for its reconstruction, this causes a vicious circle that leads to a new stenosis.

The technique presented, on the contrary, offers not only the advantages of minimally invasive surgery such as: greater dexterity and movement to the surgeon, better visualization of the structures, greater access to the entire abdominal cavity, reduces the risk of surgical site infection, less postsurgical pain, less external scars, reduction of postoperative complications such as adhesion syndromes, and less blood loss; [10] but also allows to visualize and explore the right and left hepatic ducts with the use of the choledochoscope and, if necessary, the extraction of stones. Likewise, it allows to perform a procedure under direct vision of all adjacent structures, mainly vascular.

It should also be noted that it is a technique where the bile duct is not used as part of the new closure of the biliodigestive anastomosis, but is supported by the surrounding healthy liver bed, thus avoiding a greater inflammatory reaction in the biliary epithelium that can condition fibrosis and a new stenosis, so its advantages are mostly seen in the high hepaticojeyuyal biliodigestive anastomoses of the Hepp-Couinaud type preferably.

Currently, the authors are carrying out an analysis of the evolution of the patients to give breadth and continuity to the study of the exposed technique.

Conclusions

The stenosis of the hepatojejunal bilioenteric anastomosis represents more than 50% of the complications of biliodigestive diversions and must be treated satisfactorily as warranted by the patient offering updated techniques following the parameters of the minimally invasive approach. The exposed technique is effective and reproducible when the endoscopic and percutaneous approach are not possible to perform or they have failed in the treatment of upper biliodigestive stenosis, offering the advantages of laparoscopic surgery and performing a satisfactory dilation without causing greater inflammatory reaction and risk of recurrent fibrosis as in open surgery.

Conflict of interest

The authors declare that they have no conflict of interest.

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