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AXIAL STENTING OF THE HEPATICOJEJUNAL ANASTOMOSES

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Summary

Background: The aim of a biliary-digestive derivation is, in fact, restoring biliary transit no matter the obstacle. There are three essential factors that make this possible: the biliary partner of the anastomosis, the digestive partner and the anastomosis stoma itself. Over the time, many attempts were made, so that nowadays hepaticojejunal anastomosis on isolated loop is imposed. In this way alimentary pollution of the biliary sector is avoided, as well as the reflux cholangitis, a disadvantage that occurs in other types of biliary-digestive anastomoses.
Methods: This is a retrospective, unicentric, multi-operative study, performed on 267 anastomoses, 148 with axial drainage, 119 without drainage, 209 malignant and 58 benign.
Results: Final results show the predominance of stented anastomoses over the non-stented ones. 103 from the 148 stented anastomoses (94%) were made using axial drainage. It was determined that the evolution was favorable for the drained patients in what regards both the fast or relatively slow remission of the icteric syndrome and the decrease in the patients with very slow or incomplete remission, though without observing significant differences. During the study, some complications occurred: hemorrhage complications in one patient, two septic complications, partially or totally malfunctioning drainage and anastomotic fistulas.
Conclusions: Despite the relatively difficult way of the set up and the bigger possibility of accidental mobilization of the tube, axial stenting of the hepaticojejunal anastomosis is the gold standard in derivations due to its best possible results on short and long terms while avoiding alimentary pollution of the biliary segment.
Key words: hepaticojejunal anastomosis, axial biliary drainage, extra peritoneal tract, transanastomotic stenting

Résumé

Le stenting axial des anastomoses hépatico-jéjunales

Contexte: Le but d'une dérivation bilio-digestive est, en fait, la restauration du transit biliaire quel que soit l'obstacle. Il y a trois facteurs essentiels qui rendent cela possible: le partenaire biliaire de l'anastomose, le partenaire digestif et l'anastomose stomie elle-même. Au fil du temps, de nombreuses tentatives ont été faites, de sorte que de nos jours l'anastomose hépatico-jéjunale à boucle isolée s'impose. De cette manière, la pollution du secteur alimentaire biliaire est évitée, ainsi que la cholangite à reflux, un inconvénient qui se produit dans d'autres types d'anastomoses bilio-digestives.
Méthodes: C'est une étude rétrospective, unicentrique, multi-opératoire, réalisée sur 267 anastomoses, 148 avec un drainage axiale, 119 sans drainage, 209 malignes et bénignes 58.
Résultats: Les résultats définitifs montrent la prédominance des anastomoses stentées sur les anastomoses non-stentées. 103 des 148 anastomoses stentées (94%) ont été effectuées en utilisant le drainage axial. Il a été déterminé que l'évolution a été favorable pour les patients drainés en ce qui concerne à la fois la rémission rapide ou relativement lente du syndrome ictérique et la diminution chez les patients présentant une rémission très lente ou incomplète, sans observer d'importantes différences. Certaines complications sont survenues: complications hémorragiques chez un patient, deux complications septiques, drainage partiellement ou totalement défectueux et fistules anastomotiques.
Conclusions: Malgré la façon relativement difficile de la mettre en place et de la plus grande possibilité de mobilisation accidentelle du tube, le stenting axial de l'anastomose hépatico-jéjunale est l'étalon d'or dans les dérivations en raison de ses meilleurs résultats possibles à court et à long terme tout en évitant la pollution alimentaire du segment biliaire.
Mots-clés: anastomose hépatico-jéjunale, drainage biliaire axiale, voie péritonéale supplémentaire, prothèse transanastomotique

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INTRODUCTION

The use of minimal invasive techniques in biliary surgery, such as endoscopic approach of the main bile duct, laparoscopic surgery, robotic surgery, interventional radiology (percutaneous approach of the main bile duct), may suggest at first inspection that the classical techniques, including biliary drainages, have fallen into abeyance. Actually, classic approach of biliary pathology still has its well defined role, including biliary drainages that will most certainly not disappear in the context of malignant pathology incidence growth and of the need to maintain at a relatively important level the biliary surgery sequelae, in iatrogenic lesions, including those after minimal invasive surgery.

The aim of a biliary-digestive derivation is actually to reestablish the bile transit no matter the obstacle. There are three essential factors that make this possible: the biliary partner of the anastomosis, the digestive partner and the anastomosis stoma itself.

Over the time, the surgeon's struggle has been turned to finding the ideal anastomosis partners and the best technique of executing a well-functioning anastomosis stoma, without further complications in both early and late postoperative time. In the last century several alternatives were tried that lead to excluding as anastomotic partners (excepting maybe in rare particular indications) the gallbladder, the stomach and even the duodenum from the current surgical practice. Although more easy and fast in what concerns the technical procedure, these procedures were proven to be functionally compromised and with more reduced reliability.

Nowadays the terminal-lateral hepaticojejunal anastomosis on Roux-en-Y isolated loop is accepted and worthily considered as "gold standard". Thus the alimentary pollution of the biliary sector and reflux cholangitis are avoided, which is a disadvantage in other types of biliary-digestive anastomoses.

Pros and cons of the biliary-digestive anastomoses drainage were outlined, but there is no statistic randomized study that can offer a clear answer based on proof regarding this problem. Hence the different attitudes, varying from routine drainage to avoiding under any circumstance this procedure.

The weak link is usually the biliary partner that may have a precarious quality, presenting a thin, fragile, swollen wall that is easily broken at any suture attempt. Biliary drainage may represent an additional safety measure by lowering the pressure and by guiding the scarring process.

MATERIALS AND METHODS

The study has a retrospective character, covering a 50 years period of time, from 1965 to 2015. It is not randomized, it is unicentric and multi-operative. Data are presented in Table 1.

Data were obtained from patients (mostly women – Fig. 1) who underwent biliary-digestive anastomosis at the Bucharest Caritas Hospital Surgery Clinic and continued at the Bucharest Oncology Institute Surgery Clinic I, where the personnel of the Caritas Hospital Surgery Clinic was moved; the total number of biliary-digestive anastomoses in the mentioned period was 784. From these cases, we excluded the derivations that included the gallbladder (counting 223) because all of them were not drained and represent anastomoses for particular situations, indicated in advanced malignancy pathology, with palliative purpose, in order to decompress the main bile duct and remit the icteric syndrome. These anastomoses are known to have low reliability and late discredit, but they are justified in these cases by low expectancy of life in patients undergoing palliative surgery.

So, the study analyses 561 biliary-digestive anastomoses. Data were taken from the observation sheets, including hospital admissions and surgical protocols. For the sheets that were not found in the archives, data were obtained from further statistic processing. Caritas Surgical Clinic has an old tradition in biliary surgery. These patients were monitored and shown.

Hepaticojejunostomy was performed on 267 patients

Hepaticojejunal anastomoses 267	Malignant 209	No prosthesis 99		
		Prosthesis 110	108	Axial drainage 103
				Witzel - 5
			Kehr drainage - 2	
	Benign 58 (1 PSO)	No prosthesis 20		
		Prosthesis 38	Axial drainage - 37	
			Kehr drainage - 1	

Table 1 - Hepaticojejunal anastomoses

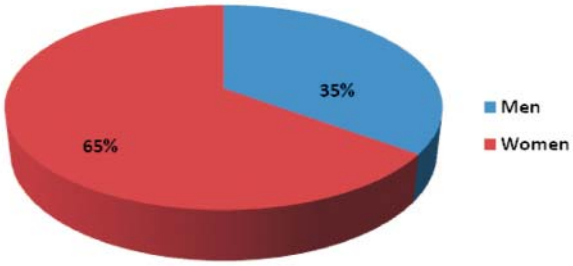

Figure 1 - Sex distribution of the analyzed cases

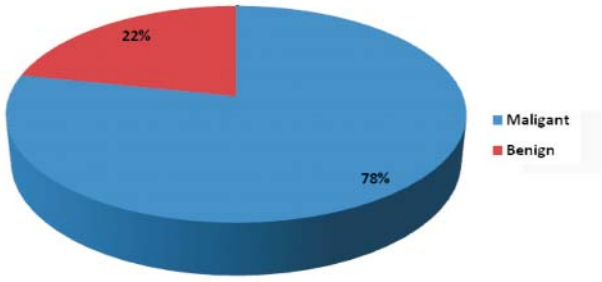

Figure 2 - Case distribution depending on the pathological type for which anastomosis was performed

from which 209 cases were malignant pathology and 58 for benign pathology (Fig. 2). As expected, the higher percentage is represented by the gold standard of anastomoses which is the axial drainage of the hepaticojejunostomy, as a preferred manner of drainage in the clinic where the study was performed. Kehr drainage was used in only 3 cases.

Results

From all anastomoses (267), 148 were stented and 119 were not stented. One can notice a predominance in stented vs non-stented patients, as in the graph presented in Fig. 3.

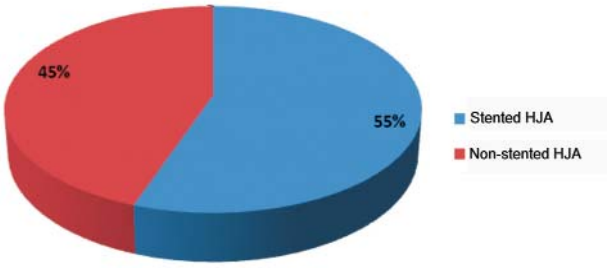

Figure 3 - Patient distribution depending on the stenting presence

From 148 stented anastomoses, the majority – 103 (94%) underwent axial drainage, 5 cases underwent à la Roux drainage and 2 cases underwent Kehr drainage.

As regards the technique, the transcystic or Kehr drainages have no set up particularities, are well known and are widely explained in surgical handbooks. We want to insist upon the axial drainage technique, in the way it is performed in the clinic where the study was performed and which suffered continuous improvements over the time, some of them already published. We will focus on three particular drainage procedures.

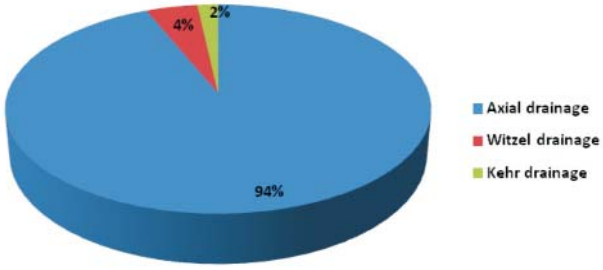

Figure 4 - Types of drainage

The transparietohepatic axial drainage externalized on the right side did not suffer essential changes, excluding the introduction of Bratucu-Ulmeanu instrument that eases the installation of this type of drainage and diminishes the risk of secondary complications. But, the transparieto-hepaticaxial drainage externalized on the left side suffered multiple adjustments in time, due to the anatomical position of the left duct and smaller thickness of the hepatic tissue, both offering the advantage of placing the drain tube on a completely extra peritoneal route, thereby avoiding later complications like intraperitoneal bile loss (including choleperitonitis) and subsequent septic complications (subphrenic abscesses, intraperitoneal abscesses).

The original technique, described by prof. Burlui who used the repermeabilized omphalic vein, was rather laborious and time-consuming.

Apart from adjustments of the instrument used in axial drainage, prof. Bratucu simplified Burlui's technique.

At first, the method involved externalizing the drain tube on a strictly extra peritoneal route, through the repermeabilized omphalic vein, then the procedure was simplified by externalizing the axial drain tube through the sheets of the ligamentum teres of the liver (without being necessary the repermeabilization of the omphalic vein). Prof. Bratucu generalized the use of this method in the clinic and proposed new indications and innovative methods for the use of this drainage type.

The installation technique (Fig. 6) uses the instrument described earlier, similar in shape to a Benique, and has two distinct steps, the parietal step and the transhepatic step, in the order preferred by the surgeon. In the parietal step, the drain tube is introduced from the exterior up to the round ligament level, which needs to be set out "ab initio". A small incision is performed at the left hypochondrium or the epigastrium level, in a convenient position to penetrate the abdominal wall with the axial drainage instrument so that its tip be externalized between the ligament's sheets above the liver. The tube is introduced through the instrument lumen, and then the instrument is retracted. The main step is next,

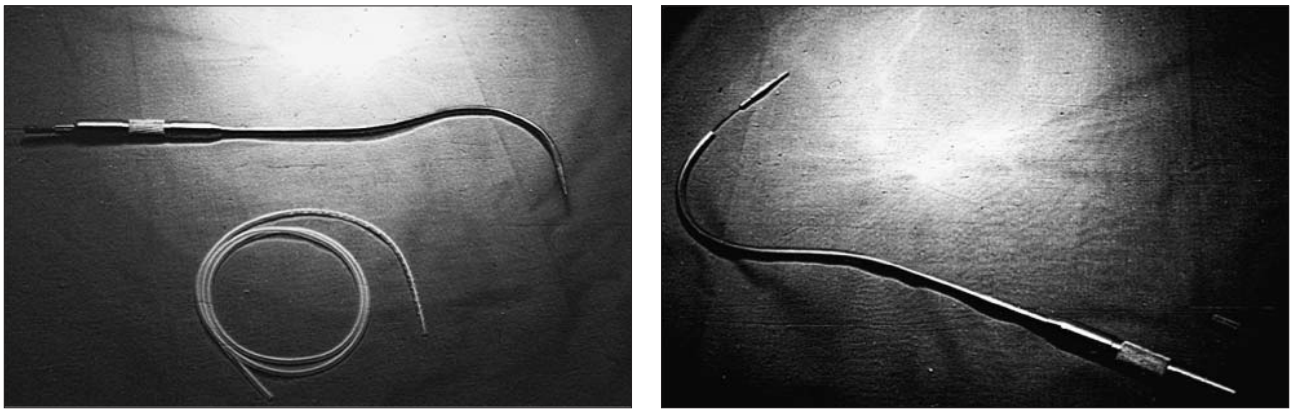

Figure 5 - Axial drainage instrument

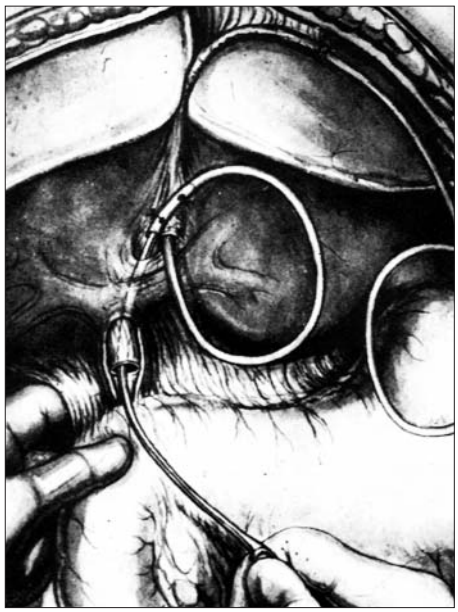

Figure 6 - Transligamentary axial biliary drainage technique

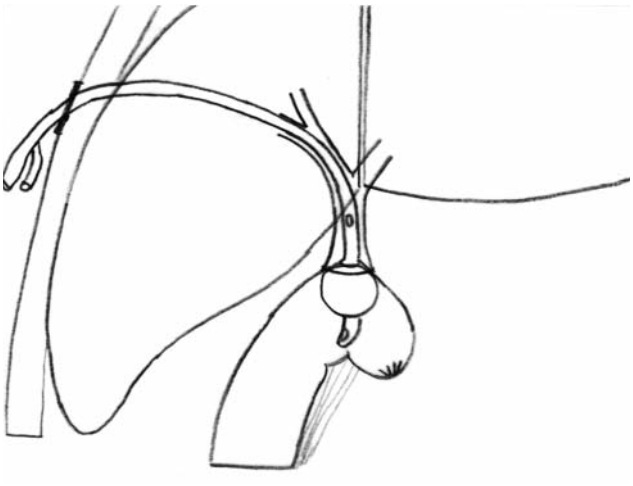

Figure 7 - Hepaticojejunostomy without suture with Foley probe externalized through right hepatic duct

the transhepatic step, when the instrument is introduced in the common bile duct, led in the left hepatic duct, then the biliary duct is perforated with the blunt tip of the instrument so that it may be led through the umbilical vein ditch, and transhepatically externalized in the round ligament thickness, close to the location where the tube was placed in the previous step. The tip and the catheter are extracted from the instrument and this time in the opposite direction the drain tube is introduced through the distal end of the instrument and pushed until the other extremity of the instrument. The instrument is pulled back and the drain tube is fastened in its final position based on the purpose of the surgeon (biliary duct drainage, anastomotic stenting, transtumoral drilling, and so on). The breach at the ligament level is closed with a thread, thus creating the strictly extraperitoneal route. The failure of the externalization of the instrument between the ligament's sheets, does not represent a problem, as the strictly extraperitoneal route is obtained through technical artificial means of coupling the tube with the ligament by using some suture threads. Through this procedure the proximal head of the tube is lead through the anastomosis in the digestive partner in such manner that there are lateral orifices in both biliary and digestive partners of the anastomosis; the suture of the anterior breach of the anastomosis follows next. In this way, a strictly extra-peritoneal route is kept, without peritubular biliary loss in the peritoneal cavity.

Hepaticojejunostomy without suture represents a particular way of installing a biliary-digestive anastomosis in which the two partners are held together by the axial biliary drainage itself. In this particular type of anastomosis, the classic drain tube with lateral orifices is replaced by a Foley probe kept in continuous traction, to which at least an orifice is added above the liquid balloon. (Fig. 7)

Simultaneous drainage of the hepaticojejunal and pancreatico-digestive anastomoses with the same tube after cephalic duodenopancreatectomies (CDP)

This technique was introduced in the clinic starting with 1948 and was applied in 70% of the CDP cases starting with this date. Pancreatico-jejunal termino-lateral anastomosis on Y isolated loop stented with a thin tube was preferred. The tube was attached to the transanastomotic axial drain tube of the termino-lateral hepaticojejunal anastomosis performed

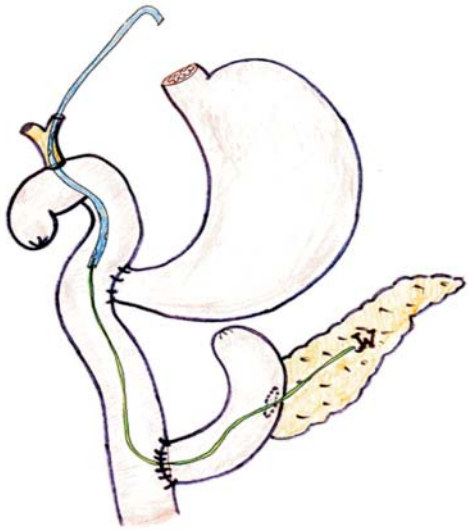

Figure 8 - Set up design after CDP with unique axial drainage for both the hepaticojejunal and the pancreaticojejunal anastomosis

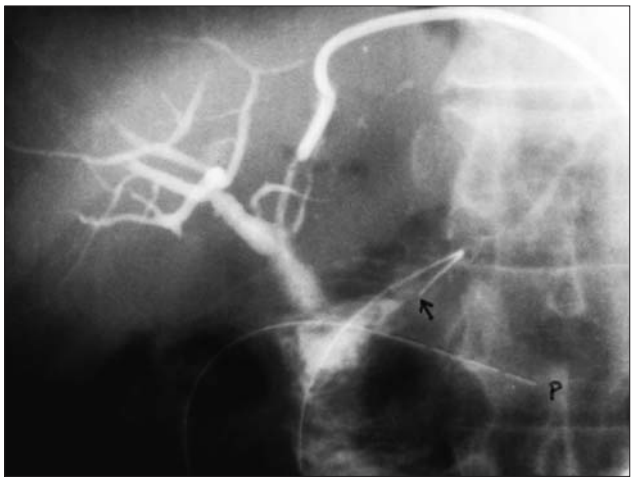

Figure 9 - Cholangiographic control after CDP with unique axial drainage for hepaticojejunal and pancreatico-jejunal anastomosis

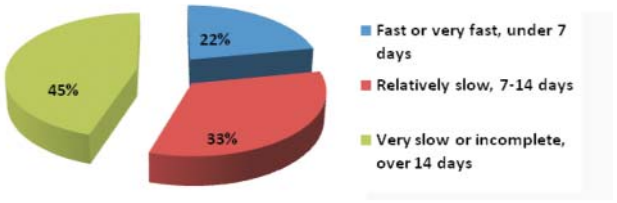

Figure 10 - Jaundice syndrome remissions for non-stented patients

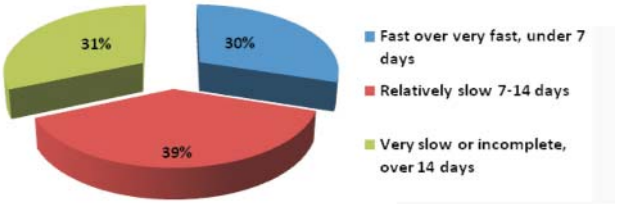

Figure 11 - Jaundice syndrome remissions in stented patients

on the other branch of the Y, as shown in Fig. 8

The advantages are multiple. First we have a single tube that drains both anastomoses (Fig. 9). Both are axial and have an extra-peritoneal route. The tube can be suppressed, allowing the possibility of long term preservation depending on necessities and may be extracted with the biliary tube. This particular manner of installing the set up after CDP offers another big advantage and that is a very good management of the redoubtable complication regarding this type of intervention which is the pancreatico-digestive fistula that may occur in 6-7 or even 20% of the cases. In this situation, the fistula is not biliary and alimentary polluted and is drained. (8)

The value and reliability of the procedure are analyzed taking into consideration several criteria. We chose three parameters depending on the type of drainage: biliary drainage dynamics, remission of the icteric syndrome (Fig. 9 and 10) and early and late postoperative mortality (fistulas, anastomotic unbindings, hemorrhages, anastomotic stenoses and other).

We did not take into consideration postoperative survival. In our opinion, it is irrelevant for anastomosis stenting reliability and is more likely linked to the pathology that demanded a biliary-digestive anastomosis (malignant or benign) and to associated pathologies of the patient. On the other side, the lack of information regarding late survival of patients included in the present study would have compromised the results.

There is a favorable evolution of the stented patients in what regards the fast or relatively slow remission of the icteric syndrome as well as a decrease of the percentage of patients with very slow or incomplete remission, though without significant differences. As to the complications, the following were observed: a case (0,67%) of hemorrhage, two cases (1,35%) of septic complications, six cases of partially or totally malfunctioning biliary drainage (4,05%), from which 5 had a conservative solution and one needed extraction. We also recorded anastomotic fistulas in eight cases (5,40%) from which six were malignant and two were benign.

Discussion and Conclusion

Installing this type of anastomosis may prove to be technically difficult even in the hand of an experimented biliary surgeon due to its main indications like: corrective interventions after a biliary accident or even more complicated, after a first corrective intervention that failed. We must mention that each new attempt of repair will lead to a more and more precarious biliary partner (non-dilated, presenting fragile wall and poor vascularization). Therefore it is essential to section the main bile duct distal to the lesion (stenotic, iatrogenic or neoplastic) where the duct is the most dilated, to avoid loss of vascularization. If the main bile duct does not fulfill these conditions, the anastomosis will be

Figure 12 - Termino-lateral hepaticojejunal anastomosis with transligamentary axial stenting

performed at a higher level, at the convergence level or even on the left hepatic duct.

As for the digestive partner, omega loop set up with Braun fistula and striction ligature was replaced with isolated loop à la Roux. In order to avoid alimentary pollution, a minimum of 40-60 cm are needed between the enteral-lateral anastomosis and the biliary-digestive anastomosis. Single, thin, slow absorbable, preferably monofilament threads with extra-mucous route are used to avoid stenoses. The anastomosis at the base of the loop show nothing particular. Transmezocolic set up is preferred. The anastomosis must be leak-proof, executed in a termino-lateral manner, only exceptional in latero-lateral manner. Before closing the anastomosis, transhepatic ligament axial drainage is performed (Fig. 12). Its role is to decompress the bile, "to put at ease to the anastomosis and to guide the scarring process" (1). So, axial drainage represents an extra safe method that offers a postoperative evolution without complications and "appeases" to the surgeon.

Postoperative cholangiography control

The anastomosis without suture is a technique imagined and improved by prof. Bratucu, used in exceptional situations when the biliary partner of the anastomosis is inappropriate for performing "safe sutures, even if it's protected by the trans-anastomotic drainage" (1). Practically, it is used in desperate situations when the surgeon has no other technical solutions due to precarious conditions of the biliary segment. Other indications for axial drainage are long term preservation in reconstructions after iatrogenic lesions, permanent stenting of the termino-lateral or latero-lateral derivations for neoplastic obstacles, especially in non-radical interventions and tumoral drilling associated to the anastomosis or for reinstalling compromised anastomoses by elastic stenosis when long term stenting and recalibration are needed. (9)

The main disadvantages of axial drainage refer to the relative technical difficulty of the setup, to a higher probability of accidental mobilization, to its few possible contraindications regarding the quality of the hepatic parenchyma. In these situations axial drainage à la Witzel is preferred.

In the end, we can justly affirm that stented hepaticojejunal anastomosis is a gold standard of derivations because it offers the best possible results and is "a heavy tool that should not miss from a surgeon's arsenal".

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