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Original research

Distal pancreatectomy with splenic preservation: A short-term outcome analysis of the Warshaw technique

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ABSTRACT

Introduction: Spleen-preserving left pancreatectomy (SPDP) with splenic vessels preservation (SVP) or without (Warshaw technique, WT) has been described with robotic, laparoscopy and open surgery. Nevertheless, significant data on medium- and long-term follow-up are still not available, since data in literature are scarce and the level of evidence is low.
Methods: In this retrospective study, we describe and compare short and medium term results of spleen-preserving distal pancreatectomy in eight patients.
Results: In WT group the duration and the intraoperative bleeding was superior than SVP group. The incidence of perigastric collateral vessels and presence of submucosal varices evidenced at CT scan was 66% in WT group, while only one case occurred in SVP group.
Discussion: The limit of laparoscopic approach is the fact that it needs advanced laparoscopic skills, which might result in intraoperative bleeding and splenectomy. The most of literature considered salvage WT intraoperatively performed in case of classical SVP and not only elective WT.
The consequence is that there is no difference in immediate postoperative results (operative time, intraoperative bleeding, hospital stay) that are in favour of SVP because WT is performed only in case of failure in preserving the splenic vessels. In fact when this intervention is performed electively, the procedure time is reduced as well as the intraoperative bleeding.
Conclusions: WT is safe and feasible, even if there are not definitive evidences that demonstrate it is superior to classic SVP. RCTs are needed to determine advantages and disadvantages of WT compared to the classic SVP.

1. Introduction

Spleen preservation in body-tail resections of the pancreas has always represented a challenge for the surgeon. Spleen-preserving left pancreatectomy (SPDP) is indicated only in particular cases of trauma, benign pancreatic lesions of body and tail next to Wirsung duct and in case of chronic pancreatitis [1]. Reduction in perioperative infectious complications and length of hospital stay with spleen preservation have been widely demonstrated [2,3]. Nevertheless, it is rarely performed [4].

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In 1943, Mallet-Guy standardized the splenic vessel preservation (SVP) technique in left pancreatectomy in case of chronic pancreatitis [5]: the splenic vessels are accurately identified and dissected from the posterior face of the pancreas and the resection of the body and tail of the pancreas are subsequently performed [6]. It is still possible to preserve the spleen in case of interruption of haematic flow in splenic arteries for accidental rupture or section dictated by necessity. Quenu [7] and Leger [8] underlined the possibility of vascularization of the spleen by a collateral blood circuit, the short gastric vessels and gastroepiploic vessels. On the other hand, Leger [8] advised against this intervention because of the risk of developing segmental portal hypertension and suggested performing splenectomy whenever it was not possible to preserve the splenic vein. Indication to this intervention was subsequently extended by Warshaw in 1988 [9] also as a technique for well selected cases and not only as an alternative technique to preserve the spleen in case of lesion of the splenic vessels [10]. However, it has not yet been fully accepted because of medium and long term risks of developing local portal hypertension, gastric fundus varicose vein and variceal bleeding.

The aim of our study is to compare the short and long term results of spleen-preserving distal pancreatectomy with and without splenic vessels preservation (Warshaw technique).

2. Methods

This study is a retrospective analysis. We included patients who underwent distal pancreatectomy from prospective databases of participating centres. Eight patients were included in the analysis.

Mean age was 46 years (range 34–73 years) and male-female ratio was 5:3. Indications for surgery were pancreatic endocrine neoplasms in 6 patients, intraductal papillary mucinous neoplasms (IPMN) in 3 patients, mucinous cystic tumours in 2 patients.

All operations were performed by surgical teams experienced in pancreatic surgery.

The interventions were performed by robotic surgery, laparoscopy and open surgery in 4, 3 and 4 patients, respectively. Warshaw technique (WT) was performed in 3 patients as salvage surgery in case of intraoperative failure of the SVP. Follow up was 12 months.

3. Results

3.1. Effects of interventions

3.1.1. Intraoperative outcomes

In WT group the duration and the intraoperative bleeding was superior than SVP group.

3.1.2. Short postoperative outcomes

There were not differences in patients in SVP group and the ones in WT group in terms of soft diet start, length of hospital stay and incidence of postoperative pancreatic fistulas.

3.1.3. Late post-operative outcomes

The incidence of perigastric collateral vessels and presence of submucosal varices evidenced at CT scan was 66% in WT group (2/3), while only one case occurred in SVP group.

The incidence of defect of perfusion evaluated by US, color-doppler US or TC scan and splenic infarction varied and are lower in SVP group (1/5 patients *vs* 1/3 patients); none patients with splenic infarction needed splenectomy.

4. Discussion

In our experience WT is safe and feasible even though it is not better than SVP. These results are in line with a recently published systematic revision of the literature [11] including thirteen non-randomized controlled trials (NRCTs) (723 patients underwent SPDP: 244 patients in the Warshaw's group and 479 in the SVP group). Risk of splenic infarction was significantly higher in the Warshaw's group [20.88 vs. 2.09%; OR 11.89 (95% CI 4.33 to 32.70); $p < 0.00001$]. The rate of splenectomy as a result of splenic infarction was also statistically associated with Warshaw's group [7.69% vs. 1.36%; OR 3.87 (95% CI 1.05to 14.26); $p = 0.05$)]. The surgical operative time was shorter in the Warshaw's group than in the SVP group (mean difference 21.2 min), but this result was not statistically significant (95% CI −47.01 to −4.48; $p = 0.11$).

Spleen-preserving left pancreatectomy is still a rarely performed surgical intervention [12] and a matter of debate and controversies. Machado [13] recently underlined that there are several inconsistencies in the literature on outcomes both during the procedure and postoperatively. While most reports would suggest better outcome with early surgical intervention this is even more infrequently performed.

The scarce practice of WT is related to multiple factors: development of gastric varices from the left portal hypertension that occurs when preserving the spleen with sacrifice of the splenic vein while [14], absence of adequate collateral circulatory paths in patients previously submitted to distal or total gastrectomy [15], fundoplicatio or colic resections [16], splenomegaly for insufficient vascularization of collateral vessels [17], high complexity of surgical technique that foresee an “untouched” left gastroepiploic artery [16].

There are few data in literature often from observational retrospective studies and frequently incomplete. In fact the case series are small: if we exclude the cases described by Warshaw [10], only Adam [18], Tien [19], Baene [20] e Carrere [21] presented more than 30 patients. The majority of studies are retrospective and observational and the recruitment of patients was made in a large period. Only few studies have adequate follow-up with results that are often conflicting (perigastric collateral vessels, submucosal varices of the stomach and splenic perfusion defect).

In order to simplify the laparoscopic approach Duluq [22] proposed to modify the distal section proposed by Warshaw transecting the splenic artery and vein at the pancreatic tail in order to avoid bleeding and reduce the conversion rates. This author described division of the splenic artery and vein at the neck of the pancreas and dissection of the pancreas posteriorly, leaving the spleen supplied by the short gastric vessels [22].

The introduction of minimally invasive surgery has eased the spleen-preserving left pancreatectomy with or without splenic vessels sparing. Xie et al. highlighted this technique in a recent meta-analysis. They found that laparoscopic spleen-preserving rate was significantly higher than in open technique [random effects model, RR 2.380 (1.177, 4.812), P = 0.016, I2 = 73.2%] [23].

In the majority of studies, included in Xie's review, SVP was performed more easily than Warshaw's tecnique, and the Warshaw's tecnique was only used in few cases when intraoperative bleeding, adhesion, and infiltration of blood vessels by the tumours occurred [23].

Laparoscopy gave the opportunity to perform an SVP with a more accurate surgical technique that allows visualization and easily sparing of the left gastroepiploic artery [17].

The limit of laparoscopic approach is the fact that it needs advanced laparoscopic skills because even a small breakage of tributary vessels from the splenic artery and vein can potentially obscure the surgical field, which might result in intraoperative bleeding and splenectomy, as reported by some authors [24]. This disadvantage has been exceeded from the introduction of robotic surgery, thanks to 3D high-definition and stable visualization; with