

# Pancreatic Head Tumors with Portal Vein Involvement: An Alternative Surgical Approach

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## KEY WORDS:

Pancreatic head cancer;  
Nonresectable;  
Portal involvement

## ABBREVIATIONS:

Superior Mesenteric Artery (SMA); Pancreatoduodenectomy (PD); Aorta (AO); Left Renal Vein (LRV); Inferior Vena Cava (IVC); Superior Mesenteric Vein (SMV)

## ABSTRACT

**Background/Aims:** One of the determining factors for the unresectability of pancreatic head tumors is the involvement of the portal venous system.

Recent reports show that the resection of tumors with portal vein involvement has similar results to lesions with same stage without portal vein invasion. The aim of this study is to present a technique that allows the resection of portal vein segments without the use of grafts and with a shorter period of intraoperative venous occlusion.

**Methodology:** Fifteen patients with pancreatic head tumors and portal vein involvement were submitted to pancreaticoduodenectomy according to this technique.

The main feature of the technique is starting the pancreatic dissection at the posterior aspect of the head of the pancreas. The superior mesenteric artery is completely dissected from the pancreatic tissues leaving the section of the pancreas and the resection of the portal vein to the last step.

**Results:** Portal vein flow occlusion did not exceed 10 minutes. There were no major postoperative complications or mortality.

**Conclusions:** This maneuver allows an easier resection of the mobilized portal vein with a shorter period of venous clamping and reconstruction without the need of venous graft.

## INTRODUCTION

Despite the rising incidence of pancreatic head tumors, resectability rates remain very low (around 20%) (1). One of the determining factors for unresectability is the invasion of the mesenteric portal venous system. However, some recent reports show that the resection of tumors with portal vein involvement led to survival rates similar to lesions without portal vein invasion (2-5).

In many situations, not only in ductal adenocarcinomas but in other pancreatic tumors like cystadenocarcinoma, neuroendocrine carcinomas or solid cystic tumors (6), pancreatic resection may necessarily include portal vein segments and, in some instances, grafts must be used for its reconstruction.

The proposed technique allows the resection of portal vein segments without the use of grafts and with a shorter period of intraoperative venous occlusion.

## METHODOLOGY

Fourteen patients with adenocarcinoma of the head of the pancreas and one with a solid cystic tumor were submitted to cephalic pancreatectomy with portal vein resection between 1996 and 1999.

## Technique

This surgical technique consists in dissecting the anterior and posterior aspects of the head of the pancreas first, leaving the section of the pancreatic head and the resection of the portal vein to the last step.

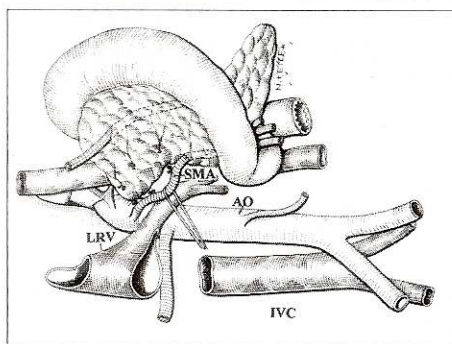
After a Kocher maneuver, the retroperitoneum and the superior mesenteric artery (SMA) are evaluated to

exclude neoplastic invasion; the inferior aspect of the pancreas is then dissected to assess portal vein involvement. When the presence of distant metastases and portal vein total occlusion are excluded, the operation proceeds with the dissection of the hepatic hilum and transection of the common hepatic duct. Hepatic pedicle dissection is completed with resection of perivascular tissue and lymph nodes from the liver hilum and following the hepatic artery up to the celiac trunk; afterwards gastroduodenal artery is ligated.

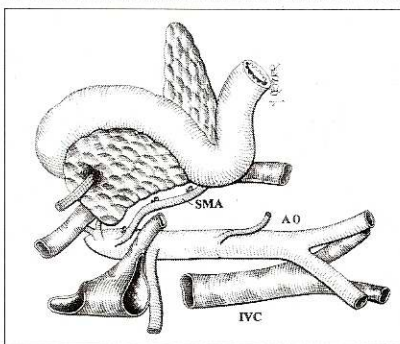
The right colon is then mobilized and SMA is individualized; resection of inter caval aortic and mesenteric artery lymph nodes is performed, SMA is then completely dissected from the posterior pancreatic tissue by ligation of the small pancreatic arterial branches (Figure 1).

The jejunum is sectioned 10 to 20cm below the ligation of Treitz. Any vascular branches from the jejunal vascular arcade up to the duodenum are then ligated, thus allowing the mobilization of the jejunum and duodenum, behind the mesenteric trunk, from left to right. This maneuver permits the liberation of the SMA from the uncinat process of the pancreas (Figure 2). The pancreas is then dissected from the splenic vein at the left side of the mesenteric-portal trunk. The body of the pancreas is sectioned at this level and the organ dissected towards the portal splenic confluence. At this point, the pancreas is attached only to the portal vein (Figure 3). The portal vein is then sectioned between vascular clamps and the surgical specimen removed. Reconstruction of the portal vein is then performed in an end-to-end fashion.

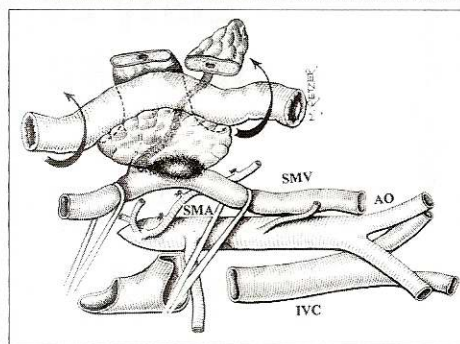




**FIGURE 1** This figure shows the posterior dissection of superior mesenteric artery (SMA) from the pancreatic head; aorta (AO); left renal vein (LRV); inferior vena cava (IVC).



**FIGURE 2** After mobilization of the jejunum and the duodenum behind the mesenteric trunk the superior mesenteric artery (SMA) can be completely liberated from the uncinate process; aorta (AO); inferior vena cava (IVC).



**FIGURE 3** This figure shows the dissection of the body of the pancreas from the splenic vessels and the tumor involvement of the superior mesenteric vein (SMV). At this point the pancreas is attached only to the superior mesenteric vein; superior mesenteric artery (SMA); aorta (AO); inferior vena cava (IVC).

## RESULTS

Portal vein flow occlusion did not exceed 10 minutes and mean operative time was 8 hours and 40 minutes. There were no major postoperative complications or mortality.

## DISCUSSION

Pancreatoduodenectomy (PD) is, undoubtedly the method of choice for the treatment of pancreatic head tumors and, in the last years, lower mortality rates have been reported following this procedure (7,8). However, in patients with portal vein invasion, the benefit of associating portal vein resection to PD is still controversial.

Recently some authors reported that patients, who needed portal vein resection during PD, presented the same survival rates as those similarly staged in whom this procedure was not necessary (2-5).

Portal vein resection leads to an increase in resectability of pancreatic head cancer, offering a higher chance of cure. Nakao *et al.* reported that after adopting the removal of a portal vein segment, an overall res-

sectability rate up to 63% was achieved (9). Launois *et al.* believe that the association of pancreatic and portal vein resection is only indicated when it provides a complete macroscopical tumor removal (10).

The proposed technique allowed us to perform complete pancreatic dissection before the section of the portal vein. The surgical specimen containing the portal vein segment is removed shortly after venous clamping exposing a large vein segment that can be mobilized for the anastomosis without the need of a graft. Indeed, Maillard *et al.*, in anatomical studies, have shown that portal vein reconstruction is feasible without grafts (11). In contrast, when vein resection is performed along with pancreatic dissection, the use of venous grafts is often necessary (10) due to the difficulty of venous mobilization.

Moreover, intestinal venous stasis is avoided by the short period of portal occlusion. We conclude that with this technique, portal vein resection of up to 3cm can be performed and an end-to-end anastomosis is possible without the use of venous grafts or bypasses (10,12).

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