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ORIGINAL ARTICLE

# Three-dimensional computed tomography analysis of the left gastric vein in a pancreatectomy

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## Abstract

**Background:** During a pancreatectomy, the left gastric vein (LGV) has an important role in the venous drainage of the stomach (total pancreatectomy, left splenopancreatectomy, pancreatoduodenectomy with venous resection and pylorus-preserving pancreaticoduodenectomy). Pre-operative knowledge of the LGV's termination is necessary for adequate protection of this vein during dissection. The objective of the present study was to analyse the location of the LGV's termination in a patient population and facilitate its identification in at-risk situations.

**Materials and methods:** Abdominal computed tomography (CT) images of 86 pancreatic tumour patients (20 of whom underwent surgery), who were treated in our institution between October 2009 and October 2010, were reviewed. Arterial-phase and portal-phase helical CT with three-dimensional reconstruction was performed in all cases. The location of the termination of the LGV was determined and (when the LGV merged with the splenic vein or the splenomesenteric trunk) the distance between the termination and the origin of the portal vein (PV). The correlation between CT imaging data and intra-operative findings was studied.

**Results:** The LGV was identified on all CT images. In 65% of cases ($n$ = 56), the LGV terminated in the PV (upstream of the liver in nine of these cases). The LGV terminated at the splenomesenteric trunk in 4.7% of cases ($n$ = 4) and in the splenic vein in 30.3% of cases ($n$ = 26). When the LGV terminated upstream of the origin of the PV, the distance between the two was always greater than 1 cm. The average distance between the termination of the LGV and the origin of the PV was 14.34 mm (10.2 to 21.1). The anatomical data from CT images agreed with the intra-operative findings in all cases.

**Conclusion:** Pre-operative analysis of the LGV is useful because the vein can be identified in all cases. Knowledge of the termination's anatomic location enables the subsequent resection to be initiated in a low-risk area.

## Keywords

left gastric vein, pancreatectomy, anatomy, 3D CT scan, venous drainage, revascularization

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## Introduction

The left gastric vein (LGV, formerly referred to as the gastric coronary vein) is a tributary of the portal system. It allows venous blood near the lesser curvature of the stomach to reach the liver through the portal vein (PV). The other venous drainage channels in the stomach are the right gastric vein and the right and left gastroepiploic veins.

In spite of the LGV's importance in the venous drainage of the stomach and its involvement in certain types of surgery (particularly total pancreatectomy, left splenopancreatectomy, pancreatoduodenectomy with venous resection and pylorus-preserving pancreaticoduodenectomy), only one previous study has investigated this vein's anatomy.[1] Indeed, in these situations, the LGV is the only route for venous drainage of the stomach; surgical injury to this vein could cause congestion of the stomach and thus a

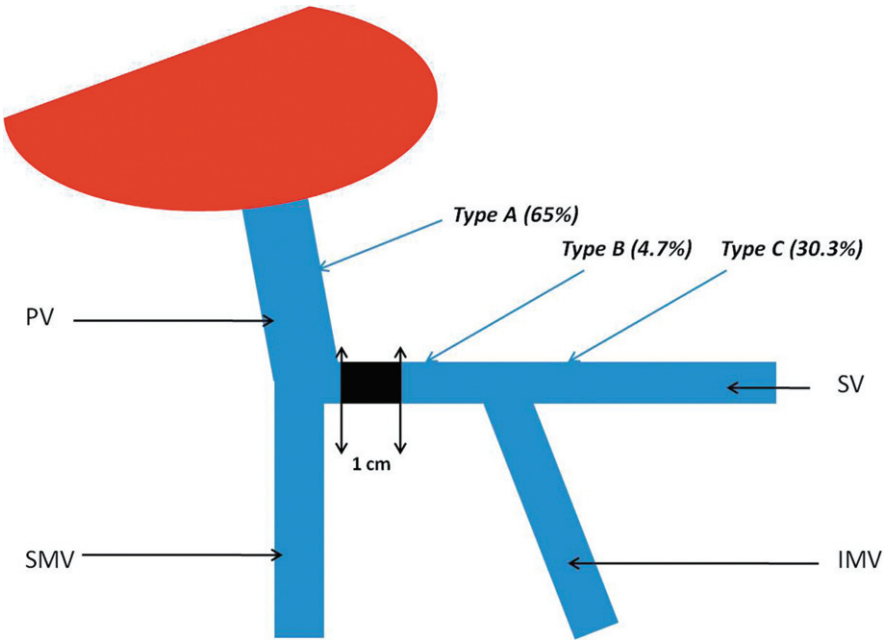


**Figure 1** Left gastric vein (LGV) termination sites and their frequencies. Type a: termination on the portal vein (PV); Type b: termination on the splenomesenteric trunk (SMT); Type c: termination on the splenic vein (SV); SMV: superior mesenteric vein; IMV: inferior mesenteric vein. The distance between the termination of the LGV (when located on the SMT or the SV) and the origin of the PV was always greater than 10 mm (the zone delimited by the black box)

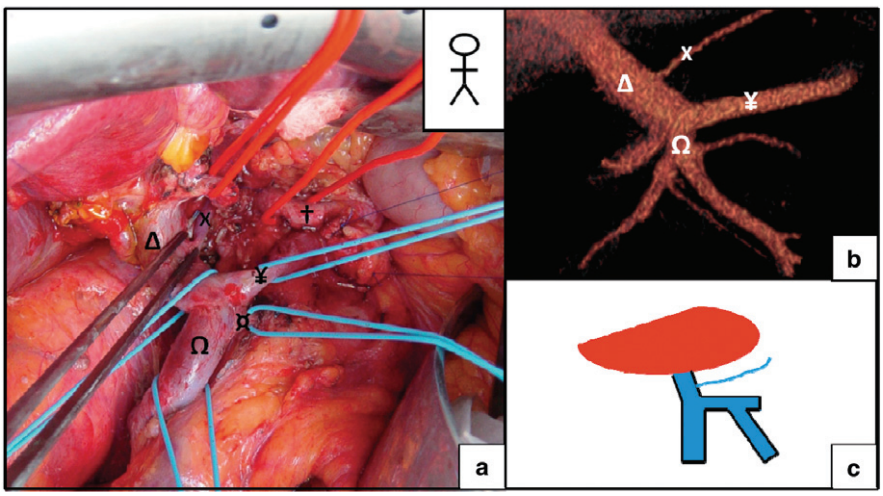


**Figure 2** Termination of the left gastric vein (LGV) on the portal vein (PV). (a) Pancreatoduodenectomy for intraductal papillary mucinous tumour (IPMN). (b) A pre-operative computed tomography (CT) scan revealed the termination of the LGV on the PV. (c) A schematic diagram of the termination of the LGV. X, LGV; †, common hepatic artery; Ω, superior mesenteric vein (SMV); Δ, PV; ¥, splenic vein (SV); ¤, inferior mesenteric vein (IMV)

gastric haemorrhage and would require additional gastrectomy or revascularization procedures.

Computed tomography (CT) analysis of the LGV's path has already been performed as part of the laparoscopic treatment of gastric cancer,[2] to locate the vein before surgery and reduce the bleeding that could result from dissection along the common hepatic artery (CHA) during a gastrectomy for cancer.[3,4] However, we are not aware of similar studies concerning the pre-operative analysis of the LGV before a pancreatectomy.

In hepatobiliary and pancreatic disease, the LGV can be damaged during the recommended dissection of the CHA's chain of lymph nodes (group 8 in the Japanese Research Society