

# The Distribution And Clinical Anatomy Of The Short Gastric Veins

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## Citation

D Power, M Forshaw, J Birch, S White. *The Distribution And Clinical Anatomy Of The Short Gastric Veins*. The Internet Journal of Surgery. 2001 Volume 3 Number 2.

## Abstract

Following pancreatectomy, insulin independence can be achieved by splenic islet autotransplantation (AT) via infusion of pancreatic islets into the short gastric veins. We examined the distribution and drainage of the short gastric veins within the gastrosplenic ligament in 27 human cadavers. A total of 76 short gastric veins were identified with a median number of 3 per cadaver (range 1-6). In 22 cadavers (81%), there was a direct communication between the short gastric veins and the other draining veins of the spleen (splenic vein in all 22 cadavers (81%) and the left gastroepiploic vein in 5 cadavers (19%)). Only short gastric veins 1 (89%), 2 (35%) and 3 (18%) communicated directly into the splenic pulp. We conclude that from the perspective of splenic islet AT, the most superior short gastric vein would appear to offer the best route for infusion of pancreatic islets whilst minimising potential reflux problems into the portal vein.

## INTRODUCTION

The short gastric veins (vasa brevia) are described as draining the left side of the fundus of the stomach and running within the gastrosplenic ligament to the splenic hilum where they empty into the splenic vein or its tributaries (Grays Anatomy 1989). However a consistent operative finding is that the upper short gastric veins appear to drain directly into the splenic parenchyma at the upper margin of the hilum. Jirayr and Blair (1980) described this anatomical variation in mice and a study by Bamroongwong et al. (1991) demonstrated this in the common tree shrew.

Consequently, splenic islet autotransplantation as a method of treating chronic pancreatic endocrine insufficiency has been developed. This process involves the infusion of pancreatic islets via the short gastric veins into the splenic parenchyma which acts as a recipient site for the donor cells (Nelson et al. 1997). The authors decided to re-examine the anatomy of the short gastric veins and their distribution within the gastrosplenic ligament.

## MATERIALS AND METHODS

The short gastric veins were dissected in 27 formalin fixed human cadavers by the four authors working in pairs. The age range was 67-89 years with a median age of 78 years. There were 12 male and 15 female cadavers.

A standard approach was used in each cadaver. The ventral

layer of the gastrosplenic ligament was incised and reflected laterally. The short gastric veins were identified at their origins on the left side of the fundus of the stomach and traced towards the spleen. We recorded the number of short gastric veins in each cadaver and noted their terminal point of drainage (splenic parenchyma; splenic vein or left gastroepiploic vein). We kept a photographic record of each dissection.

## RESULTS

76 short gastric veins were identified. There was a median number of three per cadaver (range 1-6). In 89% of specimens short gastric vein 1 drained directly to the splenic pulp compared with just 35% and 18% of short gastric veins 2 and 3 (table one). In 5 cadavers (19%), there was no communication with the splenic vein directly. In the remaining 22 cadavers (81%), there was a communication directly between the short gastric veins and the splenic vein. In 5 of these cases (19% of cadavers) there was communication with the left gastroepiploic vein, which subsequently drained into the splenic vein. Therefore, should any of the short gastric veins be used in surgical practice for the infusion of islet autograft and embolisation to the spleen, only in 19% of cases (5 of the 27) is there a 100% probability of success as in the other 22 cases one or more of the short gastric veins will drain to the splenic vein or to its tributaries. However, should the uppermost short gastric vein

be used for the infusion, then from these results it will communicate with the spleen directly in 89% of cases offering only an 11% risk of overspill of cells to the portal venous system via the splenic vein or its tributaries.

**Figure 1**

Table 1: Drainage of the short gastric veins

	Splenic Pulp	Splenic vein	Left GE vein
SG1	24 (89%)	3 (11%)	0
SG2	8 (35%)	15 (65%)	0
SG3	3 (18%)	12 (71%)	2 (11%)
SG4	0	4 (80%)	1 (20%)
SG5	0	1 (50%)	1 (50%)
SG6	0	0	2 (100%)

## DISCUSSION

Venous anatomy is often subject to variation and because of this is rarely documented accurately in anatomical texts. The authors findings however, demonstrate a consistency that renders many textbook descriptions of splenic venous anatomy obsolete. It is the potential surgical importance of these findings that may serve to change teaching practice in the future.

Total pancreatectomy as a treatment for intractable pain associated with chronic pancreatitis renders a patient diabetic requiring exogenous insulin replacement therapy (Farney et al. 1991 and Warhoff et al. 1995b). Many methods for treating this endocrine deficiency have been tried. Current surgical research centres around autologous pancreatic islet transplantation which avoids the need for immunosuppressive anti-rejection therapy (Warhoff et al. 1995a).

During the surgical resection of the diseased pancreas the tail portion (relatively rich in islet colonies) is removed and incubated with a collagenase solution. The digestate is centrifuged and a purified solution of islet cells is suspended in a solution of human albumin. This islet-rich solution is then injected back into the donor in the hope of attaining viable islet colonies that may endogenously secrete insulin in response to elevations in the host blood glucose. Many sites for this autotransplantation have been tried with mixed success (Nelson et al. 1997). The benefits of splenic islet AT

are twofold. Firstly, the gastrosplenic ligament is easily identifiable and close to the site of surgery and therefore the short gastric veins can be readily identified and cannulated during the surgical procedure in preparation for the transplantation infusion. Secondly, the infusion to the splenic parenchyma avoids the need for infusion directly into the portal vein which has resulted in fatal portal hypertension (Van der Burg et al. 1996).

The results of this study suggest that for the future of human splenic islet autotransplantation the uppermost short gastric vein (1) appears to offer the optimum site for infusion to the splenic parenchyma whilst minimising the risk of reflux problems into the portal vein.

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