

Medical Note

Distal Spleno-renal (Warren) Shunt: Intraoperative Blood Flow Measurements

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Rationale

A distal spleno-renal shunt (DSRS) provides selective variceal decompression to control bleeding gastroesophageal varices, while maintaining portal hypertension and prograde portal flow to the liver (Fig. 2).

Thrombosis of distal spleno-renal shunts occur in less than 10% of patients, but usually occurs early (in the first week) and requires reoperation. Intraoperative measurement of shunt flow shows great potential to reduce the risk of this complication.

Surgical Approach

On completion of the distal spleno-renal shunt anastomosis, 2-3 cm of the splenic vein is free below the pancreas before it is anastomosed to the left renal vein. A Transonic® Flowprobe can be placed on this segment of the splenic vein for volumetric flow measurement (Fig. 2). A Probe is chosen to fit comfortably around the vein without compressing it. It should lie in line with the vessel, and no tissue should be interposed. Contact is assured by immersing the field in saline. Flow measurements stabilize within one minute, and fluctuate less than $\pm 10\%$.

Discussion

What should the flow be in a distal spleno-renal shunt? This is a high flow shunt, with volumetric flows determined largely by spleen size. There appears to be approximately 1 mL/min flow per cubic centimeter spleen volumes - i.e. a 750 cc spleen will give a shunt volumetric flow of approximately 750 mL/min.

After first removing the clamps, flow tends to be higher than it will be after 5-10 minutes when the initial hyperemia has resolved. If flow is significantly less than this approximation, a technical error should be considered.

- Is the splenic vein kinked?
- Is there a problem with the anastomosis?

Now is the time to identify and correct a technical problem: transit-time ultrasound Flowprobes offer a method for identifying low flow in this shunt.

Reference

http://www.vesalius.com/cfoli_frms.asp

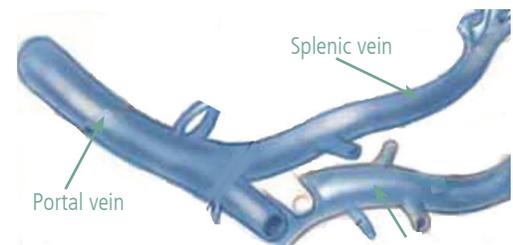


Fig. 1: Schematic of splenic vein in relation to renal vein.

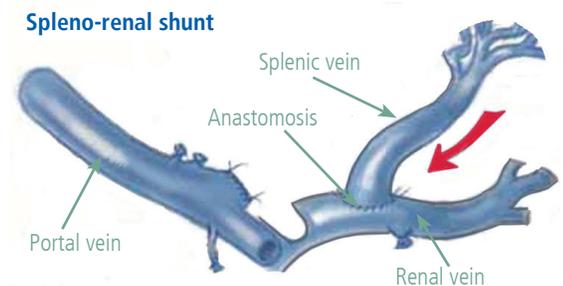


Fig. 2: Schematic of anastomosis of the splenic vein to the renal vein to create a distal Spleno-renal shunt.

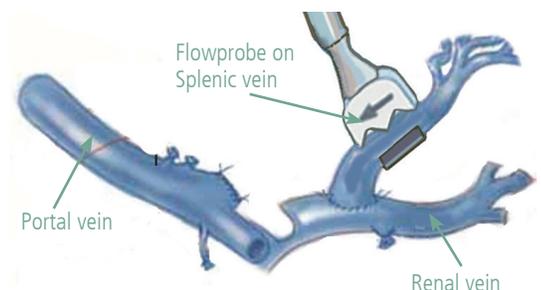


Fig.3: Flowprobe measuring flow in the splenic vein following anastomosis of the splenic vein to the renal vein.

Distal Spleno-renal (Warren) Shunt: Intraoperative Blood Flow Measurements Cont.

Equipment Needs



HT353 Single-channel Optima Flowmeter. Acquire precise actual flow measurement quickly, easily and cost effectively.



8 mm, 10 mm and 12 mm FMV Vascular Handle Flowprobes are recommended measurement of distal spleno-renal shunt (venous) flow.

Background

Alcoholic (Laennec's) cirrhosis of the liver is a common cause of portal hypertension. Portal hypertension extends to esophageal veins via gastric, splenic and gastroepiploic veins. When bulging esophageal varices are eroded by food passage through the esophagus, massive bleeding can result.

In 40% of U.S. cirrhosis patients, portal hypertension causes acute bleeding from the varices of the esophagus or stomach. This variceal bleeding accounts for one-third of all deaths related to cirrhosis. A significant bleeding episode is fatal 50% of the time. Of those surviving, two-thirds will rebleed. It is therefore crucial to first arrest the acute bleeding episode and then treat the portal hypertension.

One way to treat portal hypertension is through portal decompression via a surgically-created distal spleno-renal (DSRS) or Warren shunt.

A distal spleno-renal shunt is a high volume shunt that diverts splenic venous flow from the portal venous system to the renal venous system. An enlarged spleen (splenomegaly) is common in patients with end-stage-liver disease. A distal spleno-renal shunt provides good long-term control of variceal bleeding.

How Is a Distal Spleno-renal Shunt Constructed?

The abdomen is opened. The stomach and pancreas are elevated to expose the splenic vein which is isolated and mobilized by detaching it close to its junction with the portal vein. The vein is then reattached to the renal vein via an end-to-side anastomosis (Figs. 2,3). Intraoperative flow measurement during creation of a DSRS ensures good shunt flow without kinking of the vein or a problem with the anastomosis.



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