TECHNIQUE FOR INFLOW BLOOD CONTROL IN LIVER SURGERY - Review article

Ludmil M. Veltchev
Fellow, Master's Program in Hepatobiliary Pancreatic Surgery, Henri Bismuth Hepatobiliary Institute, 12-14, avenue Paul Vaillant-Couturier, 94804 Villejuif Cedex

ABSTRACT:

Vascular occlusion is used to reduce blood loss during liver resection surgery.

For many decades liver resections have been performed with very high morbidity and mortality. Intraoperative blood loss has indeed repeatedly been shown to adversely influence the short-term prognosis of patients. In addition, there is evidence that blood transfusion may associate with an increased risk of recurrence of malignancy, through impairment of the patient's immune response. The knowledge for liver anatomy permitted to perform safety control of vascular flow and reduce complications **(1, 2).**

Because of the numerous improvements of the liver resectional techniques, many cases became possible for radical operations. In this regard, pedicular intermittent clamping, with alternates sorts periods of clamping with intervals of restoration of blood flow, proved to be the best-tolerated clamping modality **(3).** The combination of preoperative anatomical knowledge, good medical team and use of good tools for liver parenchyma dissection makes major liver resection possible.

Key words: inflow blood control, Pringle's maneuver, liver resection

INTRODUCTION

Anatomic knowledge for vascular liver flow

The liver is an abdominal organ with dual vascular inflow of 1500 ml/min, approximately one quarter of the total cardiac output. The portal vein provides 75% and the hepatic artery provides the remaining 25%. Portal vein (PV) originates behind the neck of pancreas, as the confluence of the superior and splenic veins and courses posterior to the bile ductand hepatic artery in the free edge of the lesser omentum. At the hilum of the liver the PV divides into a shorter, more vertically oriented right branch and longer horizontally left branch.

The hepatic artery arises most commonly as a branch of the celiac axis and enters the hepatoduodenal ligament after providing the right gastric and gastroduodenal arteries. The right and left branches usually lie on a plane posterior to the bile ducts at the hilum of the liver. The vascular anatomy of the liver is variable. Variations have occurred in 25% to 75% of cases. The biggest clinical study for hepatic artery variation is reported in 1994 by Hiatt et all. **(4)** From these only two variations such as left artery arising from left gastric artery (25-30%) and a right artery, which can arise from the superior mesenteric artery (SMA) (17-20%), can compromise clamping.

Three large hepatic veins lie posterosuperior to the liver just below the diaphragm form the major drainage of the liver. The right hepatic vein is formed as a short wide trunk by the convergence of an anterior trunk situated in the right portal fissure, which drains mainly segments V and VI, and a posterior trunk, which drains mainly segments VIII. The middle hepatic vein is situated in the plane of the principal portal fissure. It drains the entire central sector. It receives the veins from segments V and VIII at its right border and the veins of the segments IV. The left hepatic vein arises from the confluence of segments II and III veins. It often receives drainage from the posterior part of segment IV, and it terminates as a short common trunk with middle hepatic vein. In additional, there is undefined number of small vessels called accessory, short, or dorsal hepatic veins. Of this, the tackiest vein, which is seen to enter IVC caudally, posterioly and on the right side and constitutes the main drainage vessel of the right postero-inferior area of the liver has been referred as the inferior, dorsolateral, dorsoinferior, anterolateral or posterior inferior right hepatic vein.

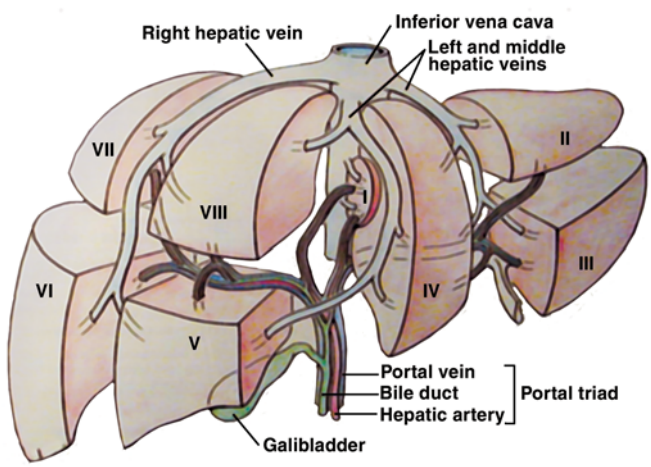
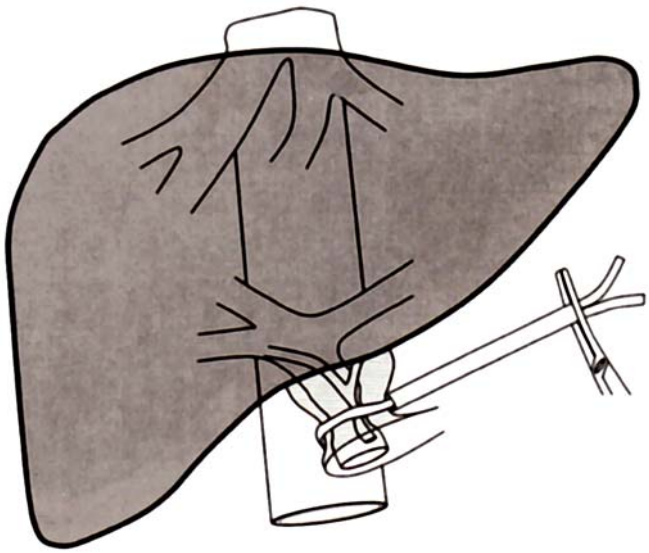


Fig. 1. Liver segmental structure

Hemodynamic response to Pedicle clamping leads to a moderate decrease in cardiac preload with a 5% decrease in pulmonary artery pressure and a 10% decrease in cardiac index is paradoxically associated with a 10% increase in mean arterial pressure **(5).** Isolated pedicle clamping usually is well tolerated and does not require specific anesthetic management. The blood pressure is restored to normal or shows an increase from the baseline during the period of declamping. It is a frequently observed phenomenon, however, that as the cycle of clamping and declamping progress, declamping causes more significant hypotension. This can be observed when the cumulative period of clamping exceeds 1 hour. Could be attributed to the reperfusion syndrome, owing to the long-term ischemia of liver parenchyma and splanchnic release toxic vasodilators. It is recommended to increase the duration of declamping during each cycle, if the cumulative duration is prolonged more than 1 hour, especially in patients with diseased liver.

Technique of vascular clamping

Inflow control is the easiest method to reduce bleeding during liver resection of liver traumatic damage. Pedicle clamping, which controls the inflow has few hemodinamics consequences. Continuous clamping, which increases ischemic injury of the liver parenchyma, also induces splanchnic congestion. Intermittent clamping has supplanted the use of selective pedicle clamping to overcome these two drawbacks.



Inflow vascular clamping - Pringle's maneuver (hepatic pedicle clamping, which interrupts the arterial and portal venous inflow to the liver, is a standard in hepatic surgery. Clamping is achieved by a vascular clamp or surgical tourniquet, which should be closed until the pulse of hepatic artery distal to the clamp is stopped. When the left accessory artery exists, simultaneous occlusion of this artery should be performed.

Continuous clamping: implies interruption of inflow continuously during the hepatic transaction phase, without intermittent release to allow reperfusion. The efficacy is limited because of splanchnic congestion and prolonged parenchymal ischemia.

Intermittent clamping presents intermittent inflow occlusion with intervals of reperfusion. It reduces the consequences of splanchnic congestion and decreases the ischemic injury. After a short period of pedicle clamping (10-20 min) the inflow is restored for 5-10 minutes according to the duration of the transaction of liver. Classically each cycle comprises 15 minutes of clamping followed by 5 minutes of reperfusion **(5).**

Preconditioning: Clavien et al***. (6)*** revealed that an initial period of ischemia (10 minutes) followed by reperfusion (10 minutes) protects the liver against prolonged ischemia and postulated that the benefits from the first clamp-unclamp sequence as a preconditioning treatment.

CONCLUSIONS

Performance of Pringle maneuver during liver transection results in less blood loss and better preservation of liver function in the early postoperative period. This is happening, because there was less hemodynamic disturbance induced by the bleeding. Intermittent vascular occlusion seems safe in liver resection. However, it does not seem to decrease morbidity. Among the different methods of vascular occlusion, intermittent portal triad clamping has most evidence to support the clinical application. Hepatic vascular exclusion cannot be recommended routinely. Ischemic preconditioning before continuous portal triad clamping may be of clinical benefit in reducing intensive therapy unit and hospital stay.

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Corresponding author:
Ludmil Marinov Veltchev, MD PhD
Mobile: +359 876 259 685
E-mail: drlmarinov@yahoo.com

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OBESITY SURGERY: INDICATIONS, TECHNIQUES, WEIGHTLOSS AND POSSIBLE COMPLICATIONS - Review article

Ludmil M. Veltchev
Fellow, Master's Program in Hepatobiliary Pancreatic Surgery, Henri Bismuth Hepatobiliary Institute, 12-14, avenue Paul Vaillant-Couturier, 94804 Villejuif Cedex

SUMMARY

In long-term perspective, the conservative treatment of obesity is always doomed to failure and only the surgical method allows reducing obesity. At this stage, the surgery of choice remains the gastric bypass, which is reduces on average 60-70% of the overweight and which is effective in 80% of the operated patients. Preoperative preparation, surgical interventions and postoperative monitoring of the patients are crucial to its effectiveness.

Key words: obesity, surgical techniques, complications

INTRODUCTION

The significant percentage increase of the population with overweight and the ineffectiveness of the medication treatment (diet, drugs) allow bariatric surgery to take an important place in the treatment (**1, 2).** At this point this type of treatment is the only one leading to a lasting effect.

Basically, two mechanisms allow the unification of all known methods into three categories:

- restrictive operations (gastric band and vertical gastroplastica)
- low absorbing operations (jejuno-ileal bypass, biliopancreatic derivation)
- mixed operations (gastric bypass)

Description of techniques:

a) Roux-en-Y Gastric Bypass (RYGB) works by restricting food intake *and* by decreasing the absorption of food. Food intake is limited by a small pouch that is similar in size to the adjustable gastric band (3, 4). In addition, absorption of food in the digestive tract is reduced by excluding most of the stomach, duodenum, and upper intestine from contact with food by routing food directly from the pouch into the small intestine. (**fig. 1.**)

b) Vertical Sleeve Gastrectomy (VSG) historically had