POST OPERATIVE ICU MANAGEMENT OF LIVER TRANSPLANT ADULT PATIENTS.

An essay submitted for partial fulfillment of master degree in anesthesiology and intensive care.

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2006

"رب أوزعني أن أشكر نعمتك
التي أنعمت علي وعلى والدي
وأن أعمل صالحـــا ترضاه"

سورة الأحقاف الآية ١٥

ACKNOWLEDGEMENT

I wish to express my sincere appreciation and deep thanks to **Professor Dr. Ahmed Gamal Eissa**, professor of anesthesiology and intensive care, faculty of medicine, Ain shams university, for his supervision and encouragement. It was a privilege to work under his supervision.

I would like to acknowledge my deepest gratitude and appreciation to **Professor Dr. Sherif Wadie Nashed**, Assistant professor of anesthesiology and intensive care, faculty of medicine, Ain shams university, for his keen guidance, unlimited support, and stimulating remarks.

I also wish to express my deep thanks to **Dr. Ahmed Mohamed Al-Hennawy**, lecturer of anesthesiology and intensive care, faculty of medicine, Ain shams university, for his close supervision and continuous help throughout the work.

To my family

My father, my mother

My wife and my son.

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Introduction

Liver transplantation (LT) is an increasingly common and extraordinarily costly procedure. Although liver transplantation has become a standard treatment of end stage liver disease (ESLD), surprisingly little information about intensive care treatment of these patients is available. Orthotopic liver transplantation (OLT) is the replacement of a diseased liver with a healthy liver in the normal anatomic position ***(Saner, 2003).***

In 1963, Starzl and colleagues performed the first liver transplantation procedure. This patient, along with the next 4, died from bleeding. Starzl et al performed the first successful human liver transplantation in 1967. Initial survival rates were poor, with only 24% of adults and 33% of children surviving the first year after liver transplantation through the 1970s ***(Starzl, 1979).***

One-year survival rates have increased from 30% in the early 1980s to more than 85% at present. The major reasons for this dramatic improvement in outcome include improved surgical and preservation techniques, better immunosuppressive regimens, more effective treatment of rejection and infection, and improved care during the critical perioperative period ***(Saner, 2003)***.

There are three options for liver transplantation: cadaver donor transplantation, living donor transplantation, and auxiliary transplantation.

Cadaver donor: The donor liver is obtained from a person who is diagnosed as brain dead whose family volunteers to donate the organ for transplantation. People who receive cadaver donors wait on the national computer list until a suitable donor becomes available.

Living donor: A healthy family member, usually a parent, sibling, or child, or someone emotionally close to you, volunteers to donate part of their liver for transplantation. The donor is carefully evaluated by the team to make sure no harm will come to the donor or recipient.

Auxiliary transplantation: Part of the liver of a healthy adult donor (living or cadaver) is transplanted into the recipient. The patient's diseased liver remains intact until the auxiliary piece regenerates and assumes function. The diseased liver may then be removed ***(Abhinav Humar, 2003).***

Orthotopic liver transplantation (OLT) is the definitive therapeutic option for patients with ESLD. It affords the opportunity for a disabled person to return to a full and active life. Although expensive, OLT may well be more cost effective

than the routine medical care of terminally ill patients with liver failure ***(David J. Kramer, 2005).***

Patients who undergo liver transplantation represent a unique group of high-risk surgical patients, all of whom suffer from advanced liver disease preoperatively. Postoperative treatment of the liver transplant patient can be complicated by the severe physiologic derangements that accompany ESLD. Depending on the severity of ESLD, the patient will be faced with profound deterioration of its hemodynamic, metabolic, cardiopulmonary and nutritional status. ***(Saner, 2003)***.

ICU admission is needed for liver transplant recipients for evaluation and management of organ system dysfunction or incipient dysfunction ***(David J. Kramer, 2005).***

Surgical anatomy of the liver

General:

The liver is the largest organ in the body, weighing 1.5 kg in the average 70-kg male. Its position under the right hemidiaphragm allows it to be protected from trauma by the costal margin. The liver parenchyma is entirely covered by a thin capsule and by visceral peritoneum in all but the posterior surface of the liver, termed the ‘bare area’.

The liver is divided into two main lobes: a large right lobe which compromises three-quarters of the liver parenchyma and a smaller left lobe the remaining quarter. Surgical resection of these lobes would be termed a right or left lobectomy ***(Willis C, 1990).***

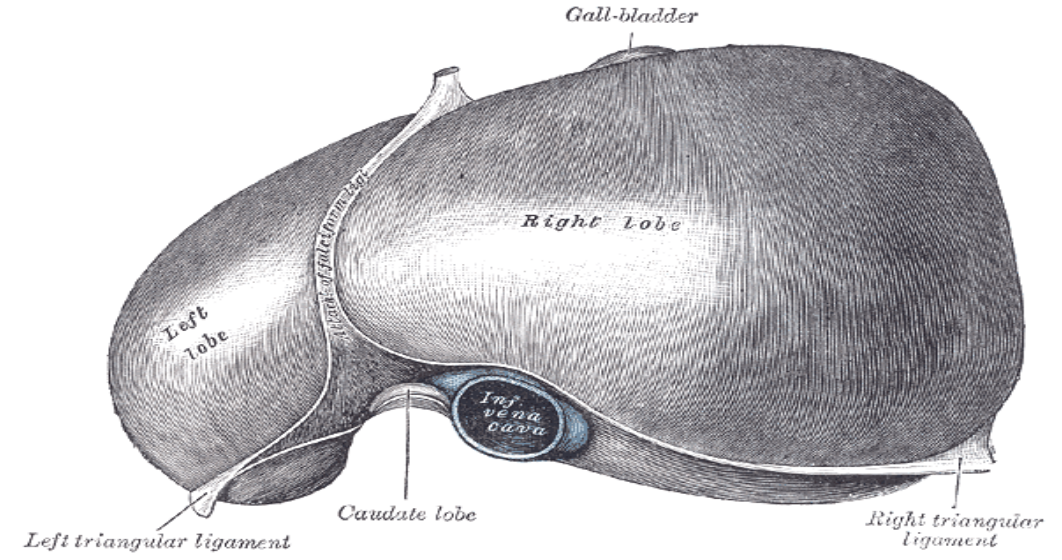

Figure 1: superior surface of the liver ***(Gray’s, 1995).***

Liver blood supply:

The blood supply of the liver is unique, being derived 80% from the portal vein and 20% from the hepatic artery. The arterial blood supply in most individuals is derived from the celiac trunk of the aorta where the hepatic artery arises along with the splenic artery. After branching to form the gastro duodenal artery it branches at a very variable level to produce the right and left hepatic arteries. The right artery supplies the majority of liver parenchyma and is therefore the larger of the two arteries.

The venous drainage of the liver is via the hepatic veins into the IVC. The vena cava lies within a groove in the posterior wall of the liver. Above the liver it immediately penetrates the diaphragm to join the right atrium, whereas below the liver parenchyma there is a short length of the vessel before the insertion of the renal veins. The inferior hepatic veins are short vessels which pass directly between the liver parenchyma and the anterior wall of IVC. The major venous drainage is through three large veins which join the IVC immediately below the diaphragm. The right hepatic vein can be exposed fully outside the liver, but the middle and left veins usually join within the liver parenchyma ***(Starzl TE, 1985).***

Structures in the hilum of the liver:

The hepatic artery, portal vein and bile duct are present within the free edge of the lesser omentum. The standard relationship of these three structures is for the bile duct to be within the free edge, the hepatic artery to be above and medial, and for the portal vein to lie posteriorly. Within this ligament the common hepatic duct is joined by the cystic duct to form the common bile duct. The common hepatic artery branches at a variable level within the ligament to form two or often three main arterial branches to the liver. The right hepatic artery often crosses the bile duct anteriorly or posteriorly before giving rise to the cystic artery. The portal vein arises from the joining of the splenic vein with the superior mesenteric vein behind the neck of pancreas.

At the hilum the major structures are divided into right and left branches. The right and left hepatic ducts arise from the hepatic parenchyma and join to form the common hepatic duct. The left duct has a longer extra hepatic course of approximately 2 cm. Once within the liver parenchyma the duct accompanies the branches of the hepatic artery and the portal vein within a fibrous sheath.

The portal vein often gives off two large branches to the right lobe which are accessible outside the liver for a short length before giving a left portal vein branch which runs behind the left hepatic duct ***(Shaw, 1984).***

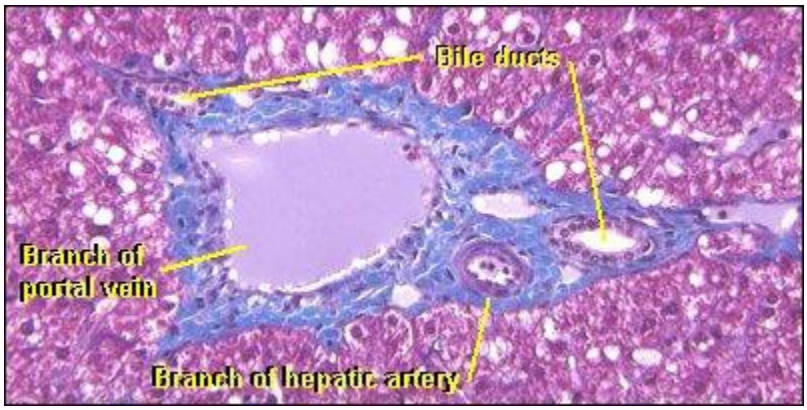

Figure 2: the portal tract ***(Gray's, 1995).***

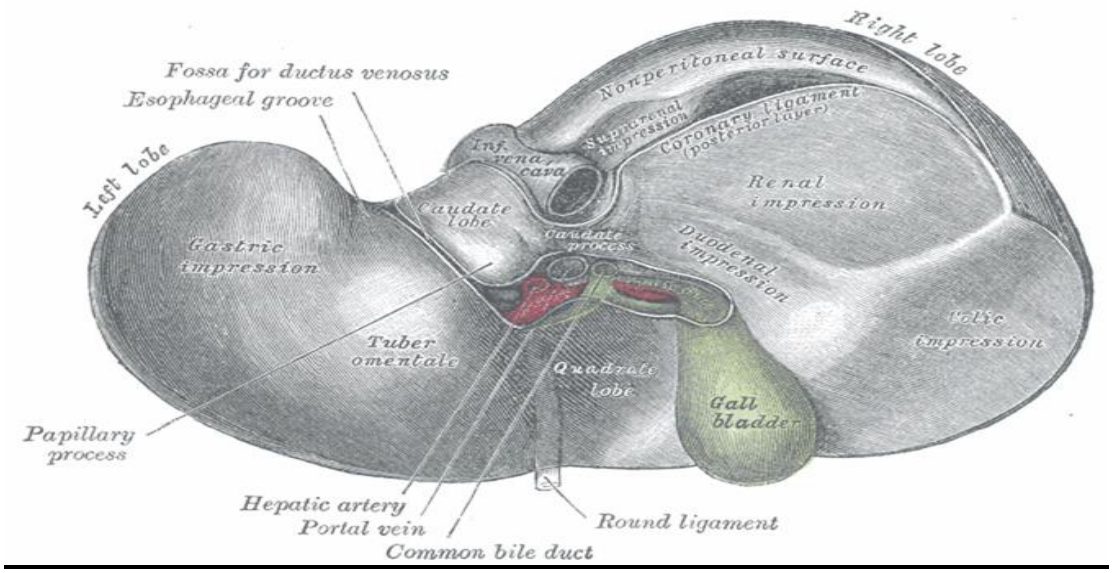

Figure 3: structures at the hilum of the liver ***(Gray's, 1995).***