Short and Long Term Outcomes of Liver Transplantation from Cadaveric Donors and Living Related Donors

Essay

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In General Surgery

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بسم الله الرحمن الرحيم

(...رَبِّ أَوزِعنِي أَن أَشكُرَ
نِعمَتَكَ الّتِي أَنْعَمْتَ عَلَيَّ و
عَلى والِدَيَّ
وأَنْ أَعْمَلَ صَالِحاً تَرْضَاهُ
وأَدْخِلْنِي بِرَحْمَتِكَ فِي
عِبَادِكَ الصَّالِحِينَ)

صدق الله العظيم

النمل.. اية رقم 19

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Mahmoud Mohamed Selim

DEDICATION

I dedicate my work to

My Parents

My brother

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List of Abbreviations

AASLD	: American Association of Study of Liver Disease.
ABO	: ABO blood group system.
ACR	: Acute cellular rejection.
ALD	: Alcoholic Liver Disease.
ALF	: Acute Liver Failure.
ALT	: Alanine aminotransferase.
AST	: Aspartate aminotransferase.
ATG	: AntiThymoglobin.
BD	: Bile Duct.
BEE	: Basal Energy Expenditure.
BMI	: Body Mass Index.
CBD	: Common Bile Duct.
CCA	: Cholangiocarcinoma.
CD 25	: Cluster of Differentiation 25.
CD 4	: Cluster of Differentiation 4.
CD 52	: Cluster of Differentiation 52.
CD-CD	: Choledocho - Choledochestomy.
CD-J	: Choledoche - Jejunestomy.
CDS	: Color duplex sonography.
CHA	: Common hepatic artery.
CLD	: Chronic liver disease.
CLT	: Cadaveric Liver Transplantation.
CMV	: Cytomegalovirus.
CNS	: Central Nervous System.
CR	: Chronic Rejection.
CT	: Computed Tomography.
CTP	: Child-Turcotte Pugh.
CUSA	: Cavitron Ultra Sonic Aspirator.
CVP	: Central venous pressure.
CXR	: Chest X-Rays.
DD	: Deaseased Donor.
DDLT	: Deaseased Donor Liver Transplantation.
DNA	: Deoxy-ribonucleic acid.
DVT	: Deep Venous Thrombosis.
EBV	: Epstein-Barr virus.
ECD	: Extended criteria donor

Introduction

"Ironically... liver replacement, which was once considered the most formidable of the whole organ transplantation procedures and the least likely to be practical, has become the flagship of new principles that are applicable to recipients of all whole organs...."

Orthotopic liver transplantation means replacement of removed liver with the transplanted allograft liver in the anatomically correct position ***(Ichai and Samuel, 2009).***

The first successful human orthotopic liver transplant (OLT) was performed in 1967 by a surgical team led by Dr. Thomas Starzl in Denver, Colorado ***(Jain et al., 2000).*** Due to advances in immunosuppression and improvements in surgical techniques, liver transplantation has become an extremely successful treatment option for patients with end-stage liver disease, with one-year graft survival rates exceeding 80% ***(Waki, 2006).***

Liver transplantation is the current gold standard treatment for acute and chronic irreversible liver failure; for selected clinical syndromes not manifesting with end-stage liver disease (ESLD), including polycystic liver disease and other metabolic diseases; for some malignancies confined to the liver; and for cholestatic liver diseases in children, such as biliary atresia ***(Gallegos-Orozco & Vargas, 2009; Murray & Carithers, 2005).***

The commonest indications of liver transplantation in adults are primary biliary cirrhosis, chronic active hepatitis and primary malignancy of the liver ***(Jian-Min et al., 2008).***

Egypt has the highest HCV prevalence in the world, 10% - 20% of general population is infected and HCV is the leading cause of HCC and liver cirrhosis in the country which considered the most common cause of liver transplantation in Egypt ***(Khalaf et al., 2005).***

The United Network for Organ Sharing in the United States has devised the Model for End-stage Liver Disease (MELD) and Pediatric End-stage Liver Disease (PELD), which are numerical scales that are currently used for liver allocation ***(Freeman, 2004).***

Cadaveric liver transplantation (CLT) (5-year survival >80%) represents the standard of care for end-stage liver disease (ESLD). Because the demand for cadaveric organs exceeds their availability, living related donor liver transplantation (LRLT) has gained increasing acceptance ***(Sagmeister et al., 2002)***.

The first successful living-donor liver transplant (LDLT) was performed in 1989 in a child, using a left lateral segment resected from his parent. Since then, LDLT has gained acceptance as an excellent treatment for end stage liver disease in children ***(Takada & Tanaka, 2004)***. The first adult to adult transplantation of a right hepatic lobe was reported in 1994 in Japan and in the US in 1997 ***(Salter and Fawcett, 2006)***.

Justification of LDLT has evolved from increased organ waiting times, wait-list morbidity and mortality of transplant candidates ***(Renz and Busuttil, 2000).*** The Donor liver shortage for orthotopic transplantation is considered to be about 27,000 deaths registered annually in the United States ***(Abt et al., 2004).***

LDLT has become an acceptable alternative for patients in need of liver transplantation (LT) who are not likely to receive a deceased donor liver transplant (DDLT) in a timely fashion. This is seen especially in countries where cadaveric donation is limited by religious and cultural beliefs, as in Japan, Egypt, Korea, and India ***(Abdeldayem, 2010).***

Rejection episodes in LRLT recipients diagnosed greater than 1 yr. post-transplant were significantly fewer than CLT recipients. LRLT have a partial immunological advantage compared with CLT ***(Toyoki et al., 2002).***

Living related liver transplantation provides grafts of excellent quality and short cold ischemic times. A major advantage is the fact that the optimal moment for the transplantation procedure can be chosen. Together with split-liver techniques, LRLT has a positive effect on the general situation of the pediatric waiting list for liver transplantation, with a reduction of pre-transplant mortality to nearly 0% ***(Colombani et al., 2000).***

Disadvantages are that living-donor transplantation requires greater technical skill in surgery and exposes the donor to the morbidity and mortality of major abdominal surgery. Donor morbidity is estimated to be 10% to 20%; major complications are biliary leaks, gastrointestinal complications, and vascular injury. Donor mortality is estimated to be between 0.2% and 1% ***(Claire et al., 2005).***

Living related liver transplantation is an inferior option to a cadaveric transplant when considering the total of risks versus benefits for both the recipient and the living donor, and so maximizing the cadaveric donor pool is recommended. However, until the organ supply can match the demand, the practice of live donor liver transplantation will continue to expand. It should do so with caution; only in patients who 'cannot wait'; only in units with sufficient surgical expertise in hepatic resection and split liver transplantation ***(Reding et al., 1999).***

Currently, there are eight patients worldwide who have survived more than three decades after liver transplantation. Approximately 20,000 liver transplantations are performed annually worldwide ***(Matesanz et al., 2009).***

Aim of the Work

This essay is aiming to discuss the differences between:

Living Donor Liver Transplantation (LRLT) and Cadaveric Donors Liver Transplantation (CLT) as regards; ***Short and Long Term Outcomes As:***

- Postoperative complications for recipients.
- Postoperative complications in donors (in case of LRLT).
- Rejection episodes.
- Recurrence of original disease (HCC, or Hepatitis).
- Survival and mortality.

Chapter (1)
Surgical Anatomy of Liver

<u>Functional segmental anatomy of the liver</u>

Understanding the internal anatomy of the liver has greatly facilitated safe liver surgery. Couinaud, a French anatomist, described the liver as being divided into eight segments. Each of these segments can be considered as a functional unit, with a branch of the hepatic artery, portal vein and bile duct, and drained by a branch of the hepatic vein. The overall anatomy of the liver is divided into a functional right and left 'unit' along the line between the gall bladder fossa and the middle hepatic vein (Cantlie's line) ***(Williams et al., 2008).***

The anterior sector of the right lobe contains superior (VIII) and inferior (V) segments. The posterior sector of the right lobe has superior (VII) and inferior (VI) segments. The medial sector of the left lobe (quadrate lobe, segment IV) is part of the left lobe from a surgical perspective but lies to the right of the midline; it is further divided into a superior subsegment (A) and an inferior subsegment (B). The lateral sector of the left lobe contains segments II and III ***(Kapoor, 2013).***

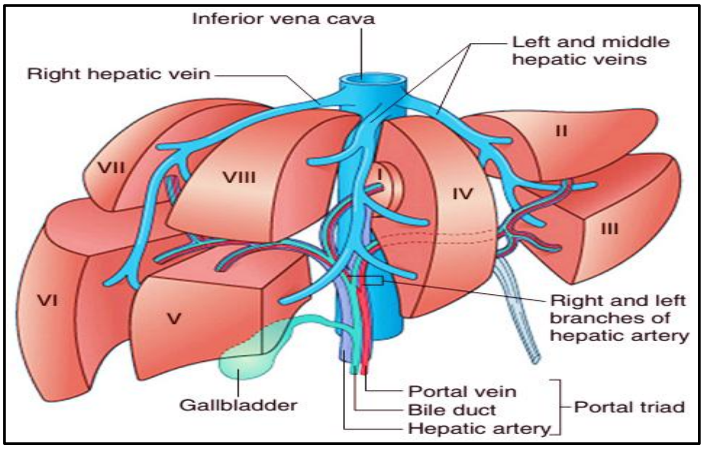

Fig. (1): Couinaud's liver segments (I through VIII) numbered in a clockwise manner ***(*McCuskey, 2012*)*.**

Segments of the liver

Segment I (Caudate lobe): lies posterior (dorsal) to segment IV with its left half directly posterior to segments II and its medial half surrounded by major vascular branches. The Glissonian sheaths to segment I arise from both right and left main sheaths: the segment therefore receives vessels independently from the left and right portal veins and hepatic arteries, and it drains independently into the inferior vena cava by multiple small branches (referred to as the lower group). They nearly always arise in the lower and occasionally from the middle third, but never from the upper third of the segment. The bile ducts draining the segment are closely related to the confluence of the right and left hepatic ducts such that ex cision of central bile duct tumours usually require removal of segment IV ***(Standring, 2008)***.

Segment II: is the only segment in the left lateral sector of the liver and lies postero-lateral to the left fissure. It often has only one Glissonian sheath and drains into the left hepatic vein ***(Standring, 2008)***.

Segment III: lies between the umbilical fissure and the left fissure and is often supplied by one to three Glissonian sheaths: it drains into the left hepatic vein. The vein of the falciform ligament can provide an alternative drainage route for segment III ***(Standring, 2008).***

Segment IV: lies between the umbilical fissure and the main fissure, anterior to the dorsal fissure and segment I. Segment IV is supplied by three to five Glissonian sheaths, of which the majority arises in the umbilical fissure: their origins are often close to those that supply to segments II and III. Occasionally segment IV is supplied by branches from the main left pedicle. The main venous drainage segment is into the middle hepatic vein; the segment can also drain into the left hepatic vein through the vein of the falciform ligament ***(Standring, 2008).***

Surgical importance of segment IV:

Some authors suggest that the quadrate lobe is only the anterior part of segment IV, calling it segment IVb, although there is no particular reason why the whole segment should not be called the quadrate lobe. However there is a practical point here. If the area of the quadrate lobe on the inferior surface of the liver is resected vertically then not all of segment IV is taken.

The posterior part represents less than 20% of segment IV and it is much the most difficult part to resect. This is because draining into the middle hepatic vein there are several moderate-sized veins which traverse this area.

The pedicles to segment IV have more variations than any other segment in the liver. Thus the portal pedicles commonly are between three and 10 in number and there may be many more. The arterial and biliary pedicles are even more variable and when the structures are dissected individually for the removal of segment IV, the surgeon is putting the blood supply and/or biliary drainage of segments II and III at considerable risk.

(Jamieson and Launois, 2006)

Segment V: is the inferior segment of the right medial sector, lies between the middle and the right hepatic veins. Its size is variable, as are the number of Glissonian sheaths that supply it. Venous drainage is into the right and middle hepatic veins ***(Standring, 2008)***.

Segment VI: forms the inferior part of the right lateral sector posterior to the right portal fissure. It is often supplied by two to three branches from the right posterior Glisson's sheath, but occasionally the Glisson's sheath to segment VI can arise directly from the right pedicle. Venous drainage is normally into the right hepatic vein, but may be via the right inferior hepatic vein directly into the inferior vena cava ***(Standring, 2008)***.

Segment VII: It forms the superior part of the posterior sector and lies behind the right hepatic vein. The sheaths to segment VII are often single. The venous drainage is into the right hepatic vein; occasionally the segment can drain through the right middle hepatic vein directly into the inferior vena cava ***(Standring, 2008)***.

Segment VIII: It is the superior part of the right anterior sector. The right anterior sectoral sheaths end in segment VIII and supply it after giving off branches to segment V. The venous drainage is to the right and middle hepatic veins ***(Standring, 2008)***.