Anesthetic Management and Perioperative Care of the Recipient in Adult Living Donor Liver Transplantation

Essay
Submitted for Partial Fulfillment of
The Master ***Degree in Anesthesiology***

By:

Ahmed Mohamed Abdel Tawab
M.B.B.Ch

Under Supervision of

Prof. Dr. Fekry Fouad Ahmed Elbokl
Professor of Anesthesiology and Intensive Care
Faculty of Medicine
Ain Shams University

Dr. Emad El-din Mansour Abd El-aziz
Assistant professor of Anesthesiology and Intensive Care
Faculty of Medicine
Ain Shams University

Dr.Ehab Hamed Abdelsalam
Assistant professor Anesthesiology and Intensive Care
Faculty of Medicine
Ain Shams University

Faculty of Medicine
Ain Shams University
2010

التعامل التخديرى وما حولى العمليه للمرضى المستقبلين البالغين فى حالات نقل الكبد من الأحياء

رسالة توطئة للحصول علي درجة الماجستير

فى التخديـــر

رسالة مقدمـة من:

الطبيب/ **أحمد محمد عبد التواب**

بكالوريوس الطب والجراحة

تحت إشراف

أ.د. فكرى فؤاد أحمد البكل

أستـــــاذ التخدير والرعاية المركزة

كلية الطب ـ جامعة عين شمس

د. عماد الدين منصورعبد العزيز

أستاذ مساعد التخدير والرعاية المركزة

كلية الطب ـ جامعة عين شمس

د. إيهاب حامد عبد السلام

أستاذ مساعد التخدير والرعاية المركزة

كلية الطب – جامعة عين شمس

كلية الطب

جامعة عين شمس

2010

Acknowledgement

First and above all, my deepest gratitude and thanks to ***God*** *for achieving any work in my life.*

Words stand short when coming to express my deep gratitude and great thanks to ***Prof. Dr. Fekry Fouad Ahmed Elbokl*** *Professor of Anesthesiology Faculty of Medicine Ain Shams University for his continuous encouragement, sincere advice, and co-operation in all steps of this work.*

I am deeply grateful to ***Dr. Emad El-Den Mansour Abd El-Aziz*** *Assistant Professor of Anesthesiology, Faculty of Medicine Ain Shams University, who devoted his time, effort and experience to facilitate the production of this work.*

I appreciate too much the guidance offered by ***Dr.Ehab Hamed Abdelsalam,*** *Assistant Professor of Anesthesiology, Faculty of Medicine Ain Shams University, for his moral support, continuous help and great aid.*

I am also delegated to express my deep gratitude and thanks to all my dear professors, my wife and my family .

Ahmed Mohamed Abd El-Tawab

List of Abbreviations

ACT	:	Activated Coagulation Time
APTT	:	Activated Partial Thromboplastin Time
CDLT	:	cadaveric donor liver transplantation
EMSALT	:	European Multicenter Study of Aprotinin in Liver Transplant
ECG	:	Electrocardiograph
FFP	:	Fresh Frozen Plasma
ICU	:	Intensive Care Unit
KIU	:	Kallikrein Inhibiting Units
LDLT	:	Living donor liver transplantation
LT.	:	Liver Transplant
MELD	:	Model for End-stage Liver Disease
OR	:	operating room
PELD	:	Pediatric end-stage liver disease
PRS	:	Postreperfusion Syndrome
PT	:	Prothrombin Time
RHA	:	Right Hepatic Artery
SMA	:	Superior Mesenteric Artery
TEE	:	Transesophageal echocardiography
TEG	:	Thromboelastogram
TIPS	:	Transjugular intrahepatic portosystemic Shunt
TPN	:	total parentral nutrition
VVB	:	Venovenous bypass

List of Figure

List of Table

Contents

Introduction and history

The first successful living donor liver transplantation was performed in 1989, with transplantation of a left hepatic lobe. In the early 1990, living–donor liver transplantation was developed extensively in Asia, where cultural beliefs discourage cadaveric organ donation ***(Lo et al., 1997)***.

The major advantage of living donor liver transplantation is that it increases the number of organs available for transplantation. In addition, living donor liver transplantation allows performance of surgery on an elective basis and frees the recipient from awaiting the availability of a cadaveric organ. These factors may reduce morbidity, mortality,and cost ***(Keefe, 2000)***.

The reduction in cold ischemia time (the time an ex vivo organ is not perfused with blood) and the use of healthy donor livers are additional advantages of living donor liver transplantation. Although initial efforts were unsuccessful, today, following years of modification of surgical techniques and the introduction of new immunosuppressive agents, liver transplantation is an accepted and successful therapy for end-stage liver failure. Unfortunately, over the recent years,

cadaveric liver donor rates have not increased significantly. As a consequence, innovative surgical techniques have been used to increase the number of patients receiving transplants from the available limited resources. These include the techniques of living donor liver transplantation (from both related and unrelated donors) and split-liver transplantation. Medical research in hepatocyt transplantation, xenotransplantation (engraftment of organs obtained from one species into another species), and liver-directed gene therapy continues, but as yet, these techniques have no clinical indication ***(Keefe, 2000).***

The success of living donor transplantation is based on two major concepts: the distinct segmental anatomy of the liver and its remarkable regenerative potential. Right lobes (segments 5–8) are most commonly implanted, with extended right lobes or trisegments (segments 4–8) required for larger recipients to ensure adequate hepatic volume. In the average-sized adult, left lobe grafts (segments 2–4) do not provide sufficient liver volume to sustain life ***(Seamen, 2001).***

Living donor liver transplantation permits immediate transplantation of the donated portion of the liver, minimizing the ischemic injury. Regeneration of the liver occurs rapidly.

The transplant may double in size in as little as 3 weeks ***(Lo et al., 1996).***

Recent studies report a favorable outcome of living related donor liver transplantation, with 1-year patient and graft survival rates of 90% and 88%, respectively ***(Marcos, 2000).***

More recently, however, the recommended surgical procedure of in vivo splitting of the liver (liver splitting completed in the heart-beating cadaveric donor) rather than ex vivo splitting has led to procedural survival rates comparable with those of whole-organ transplantation ***(Ghobrial et al., 2000).***

Until 1994, all living-donor liver transplantations were performed with the left hepatic lobe or with one or more of its segments **(*Trotter et al., 2002*).**

Left lateral segment transplantation is a relatively straight forward procedure and supplies the recipient with reduced amount of liver tissue that is suitable for a child. The first living donor liver transplantation in adults was performed with left lateral hepatic segment ***(Brolesch et al., 1991*)**. It was limited

by concern for adequate graft volume for the recipient **(*Kwasaki et al., 1998*).**

It's believed that 50% of normal hepatic volume is required to support the recipient .Meanwhile, the remaining liver volume must equal at least 30% of total liver volume to ensure function in the donor. However, reported that the liver remnant volume of approximately 35% of the total liver volume is sufficient for the donor to survive if the liver parenchyma is normal ***(Kamel et al., 2000).***

Thus, a critical component of donor evaluation is determination of liver volume. Concern for adequate liver volume for the recipient led to the development of a technique with a right lobe graft **(*Marcos et al., 1999*).**

Right hepatic lobe transplantation is the procedure of choice for adults. The first adult-to-adult transplantation of right hepatic lobe was reported in 1994 in Japan, and the first series were reported shortly thereafter ***(Kawasaki et al, 1993)* .**

The essential principle of LDLT is donor safety. For this reason, the left lobe is used often for the graft because further resection might compromise the preoperative and postoperative

safety of the donor. In view of this limitation, LDLT is not readily indicated for larger size recipients **(*Inomata et al., 2000*).**

Anatomy of the liver

Liver anatomy is described as: morphological and segmental anatomy.

***Morphological anatomy*:**

The liver is divided by the umbilical fissure and the falciform ligament into two lobes: the right lobe, which is the larger, and the left lobe **(fig 1).** The size ratio between the right and left hepatic lobes is 3:2 **(*Prokop and Van Der Molen, 2003*).**

At the inferior surface of the right lobe is the transverse hilar fissure which constitutes the posterior limit of this lobe. The portion of the right lobe located anterior to this fissure is called the quadrate lobe, limited on the left by the umbilical fissure and on the right by the gall bladder fossa. Posterior to the hilar transverse fissure is a fourth lobe, the spigel lobe **(*Prokop and Van Der Molen, 2003*).**

Thus, the liver is comprised of two main lobes and two accessory lobes which are individualized by visible well

defined fissures. This anatomy allows performance of the classical hepatectomies and lobectomies but is not sufficient for segmentectomies **(*Bismuth and Ciche, 1994*).**

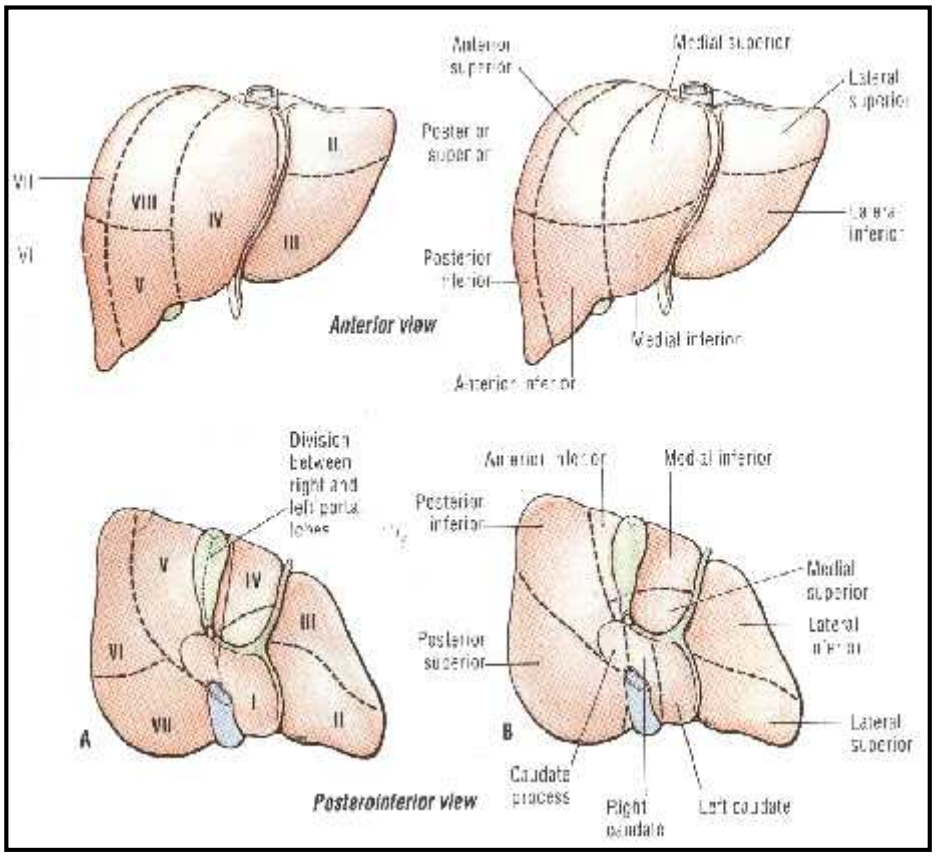

Figure1**: Segments of the liver, A: numerically identified, B: named* ***(Grant's Atlas of anatomy, 1991).