BILIARY ANATOMY IN LIVING RELATED DONOR TRANSPLANTATION AND ITS SIGNIFICANT OUTCOME

Thesis

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By

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Abstract

LDLT is a solution for various end stage liver diseases & for the shortage of cadaveric livers.

Proper preoperative evaluation of both donors & recepients is essential for optimum selection & to minimize postoperative morbidity & mortality.

Biliary complications are the commenest post LDLT complications, it includes: leakage,biloma stricture & calculi.

Biliary complications are more common in LDLT than in cadaveric liver & in RT lobe than in LT lobe due to increased

numberof bile ducts to be anastomosed Mortality rate of donors is 0%

Postoperative biliary complications in LDLT is managed by
- Conservative treatment
- PTD
- ERCP
- Ultrasound guided aspiration for biloma
- Surgery

Key Words

- Living donor liver transplant tation (LDLT)
- Post LDLT biliary complication
- Biliary anatomy & anatomical variants
- Management & post LDLT biliary complications.

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Content

INTRODUCTION

Liver transplantation has revolutionized the care of patients with end-stage liver disease. Before transplantation, patients with advanced liver disease were doomed to death within months to years. These patients now have the opportunity for extended survival with excellent quality of life after transplantation. **(Bijan et.al 2005).**

A growing demand for liver transplantation with a concomitant shortage of cadaveric livers has increased the prevalence of adult living-donor liver transplantation. Ensuring the safety of donors is critical, and strict evaluation and selection protocols have been suggested. **(Surman 2002).**

Living donor liver transplantation (**LDLT**) has become an acceptable alternative for adults in need of orthotopic liver transplantation (**OLT**) who are not likely to receive a deceased donor (cadaveric) organ in a timely fashion. The need for LDLT has arisen because of a persistent shortage of adult deceased donor livers. **(Schroeder et.al 2005).**

Although LDLT has become a viable option in selected adults in need of OLT, it is not without risk. Morbidity occurs in 15% to 30% of donors and is usually minor, such as a wound infection or ileus. More serious complications, such as a bile leak or stricture or need for reoperation, are less common. **(Schroeder et.al 2005).**

In hepatic resection for living donor liver transplantation (LDLT), an accurate knowledge of the anatomy of intrahepatic bile ducts (IHDs) is thus critical if the liver is to be successfully harvested and postoperative complications minimized. **(See Ching et.al 2006).**

The normal biliary anatomy is thought to be present in 58% of the population. Biliary anomalies are common and may lead to exclusion of many donors and it also affect the outcome for both donors and recipients. In living donor liver transplantation (LDLT), an accurate knowledge of the biliary anatomy is thus critical if the liver is to be successfully harvested and postoperative complications minimized. Evaluation of the donor liver is expensive and often leads to the exclusion of potential donors. **(Ramacciato et.al 2006).**

Aim of Work

The aim of work is to show the effect of studying biliary anatomy in LDLT on the outcome for both donors and recipients.

REVIEW OF LITERATURE

LIVING DONOR LIVER TRANSPLANTATION

Liver transplantation is the most effective treatment for various end stage liver disease and sudden , acute liver failure.Due to the world wide shortage of cadaveric liver , innovatisve surgical techniques, including split liver transplantation and living donor liver transplantation (LDLT), have been developed. (**Leong 2006).**

HISTORY OF LIVING DONOR LIVER TRANSPLANTATION

In the 1960s and the 1970 s, liver transplantation was slowly developed to become a feasible option in the treatment of end-stage liver disease. By 1984, the results of the first series performed throughout the world were deemed good enough to consider liver transplantation as an accepted treatment for these patients. If until then, liver donor shortage was not a major problem, this was going to change radically in the following decade. The number of liver transplantations performed per year rose at an exponential pace both in Europe and in the American continent. Finally, this growth was limited by an increasing shortage of donors, leading to prolonged waiting times and high mortality on the waiting list.(**Starzl 1984)**

At the same time, the development of the knowledge of segmental anatomy of the liver and in particular the systematic description by Couinaud contributed very much to liver surgery. Based on this knowledge, anatomical

liver resections, respecting the vascular perfusion of the remaining segments, could be performed. Very early it was realised that this would open the road for reduced graft liver transplantation, split-liver transplantation and even living donation.(**Smith 1969)**.

In 1984 the first successful transplantation of a partial liver allowing the transplantation of a child with part of the liver of a larger donor, was reported by Bismuth(**Bismuth 1984)**. In 1988 both the teams of Hanover and of Paris(**Pichlmayr et.al 1989)** managed to divide a liver into two grafts, allowing successful transplantation in two recipients.

The practical feasibility of split-liver transplantation as well as the increased safety of conventional liver surgery suddenly opened up the idea of removing part of the liver from a living donor to transplant it in a smaller recipient. Intensive ethical consultations took place to determine how uncoerced consent could be obtained and under which conditions a trial with such a surgical procedure could be started(**Singer et.al 1989)**.First cases were performed in 1989 in Australia and in South America (**Strong et.al 1990**) and finally a first series was produced under close institutional control by **Broelsch et al 1991** in Chicago.The procedure was taken over in Europe and further developed in Japan, where, because of the unavailability of cadaveric donation, it encountered a huge success (**Ozawa et.al 1992**).Despite initial heavy criticism in the Western world, living donation soon proved to be an inevitable development if one was to run a successful paediatric transplant program. Indeed, in centres performing both split-liver transplantation and living donor liver transplantation (LDLT), mortality of children on the waiting list fell to almost zero(**De Ville et.al 1997**).

The success in paediatric liver transplantation and the shortage of organs provided the necessary incentive to attempt living donation for adults. The emerging awareness of the importance of graft volume and the suboptimal results with smaller grafts, even when transplanted as auxiliary grafts, made surgeons move to developing right lobe liver donation for transplanting larger children or adults. Despite concerns of donor morbidity and mortality, this procedure has opened up the possibility of living donation to the adult patients with end-stage liver disease and has been on a rapid rise in the last few years. Living liver donation certainly counts amongst the great surgical achievements of the 20th century and has saved the lives of many patients(**Broering et.al 2000).**

The major impediment to a wider application of living donor hepatectomy, particularly of the right lobe, is its associated morbidity. The recent interest in a minimally invasive approach to liver surgery has raised the possibility of applying these techniques to living donor right lobectomy.The first case of a laparoscopic, hand-assisted living donor right hepatic lobectomy reported by(**Koffron et.al 2006).**The procedure,did not increase the morbidity.This procedure should only be considered for selected donors, and that only surgical teams familiar with both living donor hepatectomy and laparoscopic liver surgery should entertain this possibility.

ETHICAL DILEMMAS IN LIVING DONOUR LIVER TRANSPLANTATION

Liver transplantation is accepted worldwide as the only cure for terminal liver failure. Although the tragic death of a liver donor at a hospital underlines the need for caution. In countries where cadaveric donation is practically non-existent, living donor liver transplantation (LDLT) is the only viable way of performing liver transplants in reasonable numbers to treat patients with end-stage liver disease. However, several ethical issues need to be addressed before a hospital embarks on a LDLT programme and indeed, before every such transplant. (**Surman 2002**).

The most serious objection to LDLT is the violation of the principle of non-maleficence, or to do no harm. The donor is at risk from a lengthy and potentially dangerous surgical procedure without accruing any health benefit. It is unethical to perform LDLT at a centre with sub-optimal facilities or expertise. The minimum requirements to start LDLT should be set out, ratified by established foreign teams and followed rigidly by all new centres. (**Surman 2002**).

Donor issues: coercion, consent and acceptable risk:-

There is concern about whether live donation can ever be without emotional or financial coercion. While emotional pressure has been more or less accepted or overlooked, financial incentive is illegal. Although donation should be motivated only by altruism, the real

reason behind it is difficult if not impossible to determine. Some have lobbied for paid donation but the transplant community at large has been strongly opposed to it due to the danger of abetting exploitation of the under- privileged.(**Soin 2002**).

Genuine informed written consent is central to the safe and optimal use of LDLT. However, even if every detail is given, the understanding of prospective donors will vary with their level of awareness, social and educational background. An overzealous and detailed description of possible complications can be explained, putting off donors needlessly due to ill-founded fears and denying the recipient a chance to live. While explicitly inform all prospective donors about the mortality and major morbidity, tailor the details of the explanation according to the perceived level of their understanding. Some centres take informed consent in two sessions, spaced apart, to enable the donor and family to ponder over the pros and cons without time constraints , Although some do not do this in two_defined sessions, their policy is to inform the donor of all possible consequences over three-four counselling sessions in the outpatient clinic, and then take informed written consent before the operation.(**Singer et.al 1989**).

To avoid bias, it has been suggested that donor evaluation be done and informed consent be taken by a physician who is not from the transplant team Detailed psychological testing is essential to ascertain the donor's willingness to donate the organ free of coercion and also

enhance his/her understanding of the various psychological issues. Finally, the relationship between the donor and the recipient, and the non-coercive nature of the donation must be confirmed by a government-approved, non-partisan authorization committee before the transplant is permitted. (**Soin et.al 2002**).

It is well established that liver donation is safely possible because of two unique qualities of the liver-reserve and regeneration. Due to its enormous reserve, a person is able to function normally with as little as 25% of the liver. Within a few weeks, the liver actually regenerates to its normal (pre-removal) size. Still, in spite of careful preoperative work-up and the best surgical techniques, there remains a very small risk to life (0.3%) from donour hepatectomy the risk is higher in a right lobe donation than in a left lobe one. (**Soin et.al 2002**).

Recipient issues: use of scarce resources and deciding priority for transplant:-

Even when cadaveric donors are available, there are ethical dilemmas over the use of a scarce national resource for patients who may have inflicted the primary disease or a co-morbid condition upon themselves (alcohol- or paracetamol-induced liver failure), those who may not have prolonged survival after transplantation (those with hepatocellular carcinoma or AIDS), those who may not be 'useful' working members of society (elderly recipients), and those who are not likely to have good graft survival (those with recurrent hepatitis C). The successful use of partial livers obtained from living donors

can reduce waiting periods and mortality, and also offer a choice of transplantation to the above categories of patients who may otherwise be deemed to be low priority candidates due to societal or ethical considerations. In this way, they do not compete for the limited national pool of cadaveric donors. However, whether healthy donors should be put to risk to benefit this medically sub-optimal group of recipients is open to debate. Most centres would accept this risk. (**Surman 2002**).

MELD SCORE

The model for end stage liver disease (MELD) has been adopted by the organ procurement and transplantation network (OPTN) in 2002 as the standard priority rule for the liver transplantation waiting list. The MELD score replaces the Child-Turcotte – Pugh (CTP) score as a disease severity.This change is designed to improve the organ allocation system in liver transplantation to ensure that available organs are directed to transplant candidates based on the severity of their liver disease rather than the length of time they have been on the waiting list. Efforts have been prompted by the so called “final rule” issued in 1998 by the US of health and human services.This rule states that organs should be allocated to appropriate transplant candidates based on medical urgency.(**Avolio et.al 2006**)

MELD score is calculated using a relatively simple formula that relies on three available objective variables

- Seum creatinine
- Total bilirubin
- INR (international normalized ratio)

The following rules must be observed when using this formula

- 1 is the minimum acceptable value for any of the three variables
- the maximum acceptable value for serum creatinine is 4
- the maximum value for the MELD score is 40

Criteria for status 1 remain unchanged ; acute liver failure/ disease with estimated survival of < 7 days (highest priority for liver transplantation).(**Avolio et.al 2006**).

The formula:

{ [0.957 x log(creatinine mg/dl)] + [0.378 x log(bilirubin mg/dl)] + [1.120 x log(INR)] +0.643 } x 10.

The result is then rounded to the nearest whole number.

INDICATIONS OF LIVER TRANSPLANTATION

Liver transplantation is indicated for acute or chronic liver failure from any cause.The most common indications for liver transplantation include:-

- chronic liver failure from:
  - > cholestatic disease, including:
    - primary biliary cirrhosis (PBC)
    - sclerosing cholangitis
    - biliary atresia (pediatric patients)
  - ➢ chronic hepatitis, such as:
    - hepatitis B
    - hepatitis C
    - autoimmune hepatitis
  - > alcoholic liver disease
  - > metabolic disease, including:
    - Wilson's disease
    - hereditary tyrosinemia type I
    - alpha l-antitrypsin deficiency
    - non-alcoholic steatohepatitis
  - > cirrhosis of unknown cause
    - acute liver failure from any cause
    - unresectable hepatocellular carcinoma (HCC) confined to the liver

Less common indications for transplantation include:

- end-stage liver disease from metabolic conditions, such as:
  - > erythropoietic s