Cairo University
Faculty of Medicine
Department of General Surgery

Principles of management of vascular complications In liver transplantation

Thesis
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IN
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By
Ahmed Hussein Ahmed Ibrahim Khalil

Under Supervision of

Prof. Dr.
Adel Ahmed Hosny
Prof. of General Surgery
Faculty of Medicine
Cairo University

Prof. Dr.
Ayman Salah
Prof. of General Surgery
Faculty of Medicine
Cairo University

Prof. Dr.
Karim Abo Elmagd
Prof. of General Surgery
Pittsburgue-United states of America.

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Abstract

Although hepatic venous anastomotic stenoses may occur more frequently following living-related liver transplantation than following whole liver transplantation, the incidence of these complications has been found to have decreased following the introduction of improved surgical techniques . previous portal vein surgery or previous portal vein thrombosis . intraoperative portal vein stent placement is an effective and long lasting treatment modality to treat portal vein stenosis especially in patients with portal vein occlusion or small sized portal vein.

Key word: complications transplantation General ***Surgery***

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Ahmed Hussein Ahmed Ibrahim Khalil.

Contents

List of abbreviations

- AIDS …….Acquired immune deficiency syndrome.
- ALT…….alanine transaminase.
- AST…….aspartate transaminase.
- B.M.I …….body mass index
- C.T ……..computed tomography.
- CEA……carcino embryonic antigen.
- CMV……..cytomegalo virus.
- CRP…….C- reactive protein.
- CTP ……...Child-Turcotte-Pugh.
- D.D.L.T……...deceased donor liver transplant.
- D.S.A.....digital subtraction angiography.
- D.V.T……..deep vein thrombosis.
- EBV……Epstein bar virus.
- ESR……erythrocyte sedimentation rate.
- FBS…….fasting blood sugar.
- GGT…….gamma glutamyl transaminase.
- H.C.C……...hepatocellular carcinoma.
- HA.....hepatic artery.
- HAS…….hepatic artery stenosis.
- HAT…….hepatic artery thrombosis.
- HAV……hepatitis A virus.
- HBsAg.……hepatitits B surface antigen.
- HCV……hepatitis C virus.
- HV.....hepatic vein.
- I.N.R …….international normalized ratio
- I.V.C.....Inferior vena cava.
- IRHV……..inferior right hepatic vein.
- K……..potassium.

- L.D.L.T……...living donor liver transplantation
- LT ……..liver transplantation.
- Meld ……..model for end stage liver disease.
- MRCP……..magnetic resonance cholangiopancreatography.
- MRI ……magnetic resonance imaging.
- Na…….sodium
- OLTx……....orthotopic liver transplantation.
- P.C…….prothrombin concentration.
- P.V.S……....portal vein stenosis.
- P.V.T.....portal vein thrombosis.
- PBC ……...Primary biliary sclerosis
- PT……...prothrombin time.
- PTT……..partioal thromboplastin time.
- PV.....portal vein.
- RI…….resistive index.
- US……....ultrasound.

Introduction

Liver transplantation has become the accepted standard of care for many patients with end-stage liver disease. The transplant procedure remains a technically complex operation, and the application of living donation to the adult recipient population has added another layer of difficulty to an already challenging procedure. **(1)**

Early postoperative complications are often defined as complications occurring within the first 3 months after transplantation because most of the deaths that occur in the first posttransplantation year happen in this period.Complications in this period can be broadly classified into surgical or non-surgical causes. Surgical causes are mostly operation related and can be further subdivided into bleeding, portal vein, hepatic artery, hepatic vein, and biliary complications. Non-surgical causes are mainly related to pulmonary infection, renal failure, graft rejection, and viral or fungal infection. Most graft-threateningsurgical complications occur within 2-4 weeks of post transplantation**.(2).**

Vascular complications are reported in about 9% of liver transplant patients and are the most common significant post-operative complications. Post-LDLT vascular complications include thrombosis and stenosis of the hepatic artery, hepatic veins and portal veins as well as pseudoaneurysm formation. **(3).**

Hepatic artery thrombosis is the most common vascular complication, occurring in 1.6 to 8 %, with mortality rate that ranges from 11 % to 35%. Hepatic artery thrombosis most often occurs within the first 2 months after transplantation and frequently results in graft failure, leading to increased morbidity and mortality. Recent technical advances in microvascular surgery, the use of anticoagulants such as aspirin and low molecular weight heparin, and the use of intraoperative Doppler ultrasound (US), have reduced the incidence of hepatic arterial thrombosis **(4)**

Portal vein complications following liver transplantation are relatively uncommon, with an incidence of only 1% to 6% . They may result from the use of faulty surgical techniques, the excessive length of the interposed vascular graft, vessel misalignment, hypercoagulable states, previous portal vein surgery or previous portal vein thrombosis . intraoperative portal vein stent placement is an effective and long lasting treatment modality to treat portal vein stenosis especially in patients with portal vein occlusion or small sized portal vein.**(5).**

Hepatic vein and IVC complications are rare, occurring in as little as 1% to 4% of transplants. These complications usually result from technical problems or compression of the vessel caused by fluid collection . Although hepatic venous anastomotic stenoses may occur more frequently following living-related liver transplantation than following whole liver

transplantation, the incidence of these complications has been found to have decreased following the introduction of improved surgical techniques **(6)**

Bleeding:- poor graft function, coagulopathy, imperfect hemostasis or slippage of tie may result in postoperative bleeding requiring re-exploration. Postoperative bleeding ranges from 7% - 15% of patients and require re-exploration in about half of them even if easily controlled, postoperative bleeding tends to increase morbidity and mortality **(7).**

Aim of Work

This is a retrospective study including 200 cases of living donor liver transplantation (150 cases in Dar ElFouad hospital, 50 cases in Kasr Elainy hospital).The aim of work is to study the vascular complications in both donors and recipients and the principles of its management.

Review of literature

History

The history of liver transplantation began with experimental transplants performed in dogs in the late 1950s. The first deceased donor liver transplant (DDLT), also known as orthotopic liver transplant (OLT), was attempted in humans was in 1963 by Thomas Starzl. The recipient was a 3-year-old boy with biliary atresia who unfortunately died of haemorrhage. The first successful liver transplant was in 1967, again by Starzl at the University of Colorado Health Sciences Center, Denver. Yet, for the next 10 years, liver transplants remained essentially experimental, with survival rates well below 50%. Still, advances in the surgical procedure and in anesthetic management continued to be made during that time. (7)

The major breakthrough for the field came in the early 1980s, with the introduction and clinical use of the immunosuppressive agent cyclosporine. Patient survival dramatically improved, and liver transplantation was soon being recognized as a viable therapeutic option. Results continued to improve through the 1980s, due to ongoing improvements in immunosuppression, critical care management, surgical technique, and preservation solutions. The late 1980s and 1990s saw a dramatic increase in the number of liver transplants, and an even greater increase in the number of patients waiting for a transplant. This in turn increased waiting times as well as mortality rates for those waiting. (8)

Evolution

The longer waiting time and higher mortality rates for patients on the deceased-donor liver transplant waiting list led to the development of innovative surgical techniques such as split-liver transplants and living donor liver transplants (LDLT), with the first right lobe liver transplant performed in Hong Kong in 1996. Initially these new techniques were mainly applied to pediatric patients because of the difficulty associated with finding appropriate size-matched organs for them. However, as the number of adults on the waiting list grew, these techniques began to be applied for adult recipients as well. The use of living donor liver transplants progressed at an even more rapid pace in countries such as Japan, where the concept of deceased-donor organ donation was not widely accepted. (9)

Today, liver transplantation (LT) represents the treatment of choice for end-stage liver disease and represents the culmination of a long history of innovations made by liver surgeons based on hemorrhage control, appreciating the occurrence of regeneration and understanding the liver anatomy (10).

Due to improved immunosuppressive regimens, tissue preservation, reduction of infectious disease, and better postoperative management, orthotopic LT has achieved patient and allograft survival rates that have expanded both the indications for transplanta
tion and the number of potential recipients awaiting liver transplantation (11).

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)
    - Primary sclerosing cholangitis
    - biliary atresia (pediatric patients)
    - Alagille syndrome.
    - Progressive familial intrahepatic cholestasis.
  - ➢ 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

- hereditary hemochromatosis.
- Non alcoholic steatohepatitis.
- Cryptogenic cirrhosis.
- Neonatal hemochromatosis.

> 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
  > cystic fibrosis
  > glycogen storage diseases
  > progressive familial intrahepatic cholestasis (Byler's disease)

- metabolic disorders that cause profound extrahepatic manifestations requiring an anatomically normal liver, such as:

  > hereditary oxalosis
  > Crigler-Najjar syndrome
  > familial amyloidosis
  > hyperammonemic syndromes

- liver failure from hepatic vein occlusion caused by:
  - > Budd-Chiari syndrome
  - > veno-occlusive disease

- polycystic disease
- unresectable localized hepatoblastoma (pediatric patients)
- metastatic neuroendocrine tumor confined to the liver.
- Fulminant hepatic failure.
- Caroli's disease.
- Retransplantation for liver transplant graft failure. (12)