Arterial Complications after Living Donor Liver Transplantation

Thesis

Submitted for Partial Fulfilment of
Master Degree in ***General Surgery***

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2019


بسم الله الرحمن الرحيم
وَأَنْزَلَ اللهُ عَلَيْكَ
الْكِتَابَ وَالْحِكْمَةَ
وَعَلَّمَكَ مَا لَمْ
تَكُنْ تَعْلَمُ وَكَانَ
فَضْلُ اللهِ عَلَيْكَ
عَظِيمًا
صدق الله العظيم
سورة النساء آية (١١٣)

Acknowledgments

First and foremost, I feel always indebted to ***Allah*** *the Most Beneficent and Merciful.*

I wish to express my deepest thanks, gratitude and appreciation to ***Prof. Dr. Mohamed Fathy****, Professor of General Surgery, Faculty of Medicine, Ain Shams University, for his meticulous supervision, kind guidance, valuable instructions and generous help.*

Special thanks are due to ***Dr. Mostafa Abdo****, Assistant Professor of General Surgery, Faculty of Medicine, Ain Shams University, for his sincere efforts, fruitful encouragement.*

I am deeply thankful to ***Dr. Abdelrahman Elghandour****, Lecturer of General Surgery, Faculty of Medicine, Ain Shams University, for his great help, outstanding support, active participation and guidance.*

I would like to express my hearty thanks to all my family for their support till this work was completed.

Hossam Abdelaziz Mohamed

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List of Abbreviations

Abb.	Full term
AS	*Anastomotic stricture*
BCs	*Biliary complications*
BMI	*Body mass index*
CA	*Celiac axix*
CBD	*Common bile duct*
CHD	*Common hepatic duct*
CMV	*Cytomegalovirus*
CSEMSs	*Covered self-expandable metal stents*
CT	*Computed tomography*
CT	*Computed tomography*
D-D	*Duct-to-duct*
DDLT	*Deceased donor LT*
DUS	*Duplex ultrasound*
EBPS	*Endoscopic biliary plastic stent*
EBS	*External biliary stent*
ENT	*Ear, Nose and throat*
ERCP	*Endoscopic retrograde cholangiopancreatography*
ESLD	*End stage liver disease*
FLC	*Fibrolamellar carcinoma*
FRL	*Functional remnant liver*
GDA	*Gastroduodenal artery*
GI	*Gastrointestinal*
GRBWR	*Graft weight to recipient body weight*
GRWR	*Graft recipient body weight ratio*
HA	*Hepatic artery*
HABR	*HA buffer response*
HAC	*Hepatic artery complications*

List of Abbreviations cont...

Abb.	Full term
HAP	*Hepatic artery pseudo aneurysm*
HAS	*Hepatic artery stenosis*
HAT	*Hepatic artery thrombosis*
HCC	*Hepatocellular carcinoma*
HTK	*histidine-tryptophan-ketoglutarate*
HVs	*Hepatic veins*
IHDs	*Intrahepatic ducts*
IUS	*Intraoperative ultrasound*
IVC	*Inferior vena cava*
LDLT	*Living donor LT*
LFT	*Liver function test*
LGA	*Left gastric artery*
LHA	*Left hepatic artery*
LHD	*Left hepatic duct*
LHV	*Left hepatic vein*
LPV	*Left portal vein*
LT	*Liver transplantation*
MCA	*Magnetic compression anastomosis*
MELD	*Model for end-stage liver disease*
MHV	*Middle hepatic vein*
MRCP	*Magnetic resonance cholangiopancreatography*
MRI	*Magnetic resonance imaging*
OLT	*Orthotopic liver transplantation*
OS	*Overall survival*
PBC	*Primary biliary cirrhosis*
PHA	*Proper hepatic artery*
PHP	*Portal hyperperfusion*

List of Abbreviations cont...

Abb.	Full term
PSC	*Primary sclerosing cholangitis*
PTCS	*Percutaneous transhepaticcholangioscopy*
PV	*Portal vein*
PVT	*Portal vein thrombosis*
RHA	*Right hepatic artery*
RHV	*Right hepatic vein*
RI	*Resistive index*
SA	*Splenic artery*
SASS	*Splenic artery steel syndrome*
SD	*Standard deviation*
SLV	*Standardized liver volume*
SMA	*Superior mesenteric artery*
TLV	*Total liver volume*
UNOS	*United network for organ sharing*
US	*Ultrasound*
VCs	*Vascular complications*

INTRODUCTION

Liver transplantation (LT) has become the treatment of choice for pediatric and adult patients with end-stage liver disease (ESLD) ***(Karakayali et al., 2014)***.

The indications for LDLT included hepatocellular diseases such as hepatitis B or C virus-associated cirrhosis or alcoholic liver cirrhosis, hepatocellular carcinoma, progressive intrahepatic cholestatic diseases, including primary biliary cirrhosis and primary sclerosing cholangitis, retransplantation due to graft loss, cryptogenic cirrhosis, fulminant hepatic failure, autoimmune hepatitis, and metabolic liver disease ***(Lida et al., 2013).***

Vascular problems such as thrombosis and stenosis of the hepatic artery, portal vein, and hepatic vein are among the most serious complications reported after liver transplantation and are more frequently seen among recipients of living donor transplantations (LDLT).complications can lead to increased morbidity, graft loss, and patient death ***(Duffy et al., 2009).***

Early diagnosis and appropriate management of these complications result in longer survival. Close surveillance of all vascular anastomoses using Duplex ultrasonography facilitates early detection and treatment of these complications before irreversible graft failure. Treatment options usually include surgical revascularization, percutaneous thrombolysis,

percutaneous angioplasty, retransplantation, or less commonly, a conservative approach ***(Bonnet et al., 2010).***

Hepatic arterial reconstruction in liver transplantation (LT) is a crucial, yet delicate procedure. Particularly in living donor liver transplantation (LDLT), Hepatic arterial complications are often associated with high graft loss and mortality rates if they occur in the early phase after LT and are left untreated. Hepatic arterial complications include hepatic artery thrombosis (HAT), hepatic arterial stenosis, bleeding from anastomotic sites, splenic artery steel syndrome and rupture of hepatic artery aneurysms ***(Iida et al., 2014).***

Various factors contributing to development of vascular thrombosis have been proposed: ABO incompatibility,multiple anastomoses, prolonged cold ischemic time,acute rejection. and previous vascular thrombosis ***(Khalaf et al., 2011).***

Hepatic artery thrombosis represent more than 50% of all arterial complications. It is the most frequent and severe vascular complication following LDLT ***(Hejazi-Kenari et al., 2014).***

It is the first cause of primary non-function of the liver transplant, which can lead to allotransplant loss and patient death in the early postoperative period. HAT is associated with a high incidence of liver transplant failure (more than 50%) and carries a mortality of more than 50% in the absence of revascularization or retransplantation. In recent years, early

revascularization by means of endovascular catheter-based intervention has been a viable option for graft salvage before considering retransplantation ***(Singhal et al., 2010).***

Hepatic artery stenosis following LDLT is defined as a narrowing of the transverse diameter of the HA, more or less extended, resulting in graft ischemia mainly revealed by elevated liver function tests. Significant HAS is usually defined as a narrowing of the transverse diameter > 50% on angiogram associated with clinical suspicion and a RI < 0.5 (defined by peak systolic flowend diastolic flow/peak systolic flow) and a peak systolic velocity > 400 cm/s detected by DUS ***(Sabri et al., 2011).***

Hepatic artery pseudoaneurysm is defined as a dilated hepatic artery, which occurs after iatrogenic injury in most cases, causing blood to leak and pool outside the artery wall into surrounding tissue, with a persistent communication between the HA and the resultant adjacent cavity ***(Boleslawski et al., 2013).***

Hepatic artery rupture is defined as a severe hemorrhage from the trunk or from a main branch of the HA. It is a very serious complication that results in the disruption of the arterial blood supply of the transplant. This is a very exceptional but a dramatic complication after LDLT which carries very high incidence of liver transplant loss and high mortality rate. In most cases, this condition complicates a pseudoaneurysm of the HA, leading to major bleeding that requires emergency operation ***(Boleslawski et al., 2013).***