

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

A Comparative Study of Residual Volume in Donors for Living Donor Liver Transplantation

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Dedication

For my family for bearing me and encouraging me all the
time.

For my friends who stood by my side.

For my colleagues who supported me.

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List of Abbreviations

AFP	: Alpha fetoprotein
AIDS	: Acquired immune deficiency syndrome
ALDLT	: Adult living donor liver transplantation
ALT	: Alanine transaminase
APCR	: Activated protein C resistance
AST	: Aspartate transaminase
CA	: Cancer antigen
CAT	: Computerized axial tomography
CCA	: Cholangiocarcinoma
CD	: Cluster of differentiation
CEA	: Carcinoembryonic antigen
CHA	: Common hepatic artery
CK	: Creatine kinase
CMV	: Cytomegalovirus
CNS	: Central nervous system
COPD	: Chronic obstructive pulmonary disease
CR	: Chronic rejection
CT	: Computed tomography
CUN	: Clinica Universitaria de Navarra
DCP	: Des- γ -carboxy prothrombin
DD	: Diseased donor
DDLTL	: Diseased donor liver transplantation
DFS	: Disease-free survival
DNA	: Deoxyribonucleic acid
EBV	: Epstein-Barr virus
ECG	: Electrocardiogram
ENBD	: Endoscopic nasobiliary drainage
ERBD	: Endoscopic retrograde biliary drainage
ERCP	: Endoscopic retrograde cholangiopancreatography
ESLD	: End stage liver disease
ET	: Eurotransplant
FKBP	: FK binding protein
FLC	: Fibrolamellar carcinoma

GDA	: Gastroduodenal artery
GRWR	: Graft-to-recipient weight ratio
HA	: Hepatic artery
HBcIgG	: Hepatitis B core immunoglobulin G
HBV	: Hepatitis B virus
HCC	: Hepatocellular carcinoma
HCV	: Hepatitis C virus
HIV	: Human immunodeficiency virus
HSV	: Herpes simplex virus
IC	: Intensive care
ICU	: Intensive care unit
IgA	: Immunoglobulin A
IgG	: Immunoglobulin G
IgM	: Immunoglobulin M
IL	: Interleukin
INR	: International normalized ratio
IS	: Immunosuppression
IV	: Intravenous
LBD	: Left bile duct
LD	: Living donor
LDLT	: Living donor liver transplantation
LGA	: Left gastric artery
LHA	: Left hepatic artery
LL	: Left lobe
LPV	: Left portal vein
LT	: Liver transplantation
mAU	: Milli-arbitrary units
MELD	: Model for end stage liver disease
MHV	: Middle hepatic vein
MMF	: Mycophenolate mofetil
MRI	: Magnetic resonance imaging
mTOR	: Mechanistic target of rapamycin
OLT	: Orthotopic liver transplantation
OS	: Overall survival
PBC	: Primary biliary cirrhosis
PCD	: Post-cholecystectomy diarrhea

PCP	: Pneumocystis pneumonia
PHA	: Posterior hepatic artery
PSC	: Primary sclerosing cholangitis
PSA	: Prostatic specific antigen
PT	: Prothrombin time
PTBD	: Percutaneous Transhepatic Biliary Drainage
PV	: Portal vein
RAPV	: Right anterior portal vein
RBD	: Right bile duct
RFS	: Recurrence-free survival
RHA	: Right hepatic artery
RHV	: Right hepatic vein
RL	: Right Lobe
RV	: Residual volume
SA	: Splenic artery
SD	: Standard deviation
SMA	: Superior mesenteric artery
3D	: Three dimensional
3D-CT	: Three dimensional computed tomography
T3	: Triiodothyronine
T4	: Thyroxin
TP	: Total protein
TSH	: Thyroid stimulating hormone
TTV	: Total tumor volume
UAE	: United Arab emirates
UCSF	: University of California, San Francisco
UNOS	: United Network for Organ Sharing
VR	: Volume rendered

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Introduction

"The end justifies the means" the need for new livers for children suffered from liver failure justified the donation of their parents of a part of their livers; this is how liver transplantation began.

Liver transplantation is the only treatment of patients suffering from ESLD resulting from liver cirrhosis, decompensated liver disease, acute liver failure and hepatocellular carcinoma within Milan criteria (**Roberto et al., 2015**). During the last four decades, liver transplantation evolved from an experiment with a very high mortality rate to a common procedure with acceptable survival rates on the short and long runs (**Stefan et al., 2014**).

Orthotopic liver transplantation (OLT) became a routine procedure and the one and five year survival rate had increased to 90% and 80% respectively (**Bart et al., 2012**).

Living donor liver transplantation (LDLT) began in 1989 as a solution to solve the shortage of diseased donors (DD) organs for pediatric recipients. The increasing shortage of DD grafts for adults in North America and Europe, gave way to living donation (LD) as a potential solution to the shortage of DD organs (**Shah et al., 2006**).

Although more than 1100 cadaveric transplants are performed each year, over 300 patients die annually on the liver transplant waiting list (Eurotransplant). Living-donor

liver transplantation (LDLT) is a way to enlarge organ pool for patients. In paediatric patients, the donation of lateral segment of the left lobe became more successful and a lot of centers performed LDLT more and more (**Peter et al., 2004**).

Some countries limit cadaveric organs transplantation so LDLT was the proper solution for this (**Burcin et al., 2008**). 4%-5% of all liver transplantations (LTs) came from living donors (**Andrea et al., 2017**).

Chronic liver diseases are very common in Egypt. Hepatitis C virus (HCV) prevalence is 14.7% between 15 and 59 years age. This high prevalence led to increased numbers of patients in need to liver transplantation (LT) who suffered from end stage liver disease (ESLD), (**Khaled et al., 2016**).

Cadaveric organ donation is still illegal in Egypt. So in order to save patients suffered from ESLD living donor liver transplantation (LDLT) was begun. It was first introduced in 1991 with acceptable results; but it is risky to healthy donors, there is no cadaveric back up and is not available for all patients (**Khalaf et al., 2005**).

Donor morbidity and mortality is a tremendous issue as it limits living donation that was created to overcome the shortage of organs (**Andrea et al., 2017**). Donor safety is questioned despite the outstanding results of LDLT (**Itamoto et al., 2006**).