

# **Evaluation of addition of EEG to MELD score on the short term outcome after Living Donor Liver Transplantation (LDLT)**

***Essay***

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# Acknowledgment

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# TABLE OF CONTENT

	Pages
<b>TABLE OF CONTENT</b> .....	I
<b>LIST OF TABLES</b> .....	II- III
<b>LIST OF ABBREVIATIONS</b> .....	IV-V
<b>INTRODUCTION</b> .....	1
<b>AIM OF THE STUDY</b> .....	5
<b>CHAPTER (I): Liver Transplantation</b> .....	6
INDICATIONS OF LT.....	6
CONTRAINDICATIONS FOR LT.....	8
TYPES OF LT.....	9
POST OPERATIVE COMPLICATIONS.....	15
SYSTEMIC DISEASES IN CHALLENGING MANAGEMENT OF LT	
RECIPIENTS.....	35
PROMOTING HEALTH AFTER LT.....	48
<b>CHAPTER (II): MELD-EEG</b> .....	53
EVALUATION OF PATIENTS FOR LT.....	53
CTP VS MELD.....	54
MELD SCORE AS PROGNOSTIC FACTOR FOR POST-LT SURVIVAL.....	60
MELD LIMITATIONS.....	63
MELD AND HCC.....	65
HEPATIC ENCEPHALOPATHY.....	67
IMPACT OF HE ON LIVER POSTTRANSPLANTATION OUTCOMES.....	87
MELD-EEG.....	90
<b>SUMMARY</b> .....	94
<b>REFERANCES</b> .....	100
<b>ARABIC SUMMARY</b> .....	125

## LIST OF TABLES

<b>table No.</b>	<b>Title</b>	<b>Page</b>
<b>1</b>	Major Drug-Drug Interactions Involving Immunosuppressive	21
<b>2</b>	Unwanted Side Effects of Immunosuppressives	22
<b>3</b>	Preferred Antifungal Agents	26
<b>4</b>	Prophylactic Strategies for Common Organisms That Affect LT Recipients	29
<b>5</b>	Recommended Immunizations for Adult LT Recipients	31
<b>6</b>	Factors Associated With the Clinical Features of Metabolic Syndrome	37
<b>7</b>	Long-Term Management of DM (New-Onset or Preexisting) After LT	39
<b>8</b>	General Plan for the Stepwise Management of Dyslipidemia	42
<b>9</b>	Relative Risks of De Novo Malignancies in LT Recipients Versus a Sex- and Age-Matched Population	44
<b>10</b>	Prevalence of Cardiovascular Risk Factors and CKD in LT Recipients Beyond the First Posttransplant Year	45
<b>11</b>	Evaluation of the Metabolic Bone Status of the LT Recipient With Osteopenia	49
<b>12</b>	FDA Safety Categories for Drugs Used During Pregnancy	52
<b>13</b>	Child-Turcotte-Pugh (CTP) Scoring System to Assess Severity of Liver Disease	55
<b>14</b>	Predictive Value of MELD and CTP Scores for 3-Month Survival in Patients With Cirrhosis on the Waiting List for Liver Transplants	60
<b>15</b>	Predictive Value of MELD Score for Post-LT Survival in Patients With Cirrhosis Who Received Liver Transplants	62
<b>16</b>	Difference in Waiting List Survival Before and After Implementation of MELD in Patients With Cirrhosis With Hepatocellular Carcinoma	66
<b>17</b>	Precipitating factors for HE	69
<b>18</b>	Types of HE	71

<b>19</b>	Clinical manifestations and severity of HE	73
<b>20</b>	Clinical grades of HE	74
<b>21</b>	Major differential diagnosis of HE	76
<b>22</b>	Advantages and disadvantages of diagnostic tests for HE	78
<b>23</b>	Brain imaging modalities for diagnosis of HE	81
<b>24</b>	Options for long-term treatment of HE	83
<b>25</b>	Management of HE	86

## **LIST OF ABBREVIATIONS**

AIH	: autoimmune hepatitis
ALD	: alcoholic liver disease
BMD	: bone mineral density
CKD	: chronic kidney disease
CMV	: cytomegalovirus
CNI	: calcineurin inhibitor
CT	: computed tomography
CTP	: Child-Turcotte-Pugh
CUC	: chronic ulcerative colitis
DM	: diabetes mellitus
EBV	: Epstein-Barr virus
ESRD	: end-stage renal disease
FDA	: Food and Drug Administration
GRADE	: Grading of Recommendations ,Assessment, Development and Evaluation
HAART	: highly active antiretroviral therapy
HbA1c	: hemoglobin A1c
HBIG	: hepatitis B immune globulin
HBV	: hepatitis B virus
HCC	: hepatocellular carcinoma

HE	: hepatic encephalopathy
HESA	: hepatic encephalopathy scoring algorithm
HCV	: hepatitis C virus
HIV	: human immunodeficiency virus
HLA	: human leukocyte antigen
LDLT	: living donor liver transplantation
LT	: liver transplantation
MELD	: model for end-stage liver disease
MHE	: minimal hepatic encephalopathy
MRI	: magnetic resonance image
mTOR	: mammalian target of rapamycin
NAFLD	: nonalcoholic fatty liver disease
NASH	: nonalcoholic steatohepatitis
NODM	: new-onset diabetes mellitus
OHE	: overt hepatic encephalopathy
PBC	: primary biliary cirrhosis
PHES	: The psychometric hepatic encephalopathy score
PSC	: primary sclerosing cholangitis
PTLD	: posttransplant lymphoproliferative disorder
TB	: tuberculosis
TIPS	: transjugular intrahepatic portosystemic shunt
UNOS	: United Network for Organ Sharing



# Introduction

## **Introduction**

Liver transplantation has emerged over the past several decades as a viable treatment option for patients with acute liver failure and end stage liver disease.

Before transplantation, patients with advanced liver disease usually died within months to years. These patients now have the opportunity for extended survival with excellent quality of life after liver transplantation. **(Belle et al.,1997).**

Furthermore,the costs of liver transplants have steadily declined in recent years. **(Best et al.,2001).**

Most liver transplants are performed using a whole liver from a deceased donor. During transplantation, the donor liver is placed in the orthotopic position, hence the term *orthotopic liver transplantation*. However, because of the unique anatomical organization of the liver, donor organs can be divided and the separate parts transplanted into two recipients (split liver transplantation). **(Keeffe ,2001).**

Using this technique, a portion of the left lobe of an adult donor organ can be transplanted into a child and the remaining portion used to transplant the liver into an adult. **(Gridelli et al.,2003).**

Under ideal circumstances, a deceased donor organ also can be split and transplanted into two adult recipients. (**Renz et al.,2004**).

The same surgical techniques can be used to facilitate transplantation using living donors, where only a portion of the donor liver is removed for transplantation. Living donor transplantation for children, using a portion of the left lobe, is a well-established procedure. (**Malago et al.,2002**).

Living donor transplantation for adults, in which the donor right lobe typically is transplanted, also is performed at many transplant centers, although donor safety remains an ongoing concern. (**Trotter et al.,2002**).

Initial progress and growth were limited by technical difficulties and an inherent learning curve in the management of patients in the post-transplantation period. Improvements in transplantation outcomes have yielded a greater treatment demand and a new challenge, organ shortage (**Berzigotti et al.,2011**).

Although liver transplantation has proven to be a great success in a relatively short period of development, it should not be considered as either the initial or primary treatment modality for most liver diseases. Other than in a few specific disorders, transplantation is a therapy for disease complications rather than of the primary illness (**Montagnese et al.,2011**).

Thus, the selection of a transplant candidate is a risk – benefit analysis, in which the inherent risks of surgery, recurrent disease, and long – term immunosuppression must be weighed against the potential benefits of transplantation. These benefits differ for each patient but include improvements in survival, prevention of long– term complications, and better health(**De Rui et al.,2013**).

The most commonly used prognostic model for estimating disease severity and survival is the Model for End stage Liver Disease (MELD).The MELD score uses a patients laboratory values for serum bilirubin, serum creatinine, and international normalized ratio for prothrombin time (INR) in a log transformed equation to estimate likelihood of three-month survival. Higher MELD scores have been associated with decrease survival rates. Implementation of MELD for organ allocation has decreased Pretransplant mortality without having a negative impact on post transplant mortality (**Gupta et al.,2010**).

Hepatic encephalopathy (HE) is not part of the MELD score, which is widely used to assess the severity of hepatic failure and to estimate the need/timing for hepatic transplantation. (**Malinchoc et al.,2000**).

This is mostly related to difficulties and interoperator variability in the clinical diagnosis of HE, and its grading (**Kircheis et al.,2007**).

There is evidence that HE is a good prognostic marker of survival in patients with cirrhosis (**Bustamante et al.,1999;Stewart et al.,2007**).

HE has also been shown to carry prognostic information which is additive to that of MELD, and it has been suggested that patients with HE may not receive a transplant in a timely fashion if MELD is used as a stand-alone (**Yoo et al.,2003**).

In recent years, tools have become available to quantify HE across its spectrum of severity in a non-operator dependent, documentable fashion, thus providing 'MELD-like' summary HE indices. These tools include the automated assessment of the electroencephalographic (EEG) slowing which characterizes HE (**Amodio et al.,1999**).

The prognostic efficiency of MELD can probably be improved, especially in patients with non-fulminant hepatic failure(**Gotthardt et al.,2009;Cholongitas et al.,2007**).

The newly devised MELD-EEG index which seems a very reasonable proposal as:

- (i) it makes it possible to include HE, which had already been shown to carry additional/ separate prognostic information compared to the MELD(**Yoo et al.,2003**);
- (ii) it does so in a non-operator dependent, quantitative and documentable manner; (iii) it improves the prognostic efficiency of MELD(**Montagnese et al.,2011**).

# **Aim of Study**

## **Aim of the study**

The aim of this study is to determine the relationship between MELD score and the electroencephalogram (EEG), and the benefit of MELD -EEG on the short term outcome after Living Donor Liver Transplantation (LDLT).