

LIVER TRANSPLANTATION
Update on Allocation
Living Donor Liver Tx.

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Liver Transplantation History

- 1958 Research programs on liver replacement at Northwestern and Harvard
- 1963 First liver transplant (Univ. of CO)
- 1967 First long survival
- 1979 Cyclosporine
- 1987 Univ. of WI solution for improved organ preservation
- 1989 FK 506
- 1999 Living donor liver transplantation

Liver Transplantation Outcomes

- Median Length of Stay (NMH) 5-6 d
- 1-year survival ~90-94%
- 5-year survival ~75-80%

Liver Transplantation Problem

- Waiting List >17,000 people
- Liver transplants/year ~5,000
- Average waiting time >1 year

Liver Transplantation

Question for Transplant Team

- When to list for liver transplantation?
- When to perform the liver transplant?

Child-Turcotte-Pugh (CTP) Classification

	1	2	3
Encephalopathy Grade (mental status changes)	None	1-2	3-4
Ascites (water in abdomen)	Absent	Slight	Moderate
Albumin (gm/dl)	>3.5	2.8-3.5	<2.8
Prothrombin time (clotting factors) (seconds prolonged)	<4	4-6	>6
Bilirubin (mg/dl)	<2	2-3	>3

Liver Transplantation Evaluation

- Determine cause of liver disease
- Document severity of liver disease
- Determine survival and functional ability
- Concomitant medical problems
- Psychiatric evaluation
- Social Evaluation

Liver Transplantation Evaluation

- Medical history
 - Symptoms such as fatigue, itching, swelling, changes in mental status and GI bleeding
 - Other medical problems
 - Medications
 - Includes alcohol use and drug use history
- Physical examination
- Blood tests
 - Determine underlying cause of liver disease
 - Determine current functional status of the liver

Liver Transplantation Evaluation

- Liver Ultrasound/CT scan/MRI
- Liver biopsy
- ERCP – Cholangiogram – test that examines bile ducts if cirrhosis is otherwise unexplained

Liver Transplantation Evaluation

- Psychosocial evaluation
 - Support systems
 - Compliance with immunosuppression medication protocol after transplantation

Liver Transplantation Evaluation

- Concomitant medical problems
 - Heart
 - Lung
 - Kidney
 - Bone thinning

Liver Transplantation When?

- Quality of life
- Complications of cirrhosis
- Poor liver synthetic function

Liver Transplantation When?

- Quality of life issues
 - Severe lethargy
 - Intractable itching
 - Recurrent bile duct infections
 - Intractable ascites
 - Severe bone thinning
 - Pain

Liver Transplantation When?

- Complications of cirrhosis
 - Ascites
 - Bleeding from esophageal varices
 - Infected ascites (spontaneous bacterial peritonitis)
 - Kidney failure (hepatorenal syndrome)
 - Decreased mental status (encephalopathy)

Liver Transplantation When?

- Synthetic dysfunction
 - Poor albumin
 - Increased prothrombin time (diminished clotting factors)

Liver Transplantation When?

- Liver cancer (hepatocellular carcinoma)

Liver Transplantation Hepatitis C

- Hepatitis C does not disappear after liver transplantation
- Within one year, the majority (although not all) of patients have recurrent hepatitis C in the new liver
- Patients generally do well over the first 5-7 years after transplantation although a small percentage develop cirrhosis once again over a relatively short period of time
- Treatment with pegylated interferon alpha + ribavirin can be implemented successfully after transplantation

DHHS Final Rule

- Issued in 1998
- Defines the principles of organ allocation
- Governs the operation of the Organ Procurement and Transplant Network (OPTN)

Guidelines for Organ Allocation

- Organs should be allocated to transplant candidates in the order of medical urgency
- The role of waiting times in determining allocation order should be minimized
- Every attempt should be made to promote efficient use of donor organs

MELD

- MELD -- Model for End-Stage Liver Disease Scoring System
 - MELD Score = $0.957 \times \text{Log}_e(\text{creatinine mg/dl})$
+ $0.378 \times \text{Log}_e(\text{bilirubin mg/dl})$
+ $1.120 \times \text{Log}_e(\text{INR})$
+ 0.643
 - MELD score depends upon kidney function, bilirubin level and clotting factor levels

MELD

- For example, a patient with cirrhosis secondary to hepatitis C has a serum creatinine of 1.9 mg/dl, bilirubin 4.2 mg/dl, and INR 1.2
 - MELD Score = $0.957 \times \text{Log}_e(1.9)$
+ $0.378 \times \text{Log}_e(4.2)$
+ $1.120 \times \text{Log}_e(1.2)$
+ 0.643
= 2.039
- The MELD score is then rounded to the tenth decimal place (2.0) and multiplied by 10
- Therefore, MELD score = 20 (maximum = 40)

Limitations of MELD

- Patients with liver cancer
- Bile duct infections
- Itching
- Disabling mental status changes
- ? Criteria for living donors

Expanding the Donor Pool

- Expand Sources
 - Human - living donors
 - Other - xenotransplantation

Historical Perspective

Successful “firsts”

- LD Kidney - 1954
- LD Intestine - 1988
- LD Liver (pediatric) - 1990
- LD Pancreas - 1992
- LD Lung - 1994
- LD Liver (adult) - 1997

Essential Concepts for Using Living Donors

- No conflict of interest
- No coercion
- Minimize donor risks
- Donors must be given every opportunity to change their minds
- Emphasize alternatives

How Much Liver Do You Need?

- Liver = 2% body weight
- Optimal: > 1% liver weight/body weight ratio
- 70 kg recipient needs at least 700 cc (gm)
- Cannot go below 0.7 - 0.8%

NMH Results - Recipients

Living Liver Donation (adults)

- 90% 1-Year Patient Survival
- 87% 1-Year Graft Survival

Conclusions

Living Donor

- Living liver donation should be reserved for situations where the benefit to recipient outweighs the risk to the donor
- Donor safety must take highest priority
- Long-term effects are unknown
- Full informed consent