Comprehensive Evaluation of the Potential Liver Donor: Review of Process and Best Practices

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Disclosures

- No financial disclosures
- This talk was developed with the help of my amazing transplant team
Question

How many of you are either starting a liver program or are new to role?
Objectives

1. Review background of live donor liver transplant (LDLT)
2. Benefits of LDLT
3. Review components of a living donor evaluation
4. Get as excited about living liver donation as I am
Background

- Introduced to address the shortage of organs available with deceased donor transplant
- Began with pediatric LDLT
- Almost 9,000 of live donor liver transplants have been performed nationwide
- Growing in popularity but only accounts for approximately 5% of transplants performed yearly
- Approximately 50 large and small programs in the country
Figure 1. Living donor liver transplants performed annually in the United States (2002–2019)
Benefits to LDLT

- Offers candidates excellent long-term outcomes
- Transplanted faster
- Those not represented by MELD have access to transplant
- Lower rates of recipient mortality compared to staying on the waitlist
- Optimize recipient for the time of transplant
- Allows for transplantation before additional decompensations occur
Can LDLT Ever Be Pursued with Acceptable Risk to the Donor?

The Vancouver Forum: established practice principles for LDLT

- LDLT should only be performed if the risk to the donor is justified by the expectation of an acceptable outcome in the recipient.
- Indications for LDLT should be the same as those established for DDLT.
- LDLT should offer an overall advantage to the recipient when compared to waiting.
Double Equipoise

• Described by the balance between the recipient’s survival benefit and the probability of mortality for the donor
• Balance the risk of the donor to the benefit of the recipient
• Careful selection through a thorough donor evaluation

Ethical Principles

Non-Maleficence: “Do no harm”
Donor Safety

Beneficence: “Do good”
Expected Recipient Outcome

Utility: “Promote Net Good”
Need

Autonomy

Expected Recipient Outcome
Recipient is Listed for Transplant

Health History Questionnaire

Screening Blood Work

Evaluation: Meet the Team

Physical Exam
EKG and Chest X-Ray
Further Laboratory Testing
Imaging of the Liver with CT and MRI
CCTA and Echocardiogram (age/risk)

Living Donor Coordinator
Transplant Surgeon & Hepatologist
Social Worker - Independent Living Donor Advocate
Psychologist
Dietitian

Additional Testing and Consults Depend on Individual Risk Factors

Final decision by the Transplant Team

The donor may withdraw from the evaluation process at any time.
Medical Evaluation

• Medical evaluation should:
  • Assess general health of the donor
  • Assess compatibility of the donor to the recipient
  • Screen donor for conditions that increase donor’s surgical risk
  • Perform tests to identify potential for transmission of diseases

There is a lack of standardization in this country. Recent survey conducted by University of Colorado team, led by Dr. Whitney Jackson, to evaluate the practice patterns of all active live donor liver transplant programs in the country
Medical Evaluation

Components to Consider

What should be the age cut-off?

- Lower age of 18 due to concerns surrounding maturity and ability to give informed consent
- 75% of centers use upper age limit of 55-60

Medical Evaluation

Donor Upper Age Limit

<table>
<thead>
<tr>
<th>Age Limit (Years)</th>
<th>Percentage of Respondents</th>
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</thead>
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<tr>
<td>None</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
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<tr>
<td>55</td>
<td>30</td>
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<td>60</td>
<td>45</td>
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<tr>
<td>65</td>
<td>5</td>
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</table>
Medical Evaluation

When should a liver biopsy be performed?

- Most centers have a protocol for performing pre donation biopsy
  - Steatosis on imaging (10% often a trigger)
    - Steatosis assessment
    - How much is too much?
  - Elevated LFTs
  - BMI threshold
  - Metabolic risk factors
  - Other indications for biopsy
Other Indications for a Liver Biopsy

- First-degree relative with autoimmune LD
- ANA > 1:160
- AMA positivity
- A1AT MZ heterozygote
- A1AT MS heterozygote
- Iron on imaging
- Transferrin saturation elevation
- HFE compound heterozygote
- HFE gene carrier

Percentage of Respondents
# Medical Evaluation

## Our Center Experience

<table>
<thead>
<tr>
<th>Indications (N=92)</th>
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<tr>
<td>BMI ≥ 28 kg/m²</td>
<td>30</td>
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<tr>
<td>Positive ANA</td>
<td>20</td>
</tr>
<tr>
<td>1st Relative with AILD</td>
<td>14</td>
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<tr>
<td>A1AT Heterozygote</td>
<td>9</td>
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<tr>
<td>Abnormal Liver Enzymes</td>
<td>5</td>
</tr>
<tr>
<td>Steatosis on Imaging</td>
<td>8</td>
</tr>
<tr>
<td>Abnormal Imaging</td>
<td>2</td>
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<tr>
<td>HBCAb</td>
<td>2</td>
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<tr>
<td>HFE Heterozygote</td>
<td>1</td>
</tr>
<tr>
<td>Low ceruloplasmin + Abnormal 24 hour urine</td>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication</th>
<th>Frequency of Rule Out</th>
<th>Pathological Finding</th>
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<tbody>
<tr>
<td>BMI</td>
<td>2/21 (9.5%)</td>
<td>Non-specific hepatitis</td>
</tr>
<tr>
<td>BMI with Steatosis</td>
<td>1/5 (20%)</td>
<td>Steatohepatitis</td>
</tr>
<tr>
<td>BMI with ↑ LFTs</td>
<td>2/2 (100%)</td>
<td>Steatohepatitis</td>
</tr>
<tr>
<td>ANA</td>
<td>3/20 (15%)</td>
<td>Thick walled hepatic arterioles</td>
</tr>
<tr>
<td>↑ LFTs (normal BMI)</td>
<td>2/3 (66%)</td>
<td>Steatohepatitis</td>
</tr>
<tr>
<td>Steatosis on imaging (normal BMI)</td>
<td>1/3 (33%)</td>
<td>Steatosis (20%)</td>
</tr>
</tbody>
</table>
Medical Evaluation

Should we screen for venous thromboembolism (VTE)?

- Large programs report having protocols for VTE
Medical Evaluation

How should we assess cardiovascular status?

- Almost all centers have a protocol to evaluate cardiovascular disease risk (CVD)
- Based on risk factors
  1. Ischemic Evaluation
     - Stress test
     - Cardiac computed tomography (CT) angiogram
  2. Structural assessment
     - TTE
  3. Cardiology Consult
Medical Evaluation

What should be the maximum allowable BMI?

- 92% of centers had a max BMI
- Median BMI 32
- Why is there a max?

![Donor BMI Threshold Diagram]

Medical Evaluation

What else should we screen for?

• Autoimmune Markers
  • Most centers routinely assess for autoimmune diseases
    • ANA
    • AMA
    • SMA

• Hereditary Markers
  • Alpha-1-antitrypsin
  • Hereditary hemochromatosis
  • Wilson’s disease
Medical Evaluation

• Transmissible Diseases
  • CMV
  • HIV
  • Hepatitis B
  • Hepatitis C
  • Syphilis

• Endemic Risk
  • Unique to your region
Surgical Evaluation

- Surgical history
  - History of abdominal surgeries
- Imaging studies
  - CT scan
    - Liver volumes
    - Blood vessel anatomy
  - MRCP
    - Biliary Anatomy
  - 3D Imaging
  - Mevis
Anatomical Considerations in Selecting the Donor-Recipient Pair
Surgical Evaluation

• Graft weight-Body Weight Ratio (GWBWR)
  • 0.8% graft minimum
  • 1.0% ideal
  • Example: 80kg recip. We want an 800g right lobe.

• Other factors to consider for graft size:
  • How sick is the recipient (portal hypertension)?
  • Does the graft contain fat?
  • Minimize risk for donor. Maximize benefit for recipient
  • Size is always a balance between donor risk and recipient need

The Surgery
Right Lobe Procurement

14th Annual Living Donation Conference
Presented by the American Foundation for Donation and Transplantation

Right Lobe Implantation
Mortality and Morbidity

The debate revolves around how much risk is acceptable for a donor

Mortality

- A2ALL data (through 2013) reported donor mortality rate of 1 in 200
- SRTR report summarizes 2016-2020
  - Total number of LDLTs: 2128
  - Major centers in US broadly quoting mortality risk =/< 1 in 500

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<tr>
<th>Cause</th>
<th>0-30 days</th>
<th>31-90 days</th>
<th>91-365 days</th>
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<td>0</td>
<td>0</td>
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<tr>
<td>Accident/homicide</td>
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<tr>
<td>Medical</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cancer</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
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</table>
Mortality and Morbidity

Morbidity

• Approximately 30 - 40% of donors will experience an early complication
• Only 10-15% of those complications will require considerable intervention
• Major vs. Minor complications

Ladner DP et al. J Hepatol. 2015
Olthoff KM et al. Liver Transplantation. 2015
Psychological Evaluation

- Evaluation by a psychiatrist or psychologist
- Review psychological issues that may complicate a donor's recovery
- Attempt to identify factors that warrant educational or therapeutic intervention prior to donation
- Determine ability to make informed decision
Psychological Evaluation

- Psychological testing
  - Provides objective data
  1. Personality Assessment Inventory (PAI)
    - Screens for psychopathology
    - Measures somatic concerns
  2. Millon Behavioral Health Diagnostic
    - Focuses on coping strategies and orientation to health
    - Used in kidney donors
- Interview with donor and provider to determine risk
Psychological Evaluation

Case Study

• 25 year old female, works as an ICU RN at a local hospital
• Reports history of anxiety
• Medications included bupropion 75mg daily
• Given PAI testing
• Anxiety-related disorders scale above level of significance (LOS)
• Obsessive-compulsive subscale also above LOS
Psychological Evaluation

• Psychologist reported she described a number of experiences consistent with and suggestive of obsessive compulsive disorder (OCD)
• She was referred for local psychiatric consultation and exposure therapy
• Recommended she start SSRI therapy with 6 weeks of treatment before proceeding with donation
• Received consult service during the index hospitalization for donation
• Donor reported at all subsequent follow ups that she felt those early interventions was the reason for a successful post donation course.
• Has continued her therapy and has a “much clearer sense of her OCD symptoms” and has been able to manage her compulsions.
Social Evaluation

- Eval usually performed by a licensed clinical social worker (LCSW)

- Special emphasis on:
  - Employment
  - Health insurance status
  - Living arrangements
  - Social instability
  - Motivation for donation
  - Coping strategies
Independent Living Donor Advocate

• Functions Independently from the recipient’s transplant team
• Can be physician, chaplain, often times a social worker
• Explains and supports the rights as a donor
• Assure the donor is willing to donate without feeling pressure
• Assess that the donor understands the components of informed consent
• Remind the donor they can decide *not* to donate at any time
Summary

• We know there is a shortage of deceased organs in this country. While living donation is increasing, it still only represents a small percentage of transplants performed every year.
• LDLT offers excellent outcomes for recipients while demonstrating justifiable risk to the donor.
• Evaluation of a potential living donor must be a careful consideration from the multi-disciplinary team.
Conclusion

Living donation helps thousands of recipients get transplanted every year that could otherwise die on the liver transplant list. Through thoughtful and thorough evaluation, we can safely perform these living donor surgeries with outstanding outcomes for both the donor and recipient.
Session Survey

Jaime Cisek, RN, BSN | April 19th 2:00 PM-2:45 PM