

Transplantation for Amyloidosis: 18 Years Later

Steve Zeldenrust, MD, PhD
Mayo Clinic



Scottsdale, Arizona



Rochester, Minnesota



Jacksonville, Florida

Rationale

- **Why liver transplant?**
- **What about transplanting other organs?**

Liver Transplant

- **First liver transplant performed in Sweden 1990**
- **The FAP World Transplant Registry:**
 - **Updated 6/30/09**
 - **1523 OLT performed worldwide**
 - **110 transplants/year**
 - **Portugal, France and Sweden account for nearly two-thirds**

Outcomes

- **Low mortality rate (4%)**
- **Predictors of good outcome:**
 - **mBMI**
 - **Disease duration**
 - **Mutation (V30M vs non-V30M)**
 - **Autonomic neuropathy**

V30M Outcomes

- **Neuropathy stable or improved in up to 40%**
- **Nutrition improves in up to 80%**
- **Cardiac progresses in ~50%**
- **Kidney involvement unaffected**
- **Eye deposits worsen**

Non-V30M Outcomes

- **Small numbers make prediction difficult (n=100)**
- **Neuropathy – autonomic most likely to improve, sensory variable**
- **GI improves in most**
- **Eye and brain can worsen due to local production of variant TTR**

Non-V30M Outcomes

- **Cardiac progresses in many**
- **Evidence that pace of deposition can increase after transplant**
- **Cardiac deposits develop in those with no heart involvement at dx.**
- **New deposits contain normal TTR made by transplanted liver**

Heart Transplant in ATTR

- **FAPWTR:**
 - **Liver + heart 19**
 - **Liver + previous heart 5**
 - **Liver + sequential heart 1**
 - **Liver + heart + kidney 1**

Heart Transplant in ATTR

- **Outcomes similar to other indications for heart transplant**
- **Some centers advocating combined heart/liver transplant in non-V30M**
- **Controversy over timing (combined vs. sequential)**

Kidney Transplant in ATTR

- **Kidney involvement in most at diagnosis**
- **Only symptomatic in ~10%**
- **FAPWTR: Liver + kidney 43**
- **Survival worse than liver alone, but related to low mBMI**

What Does It All Mean?

- **Known:**
 - **Survival improved with liver transplant in V30M**
 - **Most effective if early**
 - **Major benefit is nutrition**
 - **Combined liver + heart and liver + kidney feasible**

What Does It All Mean?

- **Unknown:**
 - **When is it futile?**
 - **Which mutations benefit?**
 - **If heart involved need combined heart + liver?**
 - **Is amyloid halted, slowed, reversed or accelerated?**

Implications

- **ATTR clear indication for liver transplant**
- **Early and accurate diagnosis critical**
- **Possibility of domino shortens wait time**
- **Need for multiple organs lengthens wait time**

Future Directions

- **Better follow-up needed to answer important questions (disease progression, etc.)**
- **Impact of new treatments (alternative to transplant vs. adjunct to transplant)**

Other Types of Amyloidosis

- **AFib:**
 - **Synthesized exclusively in the liver**
 - **Liver + kidney due to extensive kidney involvement**
 - **Excellent outcomes**

Other Types of Amyloidosis

- **AApoA1 and AApoA11:**
 - **Pace of deposition very slow**
 - **Affected organ replacement effective**
 - **May benefit from liver transplant**