Endovascular Treatment Of Hepatic Artery Stenosis After Liver Transplantation: Tips And Precautions: How To Manage Complications

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Hepatic Artery Stenosis
Incidence and morbidity
Affects 5-11% of orthotopic liver transplants
Can Lead to biliary complications (ischemic)
Up to 65% chance of progressing to hepatic artery thrombosis (HAT)
Re-transplant required in up to 75% with HAT

30-50% risk of liver failure

Top 5 Liver Transplant Centers

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<th>Center</th>
<th>2012</th>
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Source: OPTN/UNOS and Scientific Registry for Transplant Recipients Jan. 2018

Hepatic Artery Interventions
N=155 over 10 years*

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* Through 10/31/2018

Endovascular Technique
- Femoral (~70%) or brachial/radial
- 6 Fr RDC-1 guide (femoral)
- 4-5 Fr sheath (brachial/radial)
- 0.014 inch platform
- Coronary balloon
- Coronary stent (drug eluting)
Technique

99% Stenosis of proper hepatic artery

coronary stent placement

Main HA

Filling of hepatic vasculature

POST

PRE

Study Design

- Retrospective Review: August 2009 – March 2016
- Tertiary care institution
  - Ochsner Clinic Foundation, New Orleans, LA
  - Largest US volume of OLTx since 2011
- Objective
  - Define potential risks associated with early intervention for HAS
  - Describe salvage techniques for endovascular repair
- IRB Approved

Results

- 79 pts, 1129 OLTx in 6.5 yrs
- 6.9% HAS Rate
- n=106 angiograms
- 99 Interventions
  - 7 Diagnostic
  - 34 PTA Alone
  - 65 Stent

Goldsmith et al., J Vasc Surg Nov 2017;66;1488

Mean Age = 51 yo (Range 11-72)
Femoral Approach = 72.6%
Median Time to Intervention = 71 days

Goldsmith et al., J Vasc Surg Nov 2017;66;1488
Technical Success

91% (90/99)

- Major Complication
- HAS could not be treated

n=2

- Major Complication
- HAS Aborted

n=2

- >30% Residual Stenosis

n=5


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Major Complications

- 3 Ruptures, 5 dissections: **7.5% rate** (8/106)
- 6/8 (75%) had successful endovascular Rx
  - Ruptures all successfully Rxed with Jomed covered stent (n=2) or balloon tamponade (n=1)
  - Dissections Rxed with stents if true lumen access could be obtained
  - No open Rx was required
- However, 4/8 patients (50%) went on to HAT, compared to 1.4% (1/71) in the non-complication cohort (P < 0.001)

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Mortality

- 1 year all cause mortality
  - Complication Cohort: 12.5% (1/8)
  - Non-complication Cohort: 7% (5/71)
  - P = .484

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Risk Factors for Complications

- Tortuosity
  - Non-complication Cohort
  - 34.6% (34/98) interventions had tortuous anatomy
  - Complication Cohort
  - 75% (6/8) interventions had tortuous anatomy
  - P = .05
  - 2 fold increase
### Risk Factors for Complications

**Re-transplants**
- Non-complication Cohort
  - 12.6% (9/71) patients had ≥2 liver transplants
- Complication Cohort
  - 37.5% (3/8) patients had ≥2 liver transplants

3 fold increase

\[ P = .097 \]

### Hepatic Artery Rupture

- 11 y/o boy with Budd –Chiari
- 1st liver Transplant 12/10/13
  - Open Exploration for hepatic artery thrombosis
- 2nd Liver Transplant 12/12/13
- Colon perforation/exploration 12/24/13
- Severe HAS, angio on 1/13/14 (POD 31)

**HAS**

**3x20 Balloon Tamponade**
Jomed 3x16 Covered Stent

Resolution of HAS & hepatic rupture

Take home clinical pearls

- Only Rx high grade stenosis
  - PSV >400-450, RI <0.5 (usually <0.4), + tardus parvus waveforms
  - Overall, I treat <50% of cases I’m asked to see
- Don’t treat in setting of rejection or sepsis
- Case plan carefully (femoral vs brachial/radial)
- Meticulous technique is essential
- Can be technically challenging/unforgiving
  - Experienced in rapid exchange 0.014 systems
  - Need availability of bail-out devices

Ochsner Health System