MRI in Pediatric Liver Transplantation

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Objectives

- Pre and Post transplant imaging of the pediatric liver
- Technique
- Key findings
  - Normal variants
  - Pathologic findings
Background

- Pediatric liver transplant in N. America
- ~1,800 liver transplants 18 years and younger
- ~8% of all liver transplants

![Number of liver transplants](SPLIT data 2017)
Background

- Indications for pediatric liver transplantation

![Pie chart showing distribution of diagnoses for pediatric liver transplantation]

Squires R, et al. JPGN 2014
Types of Liver Transplantation

- Whole liver (pediatric deceased donor)
  - 53%
- Split liver (adult deceased donor)
  - Left lateral or left hemiliver
  - 16%
- Living donor
  - Segment II-III or II-IV
  - 17%
- Reduced size (adult deceased donor)
  - 9%

SPLIT data 2017

Whole liver from deceased donor
Types of Liver Transplantation

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SPLIT data 2017
Pre-operative Imaging of Recipient

- Liver parenchymal disease
  - Cirrhosis/metabolic liver disease → hepatocellular carcinoma
  - Hepatoblastoma
- Contraindications
  - Extrahepatic malignancy
  - Extended thrombosis of the portal tract
Pre-operative Imaging of Recipient

- Liver parenchymal disease
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- Contraindications
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Portal Vein Assessment

- 4-month old with h/o biliary atresia post Kasai; pre-transplant evaluation
Portal Vein Assessment
Pre-operative Imaging

- Patency of portal vein
- Aberrant hepatic artery
  - Replaced
  - Accessory
- Accessory hepatic veins
- Liver volume (~30% needed)
Contrast Agent

- Extracellular Gd contrast agent
  - Dotarem, Gadovist, ProHance 0.1 mmol/kg
- Mixed extracellular hepatobiliary Gd contrast agent
  - Multihance (5%) 0.1 mmol/kg
    - 1 hour delayed
  - Eovist (50%) 0.05 mmol/kg
    - 20 min delayed
    - Blood pool less conspicuous
    - Transient breathing artifacts
Choice of Contrast Agent?

- Pre-liver transplant evaluation
  - Multihance
  - If recent CT angiogram available, Eovist is an option
- Post transplant
  - Vascular complications
    - Multihance
  - Biliary complications
    - Eovist (competes with elevated serum bilirubin levels)
Choice of Contrast Agent

Eovist

Multihance
Pre-Transplant Liver MR Protocol

- Multihance
- True FISP
Normal Post-operative Appearance

Periportal Edema
Loss of lymphatic drainage
Can last up to 1 year post op
Portal Vein Anastomosis

- Usually end to end
- Partial liver graft: donor LPV to recipient MPV
- Venous graft from SMV to donor portal vein
- Complications:
  - Stenosis
  - Thrombosis
Portal Vein Anastomosis

Mild calibre change – normal variant
Hepatic Vein/IVC Anastomosis
Piggy Back technique
Hepatic Artery Anastomosis

- Usually end to end

Celiac Axis (branch)  Hepatic artery conduit
Hepatic Artery Anastomosis Complications

Stenosis

Conduit thrombosis
Hepatic artery stenosis/thrombosis → Graft necrosis
Late Hepatic Artery Conduit Thrombosis

Hepatic artery conduit thrombosis with bile lakes and biliary strictures
Types of Biliary Anastomosis

- Bilioenteric (Roux loop)
  - Split grafts/Kasai
- Duct to duct
  - Whole liver transplant
Wound dehiscence and persistent fluid collection post liver transplant

40 min post Eovist delayed images
Biliary Stricture at Anastomosis

Fibrosis at anastomosis
Biliary Stricture at Anastomosis
Summary

- MRI problem solving tool in liver transplant imaging
- Pre-transplant – vascular
- Modality of choice for biliary complications
Thank you!

Questions/Comments
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