Overview Of Lymphatic Imaging Techniques

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Disclosures

• Consulting
  – Guerbet Group
  – Cook inc
• Ownership
  – Controlrad

Novel Lymphatic Imaging

• The lymphatic system was forgotten for generations due to lack of robust imaging.

• Recent development of new interventional technique (thoracic duct embolization, interstitial lymphatic embolization and livery lymphatic embolization) stimulated development of new imaging methods.

Why Lymphatic Imaging is complex?

• Multiple lymphatic systems
• Small size of the lymphatic vessels
• Difficult on introducing contrast

Lymphatic System-Flows

• Lymphatic Systems
  – Liver
  – Intestine
  – Soft tissue

Traditional Lymph Flow Imaging Techniques

Pedal Lymphangiogram
Traditional Lymph Flow Imaging Techniques

PEDAL LYMPHOSCINTIGRAPHY

Interstitial Lymphangiography

Points of Access of Lymphatic System

- Interstitial lymphangiography
  - Fluoroscopy guided
  - Intranodal lymphangiography
  - Liver lymphangiography
  - Mesenteric lymphangiography
- Dynamic contrast MRI lymphangiography
- CT lymphangiography
- TO lymphangiography
- CT liver lymphangiography

Intranodal Lymphangiography

- Indication
  - Guide for interventional procedures
  - Thoracic duct embolization
  - Interstitial lymphatic embolization

Intranodal Lymphangiography

**Post Cath Groin Lymphorrhea/Lymphocele**

Post embolisation

**Scrotal/Vulvular Edema/Leakage**
Scrotal/Vulvular Edema/Leakage

Scrotal Edema-Gravity Matters!

After Walking

Neck Lymphangiogram

Contrast Enhanced MR Lymphangiography

- Position of the needles (US contrast)

MRL Sequences

1. Heavy T2 (MRCP sequences)
   - Identification of the:
     - Lymphatic masses
     - Effusions
     - Edema

2. Fast angio acquisition technique (TWIST)
   - Dynamic evaluation of the lymphatic flow

3. Delayed high resolution angio technique (Inversion recovery with fat suppression)
   - Allows for delayed images
   - High resolution images of the lymphatic system
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What Are Advantages of Contrast enhanced MRL vs Conventional Lymphangiography?

- Gadolinium is less viscous
  - “Goes” where lipiodol doesn’t “go”
  - Better contrast resolution
  - 3D ability
  - Ability to collect the dynamic data

When To Use MRL?

- Demonstration of the lymphatic anatomy (presence of TD, number of the ducts)
- Identification of the pulmonary lymphatic abnormality (chylothorax, plastic bronchitis and more)
- Identification of the lymphatic abnormality in:
  - Chylous ascites
  - Chyluria
  - Lymphoma
  - Genital
  - Peritoneal

Dynamic MR Lymphangiogram

Idiopathic Chylothorax

Congenital Lymphatic Dysplasia
Intraprocedural CT lymphangiography

Liver Lymphatic System-Anatomy

Superficial  Deep

80-90% of the lymphatic flow drains through periportal lymphatics

Communication of the Liver Lymph with TD

Our Experience

- Liver Lymphorea
- Thoracic lymphatic disorders
  - Plastic Bronchitis, Chylothorax
- Protein Losing Enteropathy (PLE)
- Liver Ascites
Liver Lymphorrhea

Embolization with Onyx

- One paracentesis day after the procedure-cured from ascites
- US showed periportal thickening

Liver Lymph in The Chest-Plastic Bronchitis

- 14 yo patient, single ventricle, Fontan physiology
- Presented with PB

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- T2W imaging

Liver Lymphatic Catheterization
Liver Lymphatics Injection/Embolization

Protein Losing Enteropathy in Congenital Cardiac Disease (Fontan)
- Severe loss of serum proteins into the intestine

Liver Lymphangiogram PLE

Contrast in duodenum

Liver Lymphangiogram PLE

PLE-Leakage Diagram
Liver CT Lymphangiography

Mesenteric Lymphangiography


Mesenteric Lymphangiography

Surgical Mesenteric Lymphangiography

- Surgical
- Percutaneous

- Equipment
  - 25 G spinal needle

- Indications
  - Chylous ascites
  - Protein losing enteropathy?

Mesenteric Lymphangiography

Conclusion

- New lymphatic imaging opened new opportunities to image the lymphatic pathology
- More minimally invasive imaging methods need to be developed
- Why?
- Because we have novel Interventional options
Thanks!