CO$_2$ in TIPS & Venous Intervention

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Disclosure

- Consultant for Terumo
- Consultant for Gore
CO$_2$ Imaging

- Learning curve
- Don’t underestimate the technique
  - Not difficult, but requires skill and care
  - Requires knowledge and patience
- Avoid problems and complications
- Great diagnostic tool
CO₂MMANDER
TIPS Procedure
TIPS procedures

- I use CO$_2$ for all TIPS procedures
- CO$_2$ portogram is excellent for the portal vein localization stage of the procedure
- In difficult cases: Look for the CO$_2$ “target”
TIPS procedures

- AP and oblique views
  - Excellent to localize the portal vein
- Wedge injection
  - Wedged catheter or balloon catheter
  - Gentle injection of 15-20 cc
  - Careful in patients with ascites
- Intraparenchymal injection
CO$_2$ Portogram in TIPS
Case Presentation

• 76 year old woman
• Hepatitis C cirrhosis
• End-stage Renal Disease
  • History of kidney transplant
  • Shows with progressive kidney failure
  • Increasing serum creatinine levels
  • Progressive ascites
Case Presentation

- **Evaluation by scores:**
  - MELD score: 8
  - Child-Pugh score: 8 – Class B

- **Imaging:**
  - Patent portal vein
  - Patent splenic vein
  - Patent Hepatic veins
  - No masses within the liver
MRI scan
Case Presentation

• Case extensively discussed in clinical rounds
  • Hepatology
  • Nephrology
  • Medicine
  • Interventional Radiology

• Decided to offer TIPS
  • Worsening renal failure after treatment for ascites
  • Paracentesis and diuretics
TIPS

Portal Vein Access
TIPS

Tract dilation and evaluation
TIPS

Stent placement
Outcome

• Procedure technically went well
• Difficulty extubating the patient
  • Aspiration pneumonia
• Clinically:
  • Liver function: stable
  • Renal function: improved
  • Respiratory function: deteriorated
• Patient died 2 weeks after TIPS
Venous Intervention
Stent Placement

- 42 year old woman
- History of left hip surgery
- Severe allergy to iodinated contrast
  - Cardiac arrest
- Severe left leg swelling and pain
IVUS & CO2 Venogram
CO2 venograms

Before stent

After stent
AV fistula maturation

- 67 year old man
- Chronic renal disease stage IV
  - Low GFR (< 30)
  - Not dialysis dependent yet
- Presents with an occluded AV fistula
  - Never used
  - Recently created (within 8 weeks)
July 15, 2014

CO2 fistulogram
August 27, 2014

July 15, 2014

August 27, 2014

OUTFLOW VEIN
Complications and Precautions
TIPS complication
IR Safety Rounds

Transient Disorientation and Severe Bradycardia after Carbon Dioxide Angiography

Anil Kumar Pillai, MD, Amar Pravin Shah, MD, Hector Ferral, MD, Sreekumar Madassery, BS, Scott Asselmeier, MD, and Sudheer Paruchuri, MD
Discussion

- CO$_2$ is a useful diagnostic and interventional tool
- Practice Expands Indications
  - Patients with severe contrast allergy
  - Patients with borderline renal function
  - Patients with fluid overload
- Careful technique is imperative
- Use of a low pressure system is imperative
Thank you

Owl - Davide Salvadore