

MGH Sheep Protocol

Materials checklist:

Book relevant materials on google calendars []

Book dash monitor Brian

Computational cart:

- IVUS machine [y]
- EM station [y]
- EM emitter [y]
- Mitra clip []
- Anthony lab EM tracker stand [y]
- PIM module [y]
- USB splitter [y]
- pullback device [y]
- pullback device power chord [y]
- pullback device USB cable []
- dash monitor cable []
- computer [y]
- computer monitor facing out [y]
- computer charger [y]
- frame grabber [y]
- optional: frame grabber for fluoro []
- mouse []
- keyboard []
- supply boxes [y]
- dash monitor [y]
- camera [y]
- camera stand [y]
- iPhone stand [y]

supplies:

- printed protocol [y]
- barbell weights [y]
- IVUS + EM catheters [y]
- steerable EM catheter [y]
- computer monitor [y]
- guiding catheters [y]
- dryseal [y]
- dilators [y]
- guidewires [y]
- contrast agent [y]
- saline []
- puffing catheters [y]
- surgical drapes [y]
- ECG electrodes [y]
- syringes for contrast agent injection [y]

Room Setup:

Electronics setup (obvious):

- setup power strip
- power on IVUS
- set up EM emitter stand, power on EM station
- plug in computer charger and usb-splitter

Pullback device setup:

- Ask staff if MGH dash monitor can be used for monitoring ECG
- setup pullback device on tripod
- connect ECG electrodes to dash monitor
- connect ECG electrodes to animal
- connect dash monitor to pullback device

EM tracker stand setup :

- Position EM tracker at level of pig's abdomen (where we want tracking to be most accurate)
- Place a barbell on EM tracker stand []
- Apply lock on wheel stand
- **Give warning to team and animal facility staff not to move EM tracker stand []**

Camera setup:

- Ensure iPhone is set to record at 60fps []
- Ensure fluoro machine is in record mode / connect a frame grabber []
- Station camera with view of operator, C-arm, ultrasound 3D display, ECG signal, pullback device, and possibly EM tracker stand []
- station other camera / iPhone to record fluoro screen []

Computer setup:

- ensure correct calibration file loaded for catheter []
- ensure correct ML model loaded []
- presave data directories on computer []
- activate frame grabber, ensure aortascope working []

Protocol:

Gaining access:

- 0.018 wire
- 12 Fr dilator, 12 Fr sheath
- 0.018 IVUS

Pullback (repeat for each dataset collection):

- Ensure **gating is on** and other yaml parameters look correct, check whether fluoro arm creates EM interference (when both on and off)
- **Remind staff in room not to touch EM tracker stand from this point onwards []**
- Create an **empty dataset folder** for pullback data and load preop data into it
- Plug IVUS catheter in and **ensure adequate ultrasound imaging quality** before recording and that catheter is outside the sheath
- Start recording with **(1) camera in room, (2) screen recording, (3) click ‘start recording’ in aortascope, and (4) click start pullback device in that order**
- (for one experiment) **Take a picture and video of OR setup** that includes – EM tracker stand, C-arm, ECG signal, pullback device, operator, ultrasound 3D display
- Pull to the end of the distal abdominal aorta smoothly and continuously, **(1) click ‘save data’, then (2) ‘stop pullback device’.**
 - If you used the steerable system, pull the whole system back together (catheter + sheath) with no relative displacement between the components
- Flush IVUS catheter with saline

Side branch navigation:

- Turn **‘record_poses’** parameter on
- Position the C-arm so that it includes a view of all abdominal branches and the distal abdominal aorta, use contrast as needed
- **Remind staff in room not to touch EM tracker stand**
- **Start recording with (1) camera in room, (2) screen recording**
- **Start the clock** – interventionalist attempts to cannulate Celiac, SMA, LRA, and RRA as quickly as possible from top to bottom
 - Ultrasound view is continuously **manipulated to be at 90 degrees** to the vessel for clear side view
 - perform a **shot of fluoroscopy to verify successful cannulation (quick puff of contrast through the steerable catheter** on ONE of the cannulations, taking a video while doing so)
 - Record time each time a vessel is cannulated, pausing timer when cannulation has been verified to reset (use ‘lap’ function on iPhone and take screenshot at end of study)
 - Record the fluoro use time for each vessel
 - Record **time in datasheet** when 90 degree view of the next vessel is achieved
- (for one experiment) **Take a picture and video** of OR setup that includes – EM tracker stand, C-arm, ECG signal, pullback device, operator, ultrasound 3D display
- **Flush steerable catheter** with saline after each experiment

Fluoro comparison

- Leave fluoro machine in same spot
- Using same catheter, attempt to cannulate all vessels beginning at the distal abdominal aorta
- Rotate C-arm as necessary, including rotation in required cannulation time
- **Record the fluoro use time** for each vessel
- (for one experiment) **Take video of surgeon rotating C-arm** to gain 90 degree view of vessel while trying to cannulate and injecting contrast at same time

(Optional)

Navigating aortic arch – approach 1 (easy approach) – use precurved guiding catheter

- Feed a guiding catheter over the wire and navigate it up to the base of the aortic arch
- Using fluoroscopy as guidance, rotate the guiding catheter to point in the direction of the aortic arch and pass an 0.018” or 0.014” wire through until it reaches the base of the aortic root
 - inject a puff of contrast if aortic root direction is unclear, take a picture for paper
- Remove the guiding catheter
- Test to see if the IVUS catheter can be feed around the aortic arch with minimal force without entering the head branches