Is the Transradial Approach Feasible for Peripheral Intervention?

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Disclosures

• None for this presentation
Overview

• Cardiology adaptation
• Procedure/caveats
• Concerns
• Vascular adaptation?
Radial artery access for cardiac cath/PCI

- Transradial diagnostic cardiac cath first described by Campeau and associates in 1989 (Canada)
- Transradial PCI first described by Kiemeneij and Laarman in 1993 (Netherlands)
- Learning curve - steep for cardiologists trained in femoral approach, may be less so for those trained in radial approach “de novo”
- 3 main components of learning curve: 1) radial artery access, 2) advancing catheter from radial artery into aortic root, 3) engaging coronary arteries
The facts

• In the USA, most cath/PCI procedures are still performed via the femoral artery
  • France: 55%
  • Germany: <10%
  • USA (2010-2011): 8.3% diagnostic, 6.9% PCI
  • OSU: almost 50%

• The radial artery is increasingly being used as the access site for cardiac cath/PCI procedures

• Transradial compared to transfemoral PCI is associated with reduced access site and bleeding complications and possibly improved cardiac outcomes

• Though the benefits are compelling, current studies do not make it clear how long it would take to achieve such benefits at a single institution
Comparison of transradial and femoral approaches for percutaneous coronary interventions: A systematic review and hierarchical Bayesian meta-analysis
Bertrand et al, American Heart Journal, April 2012

- 15 randomized/61 observational studies
  - 1993-2011
  - >760,000 patients
  - 76% reduction in bleeding and 80% reduction in transfusion
  - 44% reduction in mortality early after PCI (mostly due to observational studies)
RIVAL trial: TRA vs transfemoral
Jolly, et al. LANCET 2011

- 7021 patients worldwide
- Combined all-cause death, MI, CVA, non-CABG related major bleeding similar between the groups
- Radial access reduced major vascular complications
- Subgroup analysis:
  - Decreased mortality for TRA in STEMI patients at high volume TRA centers
  - Procedural volume and expertise important in outcome (Jolly, et al. JACC, Mar 2014)
2013: Consensus document on the radial approach in PCI

- Position paper by the European Association of Percutaneous Cardiovascular Interventions and Working Groups on Acute Cardiac Care and Thrombosis of the European Society of Cardiology:
  - Radial access should be the first choice for PCI
  - Shift from 1998 recommendation which called for TRA only if TFA was contraindicated
• “Radial Access as a Default for PCI: Too Early to Call”/Concerns about blanket recommendation:
  • No mention of improved safety if micropuncture needles used
  • Old definitions of bleeding
  • Adverse events specific to radial access: parathesias, radial artery occlusion, inability to use radial in the future (CABG, HD access, arterial line), compartment syndrome
  • Long learning curve
  • 13.8% anomalous radial artery anatomy, with higher failure rate
Access and Landmarks: Putting it All Together

1) Locate bony prominence of lateral aspect of radius bone (styloid process)

2) Bring out palmaris longus tendon and flexor carpi radialis tendon by having patient touch thumb to 5th and slightly flex wrist

3) Palpate radial artery immediately lateral (thumb side) to the flexor carpi radialis and at least one finger breadth cephalad to the bony prominence on the radius

4) Access radial artery HERE
49% of pts have bifurcation of RA prox to palmar arch

Avg diameter of RA: 3.2 mm prox to bifurcation, 2.8 mm distal

Ideal location to puncture RA: 10 mm prox (cephalad) to styloid process of radius bone
You’ve Got Access! . . . Now What?

- Complex radial artery loop
- Two remnant recurrent radial arteries
- Brachial artery
- Ulna artery

Figure 1. Radial artery loop.

- 2,211 transradial cath/PCI cases. Pre and post radial artery angiograms done

- Anatomical variations present 23% of the time (excessive tortuosity, RA stenosis, RA hypoplasia, radioulnar “loop”, abnormal origin, aberrant RT subclavian artery)

- In those with variant anatomy, procedure successfully completed 93%, in those without, 99%. (Radioulnar loop only 83%)
Ulnar artery access for cardiac cath
Ulnar Artery Access for Cardiac Cath

- Literature search reveals 9 publications on transulnar cardiac cath/PCI
  - Approximately 600 patients
  - Success rate ≥ 90%
  - Very low complication rate, small hematoma at puncture site in 2%
Transradial Cath/PCI Technical Issues

• Technical issues:
• What if you need to use larger sheaths? IVUS of radial artery diameters.

2.2 mm diameter. Not OK for 8 Fr

4.0 mm diameter. OK for 8 French
Radial Artery Access for Cardiac Cath
OSU Protocol

• Technique

  • Proceed only after confirmation of normal Allen’s/Barbeau’s test
  • Access 1-2 cm cephalad to styloid process on lateral side of distal radius
  • 5 or 6 Fr transradial “kit”: micropuncture needle, and wire, hydrophilic sheath
  • “Pre”-cocktail: 5000 U Unfractionated Hep, 2.5 mg Verapamil, 200 mcg NTG
  • “Post”-cocktail: NTG and Verapamil only
Choice of Access Site for PCI in STEMI

If all roads lead to the heart, why would the access site affect cardiac outcomes?

Major vascular complications at femoral artery puncture site post PCI are associated with non-fatal and fatal cardiac complications.

Transradial PCI reduces major vascular complications by 50-80%.
Culture Change in OSU Cath Lab:
The Emergence of a “Radial First” Mindset
Post PCI Access Site and Bleeding Complications
A New Wave of Complications

- Arteriovenous fistulae
- Pseudoaneurysms
- Arterial eversion or herniation
- Arterial avulsion
- Compartment syndrome
Radial artery loop?
Radial artery avulsion.
Multi-disciplinary Consensus

- Exclusive use of hydrophilic sheaths
- Vasodilator cocktail
- Use of TR bands
- IVUS for larger-than-usual sheath sizes
- Continued timely expert vascular surgical consultation
- Radial lounge
Radial Lounge
Why not use radial approach?

- Potential new set of complications, mostly within radial anatomy
- Inability to reach beyond iliac/femoral
  - 200cm balloon available
- Less device control over multiple turns/angles
- New technique/learning curve
- More radiation during learning phase
- Limitation on sheath size
- Limited number of re-access procedures
- Inability to use in the future?
Why consider radial access for peripheral intervention?

- Less (severe) access site complications; translate to better vascular outcomes?
- No need to obtain contralateral access over the aortic bifurcation, especially with bifurcated aortic grafts/endografts
- Easier/safer with aortic dissection
- Safer than brachial access due to regional anatomy
- Surgeons already trained in brachial approach with aortic access to the distal aorta
- May be able to continue anticoagulation
- Patient satisfaction/requests
Thank-you!!