It Is All in the Wrist…
Radial Approach to Cardiac Catheterization

Denise Rhodes MS APC-BC AACC
Interventional Cardiology
Penn State Hershey Medical Center

Disclosures

• I have nothing to disclose with regards to this presentation

Goals

• What is transradial catheterization?
• State the importance of the change to staff and patients
• Follow the transradial approach for an elective patient
• Future of the transradial approach
Catheterization

• Femoral Artery - large vessel that provides a direct route to the heart. Because bigger is better, this became the standard.

Balaji et al, Circulation 2011;124:e407-8

Femoral- Bleeding & Vascular Complications

Figure 1. Femoral catheterization and sheath insertion at the beginning of the procedure (catheter not inserted)
Where are we...
- Telemetry
- Femoral Sheaths
- Vital Signs
- Eating & Drinking
- Heavily sedated
- Stretcher or bed
- Guard Rails Up
- Discharge in AM
- Patient Teaching regarding access care

Femoral????

Recovery
- Sheath removal in lab or recovery unit
- Appropriate femoral access site management which takes time with staff and the patient
- Restrictions post procedure

Complications
- 2% of all procedures
- Bleeding most common-hematomas, pseudoaneurysms
- Delay in discharge
- Time & Money

Do we need the …

Since the beginning of time...
Radial Approach

- 1980s
- Dr Lucien Campeau

Access

Radial
- Lowest risk of access site bleeding\(^1\),\(^2\)
- Low risk of radial artery occlusion\(^3\),\(^4\)

Femoral
- Meticulous access technique to minimize inherent risk of access site bleeding\(^2\)
- Role of closure devices unclear\(^5\),\(^6\)

References:

Transradial???

Transradial World.org

“We invite you to improve the efficacy and acceptance of this elegant safer cost-effective and patient friendly procedure.”
Decreasing Vascular Complications

Strategies…
1. Pharmacological strategy
2. Optimize femoral access
3. Avoid the femoral access

Radial vs Femoral

PCIs (NCDR 2012)

Radial 8%
Femoral 92%

JACC, November 2012

What is wrong in the US?

Canada >50%
Europe >50%
Japan >50%
USA 10%
In US- approximately 2% of all catheterizations in the United States were done by radial approach in 2008!

Penn State Hershey Medical Center

2008
Femoral- 680
Radial- 848  Radial 51%

Where are we now… 2012
Femoral- 460
Radial- 690  Radial – 60%

Change the Process

• Evidence –based medicine that guided us to change procedure
• Parameters established that would ensure patient safety and appropriate care throughout
• Flexibility and individualization
• Staff education a must

TEAM APPROACH

Participation in direction of care…

- Physicians
- Observation Unit Staff
- Advanced Practice Clinicians
- Cardiac Catheterization Staff
- Patients

COMMUNICATE a CHANGE
Reasons for Transradial Approach

- Eliminates bleeding/groin pain- significant complications
- Leverages advances in safety of modern PCI to allow quicker movement through process
- Compatible with pharmacological therapy
- Standard technology

- Reasons for Transradial Approach

- Lower complication rate
- Free up staff
- Turn over time
- Increase in pt comfort
  - Back problems, pulmonary issues, quick oral intake, early ambulation
- Better hemostasis/ No peeking
- Discharge time = $

How do we get there?
Designed Work Flow

- Cardiologist approves the access site
- Catheterization Lab staff involved in room, patient preparation and initial access site care
- Observation Unit involved in access site care as part of recovery through discharge
- Patient safety and satisfaction
Pre-Procedure Care

- Pre-procedure area or Outpatient Observation Unit
  - Consents
  - Lab Work (K+, Creatinine & GFR – dictates contrast selection)
  - EKG
  - History & Physical Exam to include-
    » Allergies
    » Medications (Anticoagulants)
    » PMH (LIMA or RIMA/PVD/prior surgeries)
    » BMI
    » Skin Integrity (AV Fistulas)
    » Assess ability to lay flat

Observation Unit

Designed Work Flow

- 15 bed Observation unit dedicated to outpatient cardiac procedures
- Hospitalization coding
  *Outpatient Extended Recovery (OPER)*
- Staff involvement with plan of care
- Evaluation of the change process
Pre Procedure Care

- Assess size of wrist for compression band

Pre Procedure Care

- Sedation Needs – MILD SEDATION
  - Versed 1 mg to 2 mg
  - Fentanyl 50 mcg
  - Dilaudid 0.5 mg to 1.0 mg
  - Benadryl 25 mg
  - Other choices

Complimentary Blood Flow

“Love that wrist”
Pre Procedure Care

Access Radial & Ulnar Patency

Modified Allen’s

Pre Procedure Plethysmography


To the Cath Lab

Intra-Procedure

• Arrival in Catheterization Lab
  – Check List- Pt Identification, Consents, Lab work, Allergies, Sedation record reviewed
  – Time Out
• Prep-
  – Monitoring Devices
  – Positioning Devices
  – Wrist/Groin Prep- Case Specific or completed
  – Drapes- L heart Pack, 25gx1.5 inch needle/21gx4cm access needle

Intra Procedure Care

• Access Sites- Radial, Brachial, & Femoral
  – Chlorhexidine Prep
  – Groin Shave/prep case specific
Intra Procedure

– Positioning for Radial Access
  • Table Boards: custom made for lab
  • Utilized for R radial approaches

– Positioning for Radial Access
  • For Support place two oversized arm boards
  • Patient Supine, Abducted Right arm, Elevate on Towels with wrist hyperextended.

Customized Table Boards

Wrist Positioning
Intra-Procedure
Shave and Prep Wrist and Both Groins
- Unable to obtain access
- Tortuous vessels/Anatomical Variations
- Arterial Spasm
- Radial Stenosis
- IABP

Radial Anomaly

Axillary Loop
Intra Procedure

Positioning for Left Radial

- For Support place two oversized arm boards
- Patient Supine, Left arm Elevate on Towels with wrist hyperextended.
- Doctor will access Artery from Left side of table
- After Left Artery access obtained Elevate Left arm further on pillows and Adduct (towards midline)

Intra Procedure

Equipment Choices

- For the most part, the same products used for femoral approach will work for radial approach
- There are some product choices specifically for radial approach.
  - Short puncture needle
  - Hydrophilic sheath
  - Short vs. long sheath
  - Specific guide catheter curves and sizes
**Intra Procedure**

**ACCESS-**
- Sheath Size- 4F-7F with length 100-250mm/hydrophilic coated or noncoated
  - OR
- Sheath Size- 5F Sheath or 5F Rad T.I.G. Catheter (Terumo)
- Catheters- L heart- Standard LHC JL 3.5/JR4/Angled Pig 145
  R Heart- 5F Balloon Wedge/5F Thermodilutional Catheter

---

**Transradial Diagnostic Products**

Diagnostic Catheters:
Universal catheter that can be utilized for both RCA and LCA angiography
Enhanced performance in smaller French sizes

Brachial Curve Shape available in:
French Size: 4F, 5F, 6F
Curve Size: 3.5, 4.0, 4.5
Length: 80cm and 100cm

Medtronic

---

**Catheters**
Intra Procedure

- Radial Cocktail
  - Cardizem 5 mg Intra Arterial
  - Verapamil 2.5 mg Intra Arterial
  - Nitroglycerine 200 mEq Intra Arterial
  - Heparin 50 units/Kg (First 500)
  - Nicardipine 250mcg Intra Arterial slow push

  Given after Radial Sheath Placement

Intra Procedure

- Heparin- 50u/kg (first 5000u) or ACT obtained if patient was on heparin drip- Heparin effect
- If pt was on LMWH < 8hr prior to procedure- No addtl medication given
- If pt was on LMWH > 8hr prior to procedure- Supplement with .3mg/kg IV
- Anticoagulation- May remain on this medication, if was subtherapeutic (INR<2) may supplement w/ Heparin
Radial/Brachial Spasm

Intra Procedure
• Spasm- Nicardipine 250mcg IA slow push (premixed 100mcg/cc)

• Difficult Access-
  – Glide Wire .035/150cm or .018/180cm w/ RHC

• Unable to access- convert to groin procedure

Intra Procedure
Percutaneous Coronary Intervention
• Medication Use- Anticoagulation with Thrombolytics, IIB-IIIA Inhibitors, Angiomax

• Stent Selection- DES vs BMS

• Checking ACT w/ Thrombolytics- Differs by physician
Intra Procedure

- SHEATH REMOVAL-
- Spasm – Nicardipine 250mcg IA slow push
  - Cardizem 5 mg + NTG 200 mcg
  - Verapamil 2.5 mg + NTG 200 mcg
- Compression Band Placement
- Transfer from Lab to Outpatient Observation Unit-providing staff with patient procedure report

Post Procedure

LONG AND STRONG WITH RADIAL IS WRONG
Optimal Hemostasis without Occlusion of Radial Artery.

Hemoband Vs TR Band
Recovery

Post Procedure Care
• VS w/ wave form monitoring
• Access site assessment
• Oral fluid intake
• Ambulatory as tolerated

Post Procedure
Post Procedure

Occlude above Wrist Bend over Pisiform Carpal to Prevent Displacement of Soft Tissue and Radial Artery Occlusion.

Post Procedure

Diagnostic vs PCI

Diagnostic
1. VS/radial artery assess
2. Monitoring of Band
3. 90 minutes until hemostasis achieved, occlusive dressing, limit use of access site
4. Discharge 2-2 ½ hrs from return to Unit

Intervention
1. VS/radial artery assess
2. EKG
3. Monitoring of Band
4. 90 minutes until hemostasis achieved, occlusive dressing, limit use of access site
5. Patient Education
6. Discharge 6-8 hrs from return to Unit
Post Procedure

- Specifics regarding wrist approach
- Discharge Instructions are Institution Specific
- Advantages of the wrist approach
- FOLLOW UP with PATIENTS

Discharge Instructions

For 2 days beginning day after procedure-
- No lifting greater than 1 pound with affected arm
  - Avoid excessive wrist movement-
    flexion/extension
For 5 days beginning day after procedure-
- No vigorous exercise with affected arm

Riding the Radial Wave
Feasibility…Not just coronaries…
1. Subclavian, Vertebral & carotid interventions better suited
2. Renal & mesenteric vessels superior oriented origin, easier access
3. Iliac & proximal superficial femoral artery more accessible from arm
4. Can allow for combined approaches for effective treatment


Feasibility…Not just coronaries…
• **Catheter-based Renal Denervation for Resistant Hypertension Performed by Radial Access**…
• …6Fr sheath inserted into R radial artery…customized JR catheter to engage renal artery with Symplicity RF catheter


Feasibility…Not just coronaries
• Carotid disease pts often with PVD
• January 2005-06 selected 42 patients to undergo carotid stenting via radial approach.
• Stenting was successful in 35/42 patients with no radial access complications

What CAN go wrong?

Why Make this Work?

Maximizing the use of the Outpatient Unit while providing appropriate patient care

Patient Satisfaction

Cost Benefit

Administration Satisfaction

Why it may not work…

Not Drive-thru Medicine!

- It’s change…
- Lack of communication
- Lack of coordination
- Lack of pt/family understanding
Transradial Access for Cardiac Catheterization

Transition to this process based on:
- Team Approach
- Assessment
- Team Education

So, what’s stopping you, and you, and

• We’ve always done it the femoral way.

• We would have to train staff.

• We would have to educate the patients, too.

• We might make the news………..

“I’ll take the wrist over the groin procedure if I have to do this again.”

PCI cath patient from 2/4/2013

Where’s your finish line?
Thank you very much…

We are… Penn State

dhodes@hmc.psu.edu