36th Annual APACVS MEETING: Arterial Conduit Harvest

Robert F. Carlucci, MPAS, PA-C, FAPACVS, DFAAPA
Director, Physician Assistant Services

Staten Island University Hospital
Northwell Health™
• No disclosures
• GOALS

- Historical perspective
- Techniques
- Trends
- Evidence
- Demonstration
• Experimental
Alexis Carrel MD (France) 1910
Arthur Vineberg MD (Canada) 1946
Robert Goetz MD (NY) 1960 IMA to RCA (Rosenbach Ring)
Vasilii Kolesov MD (Russia) 1964 first IMA to RCA (sutured)

• Vein graft
Rene Favaloro MD 1967 Cleveland Clinic, first used SVG to autograft to the RCA
Dudley Johnson MD (Milwaukee) included left system

• Mixed venous and arterial grafting
Charles Bailey MD (Philadelphia) 1968 used IMA with SVG
Alain Carpentier MD (France) 1971 Radial graft “skeletonized”
Floyd Loop MD 1986 Cleveland Clinic IMA 10 year mortality benefit
Christopher Acar MD 1992 (France) “no touch”, pharmacologic

Ann Cardiothorac Surg 2013; The history of arterial revascularization: from Kolesov to Tector and beyond.
Buxton

Staten Island University Hospital
Northwell Health

Robert F. Carlucci, MPAS, PA-C, FAPACVS, DFAAPA

- 28 centers. 7 countries
- Randomized 3102
- SIMA or BIMA
- Data from 1 (2010) and 5 (2016) years show no difference in mortality (endpoint)
- 1.3% (SW)
- Patency rates similar in IMA

- 8 studies  2 art 5346. 3 art 4941
- The use of a third arterial conduit in CABG patients is not associated with higher operative risk and is associated with superior long term survival, irrespective of sex and diabetic status
Radial artery grafting in CABG

• A. Carpentier *The aorta-to-coronary radial artery bypass graft: a technique avoiding pathological changes in the graft.* Ann Thorac Surg 16 (1973)
  - 40 grafts in 30 patients

  - 18 years after
  - 56 ra grafts 100% early patency, 93% late patency
  - Diltiazem
  - Refined harvest technique

Robert F. Carlucci, MPAS, PA-C, FAPACVS, DFAAPA
Randomized Controlled Trials

  - 440 ra, svg to lcx or rca
  - 1 yr svg 13.6% ra 8.2% occlusions 8, 12 month

- S. Goldman, **Radial artery grafts vs saphenous vein grafts in coronary artery bypass surgery:** JAMA 2011
  - 733 patients (ra 366) svg (367)
  - 1 year 89% for ra & svg

- P. Hayward, B. Buxton. **Radial Artery Patency and Clinical Outcomes.** Heart, Lung and Circ 2011.
  - 2004 finished enrollment
  - >5 yrs 87% 94%
  - Await 10 year data

- 5 rct including 936 patients
- 14.1% ra and 14.6% 1 year

- 35 studies with angiographic patency rates

- “the findings of this systematic review of the published literature and meta analysis support the use of the radial artery in preference to SV conduits for CABG”

- 85% ra patency
- Target vessel stenosis >90%, but not location of distal influenced long term outcome.
- No patients reported arm/hand symptoms.
- Ulnar diameter had increased.
• Radial use in CABG
  - UK/AUS/USA/CAN
  - 4% - 6%
  - 12% - STS 2002

• Radial (arterial/media/spasm)

• Guidelines should be followed
  - 70/90
Fibrocollagenous tissue

Internal elastic lamina

Tunica intima

Fibrocollagenous tissue with external elastic lamina

Tunica adventitia

Smooth muscle [Tunica media]

Endothelium
2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery: Executive Summary

Class IIb

- Complete arterial revascularization may be reasonable in patients less than or equal to 60 years of age with few or no comorbidities. *(Level of Evidence: C)*
- Arterial grafting of the right coronary artery may be reasonable when a critical (≥90%) stenosis is present.32,36,38 *(Level of Evidence: B)*
- Use of a radial artery graft may be reasonable when grafting left-sided coronary arteries with severe stenoses (>70%) and right-sided arteries with critical stenoses (≥90%) that perfuse LV myocardium.39–44 *(Level of Evidence: B)*

Class III: HARM

- An arterial graft should not be used to bypass the right coronary artery with less than a critical stenosis (<90%).32 *(Level of Evidence: C)*
The Society of Thoracic Surgeons Clinical Practice Guidelines on Arterial Conduits for Coronary Artery Bypass Grafting

Recommendations (Radial)

- As an adjunct to LITA to LAD (or in patients with inadequate LITA grafts), use of a RA graft is reasonable when grafting coronary targets with severe stenoses (COR IIa, LOE B),

- When RA grafts are used, it is reasonable to use pharmacologic agents to reduce acute intraoperative and perioperative spasm (COR IIa, LOE C).
• T. Wakeyama, H. Ogawa, A. Takaki. **Intima-media thickening of the radial after transradial intervention. An intra-vascular ultrasound study.** J Am Coll Cardiol 2003

- Increased intimal and medial thickness and intimal hyperplasia


- Acute intimal tears 67%, dissections 35% and chronic intimal thickening

- Gaudino→heart team

Robert F. Carlucci, MPAS, PA-C, FAPACVS, DFAAPA
• Summary

• Arterial grafting mortality benefit
• Ra superior to SV over time. Endpoint of mortality benefit and patency
• Not for all (% stenosis, ESRD/AV Fistula, Mod Allen’s)
• Guidelines support when adhering to 70/90 rule
• ERAH reproducible
• EVH lessons prepared us for success