Total Arterial Revascularization

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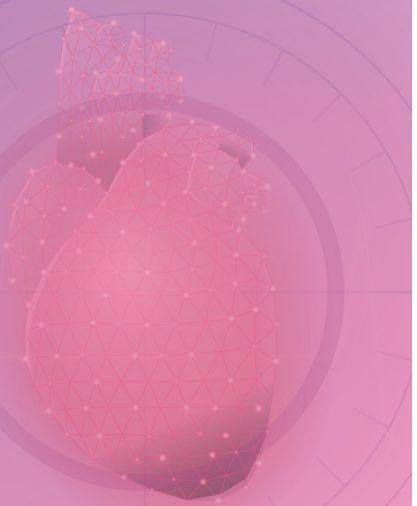


COI

- HRT- founder – Equity interest
- SAB – VGS solutions

- None related to this presentation

The wealth of data supporting LIMA – LAD is now irrefutable:

- Survival advantage
- Increased freedom from myocardial infarction
- Increased freedom from recurrent symptoms
- Reduced requirement for further coronary interventions
- Long-term patency

Given the clear benefits of the LIMA graft, we then need to ask ourselves…

Are multiple arterial grafts better than one?

(Is it possible to have too much of a good thing?)

(Do we have enough evidence to prove benefit of multiple arterial grafts?)

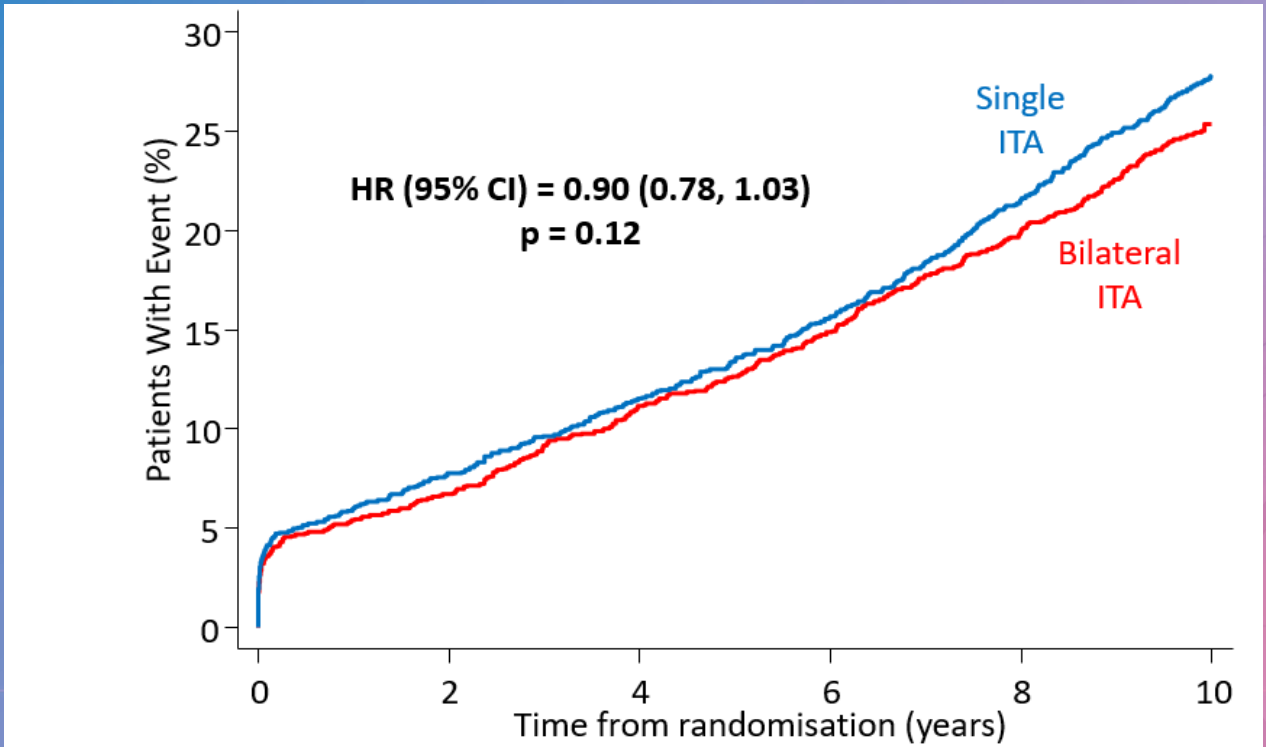
ORIGINAL ARTICLE

Bilateral versus Single Internal-Thoracic-Artery Grafts at 10 Years

David P. Taggart, M.D., Ph.D., Umberto Benedetto, M.D., Ph.D., Stephen Gerry, M.Sc., Douglas G. Altman, D.Sc.,* Alastair M. Gray, Ph.D., Belinda Lees, Ph.D., Mario Gaudino, M.D., Vipin Zamvar, M.S., F.R.C.S., Andrzej Bochenek, M.D., Brian Buxton, M.D., Cliff Choong, M.D., Stephen Clark, M.D., Marek Deja, M.D., Jatin Desai, M.D., Ragheb Hasan, M.D., Marek Jasinski, M.D., Peter O'Keefe, M.D., Fernando Moraes, M.D., John Pepper, M.D., Siven Seevanayagam, M.D., Catherine Sudarshan, M.D., Uday Trivedi, M.D., Stanislaw Wos, M.D., John Puskas, M.D., and Marcus Flather, M.B., B.S., for the Arterial Revascularization Trial Investigators†

N ENGL J MED 380;5 NEJM.ORG JANUARY 31, 2019

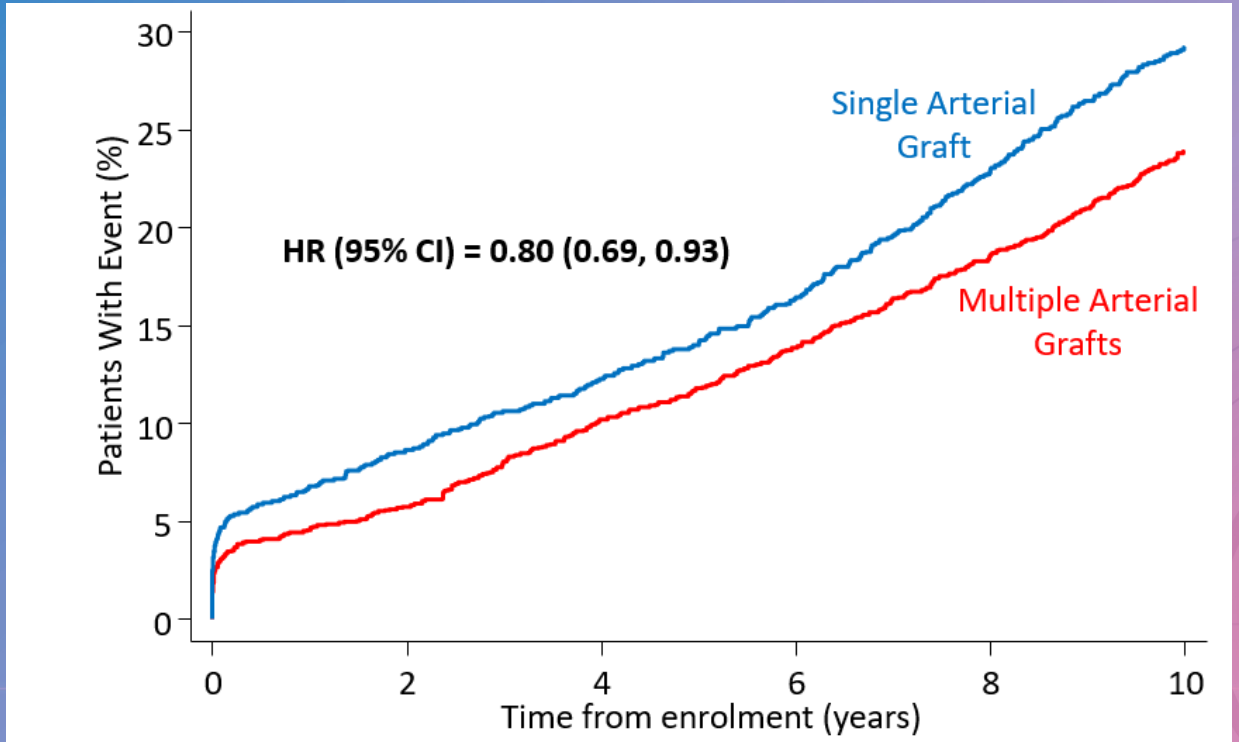
Death/MI/Stroke 10 years (Intention to treat)



No. at risk						
Bilateral graft	1548	1435	1362	1299	1214	830
Single graft	1554	1427	1366	1296	1194	821

Arterial Revascularisation Trial

Death/MI/Stroke 10 years (as treated)



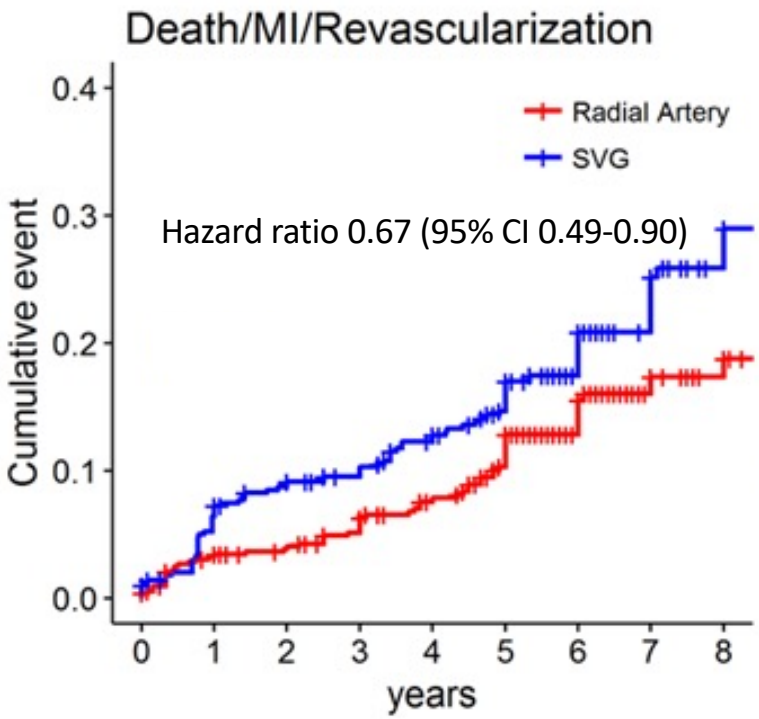
No. at risk						
MAG	1690	1591	1510	1442	1353	934
SAG	1330	1212	1162	1101	1006	692

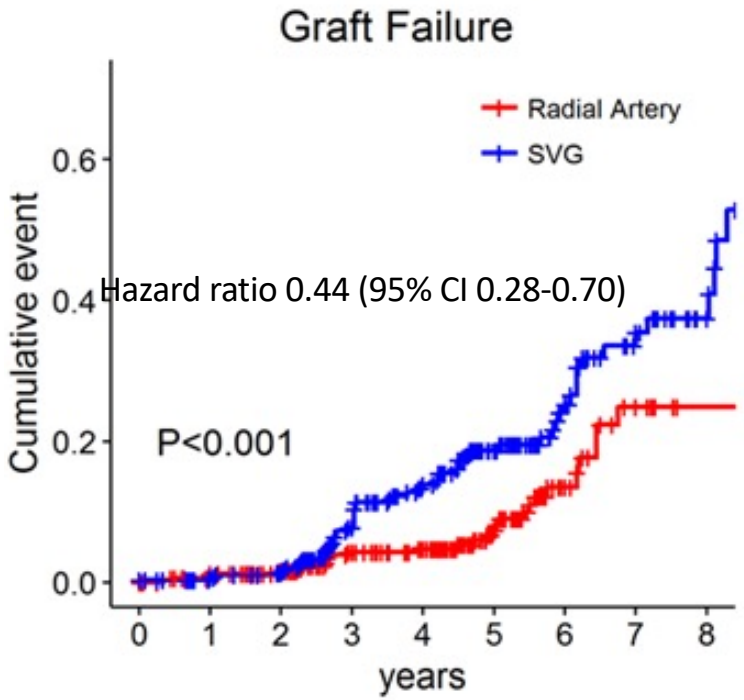
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Radial-Artery or Saphenous-Vein Grafts in Coronary-Artery Bypass Surgery

Mario Gaudino, M.D., Umberto Benedetto, M.D., Stephen Fremes, M.D., Giuseppe Biondi-Zoccai, M.D., M.Stat., Art Sedrakyan, M.D., Ph.D., John D. Puskas, M.D., Gianni D. Angelini, M.D., Brian Buxton, M.D., Giacomo Frati, M.D., David L. Hare, M.D., Philip Hayward, M.D., Giuseppe Nasso, M.D., Neil Moat, M.D., Miodrag Peric, M.D., Kyung J. Yoo, M.D., Giuseppe Speziale, M.D., Leonard N. Girardi, M.D., and David P. Taggart, M.D., for the RADIAL Investigators*


Death/MI/Revascularization
Radial Artery
SVG
Hazard ratio 0.67 (95% CI 0.49-0.90)
Cumulative event
0.0
0.1
0.2
0.3
0.4
0
1
2
3
4
5
6
7
8
years

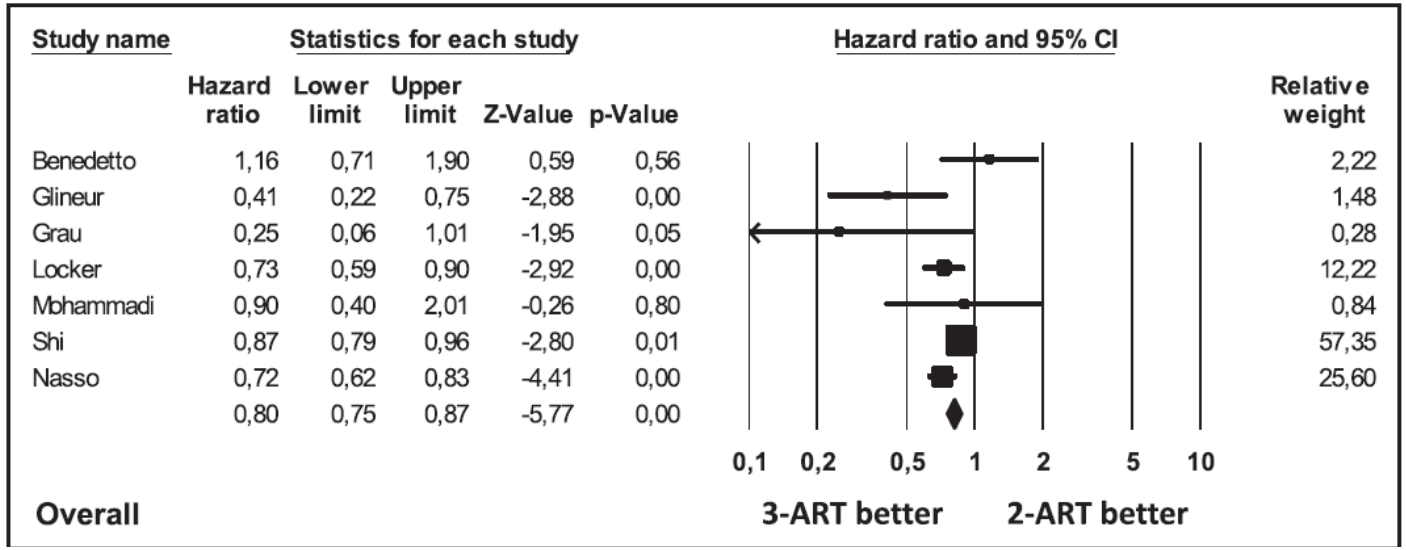

Graft Failure
Radial Artery
SVG
Hazard ratio 0.44 (95% CI 0.28-0.70)
P<0.001
Cumulative event
0.0
0.2
0.4
0.6
0
1
2
3
4
5
6
7
8
years

Three Arterial Grafts Improve Late Survival

A Meta-Analysis of Propensity-Matched Studies

Mario Gaudino, MD
John D. Puskas, MD
Antonino Di Franco, MD
Lucas B. Ohmes, MD
Mario Iannaccone, MD
Umberto Barbero, MD
David Glineur, MD
Juan B. Grau, MD
Umberto Benedetto, MD
Fabrizio D'Ascenzo, MD
Fiorenzo Gaita, MD
Leonard N. Girardi, MD
David P. Taggart, MD

Circulation. 2017;135:1036–1044. DOI: 10.1161/CIRCULATIONAHA.116.025453


Study name
Statistics for each study
Hazard ratio and 95% CI
Hazard ratio
Lower limit
Upper limit
Z-Value
p-Value
Relative weight
Benedetto 1,16 0,71 1,90 0,59 0,56 2,22
Glineur 0,41 0,22 0,75 -2,88 0,00 1,48
Grau 0,25 0,06 1,01 -1,95 0,05 0,28
Locker 0,73 0,59 0,90 -2,92 0,00 12,22
Mohammadi 0,90 0,40 2,01 -0,26 0,80 0,84
Shi 0,87 0,79 0,96 -2,80 0,01 57,35
Nasso 0,72 0,62 0,83 -4,41 0,00 25,60
0,80 0,75 0,87 -5,77 0,00
Overall
0,1
0,2
0,5
1
2
5
10
3-ART better
2-ART better

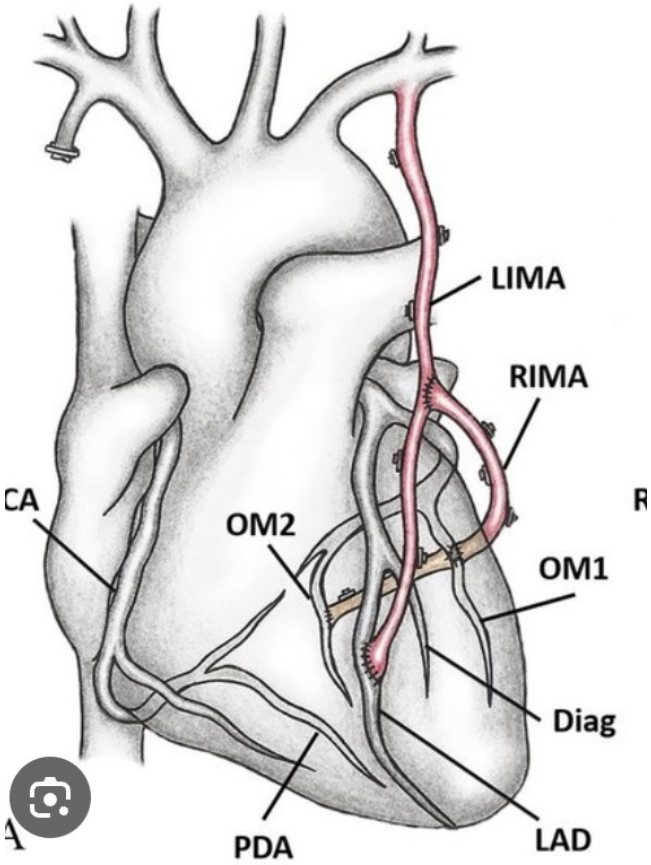
Technical Difficulties - Solutions

- Lack of number of conduits – BIMA +/- Radial GEA
- BIMA – Diabetics /obese

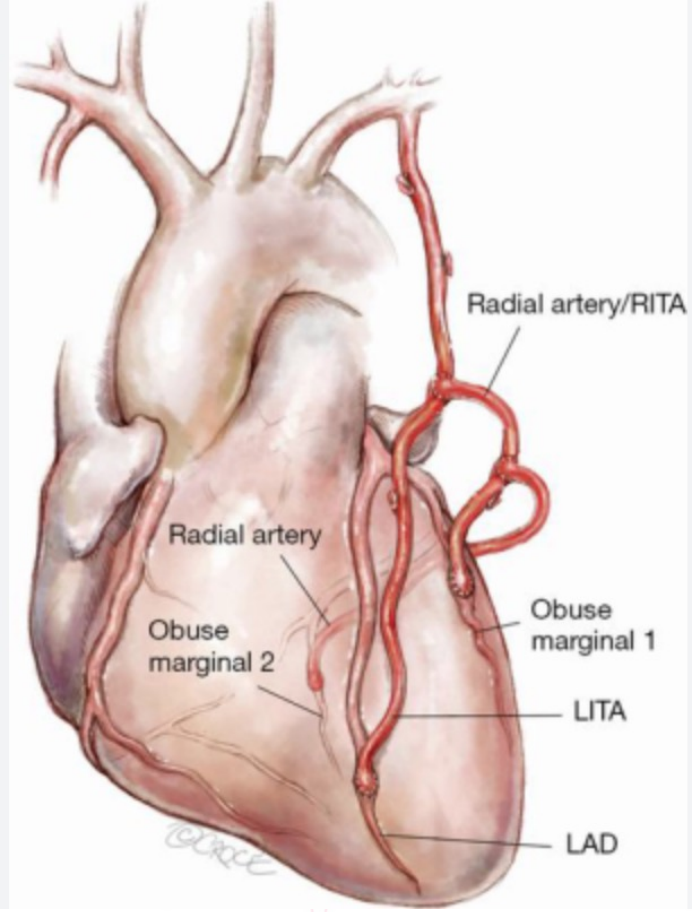
- Sequential grafts
- Composite grafts – Y grafts or end to end extension

- Competitive flow – radial grafts
- Last anastomosis vessel highest grade stenosis – CTO PDA

Graft configuration - LIMA –Y graft sequential



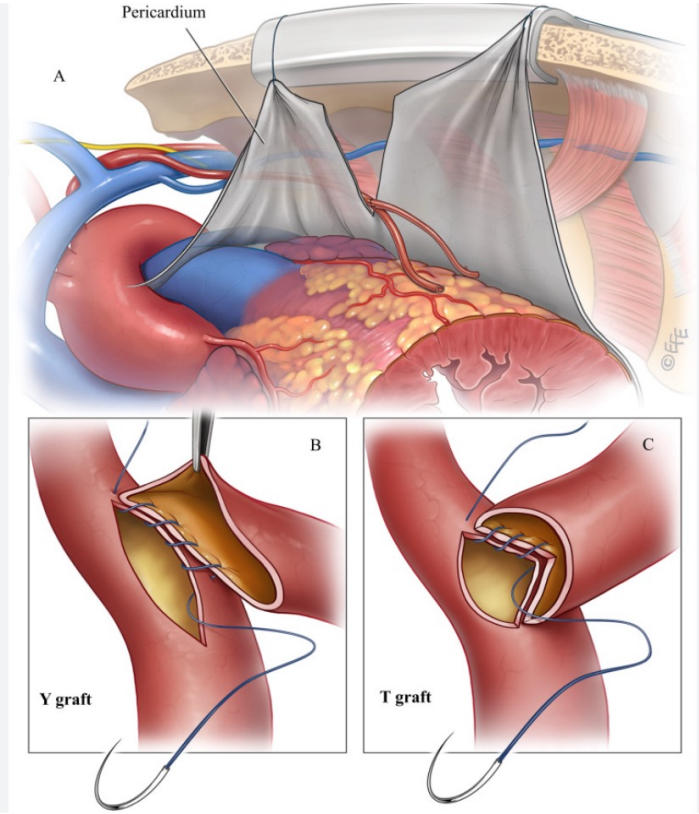
Graft configuration - LIMA – double -Y graft



Y vs T graft off LIMA

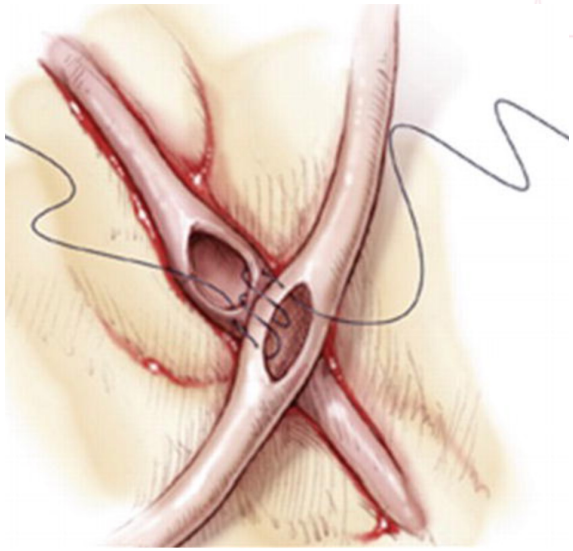
- Y – outside the pericardial V lateral grafts

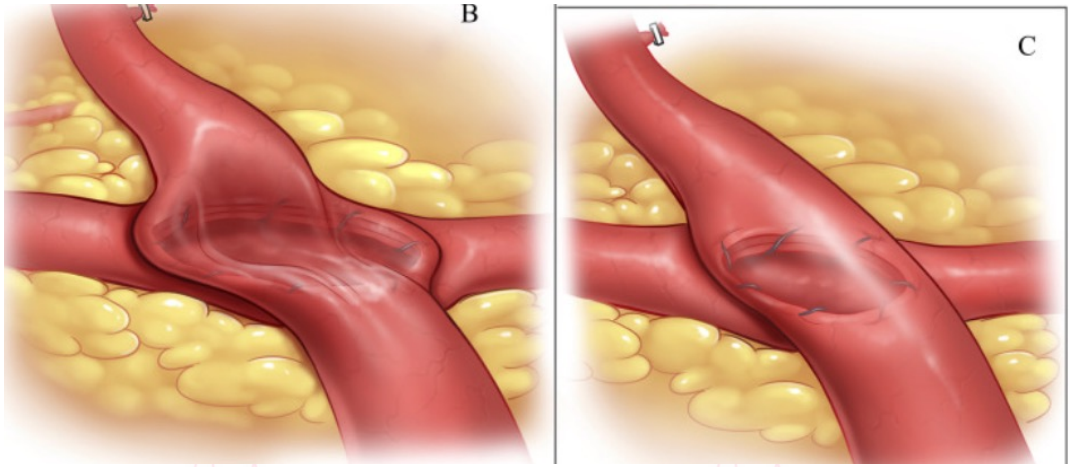
- T – inside pericardial V
  - Ramus or OM1 to prevent kink



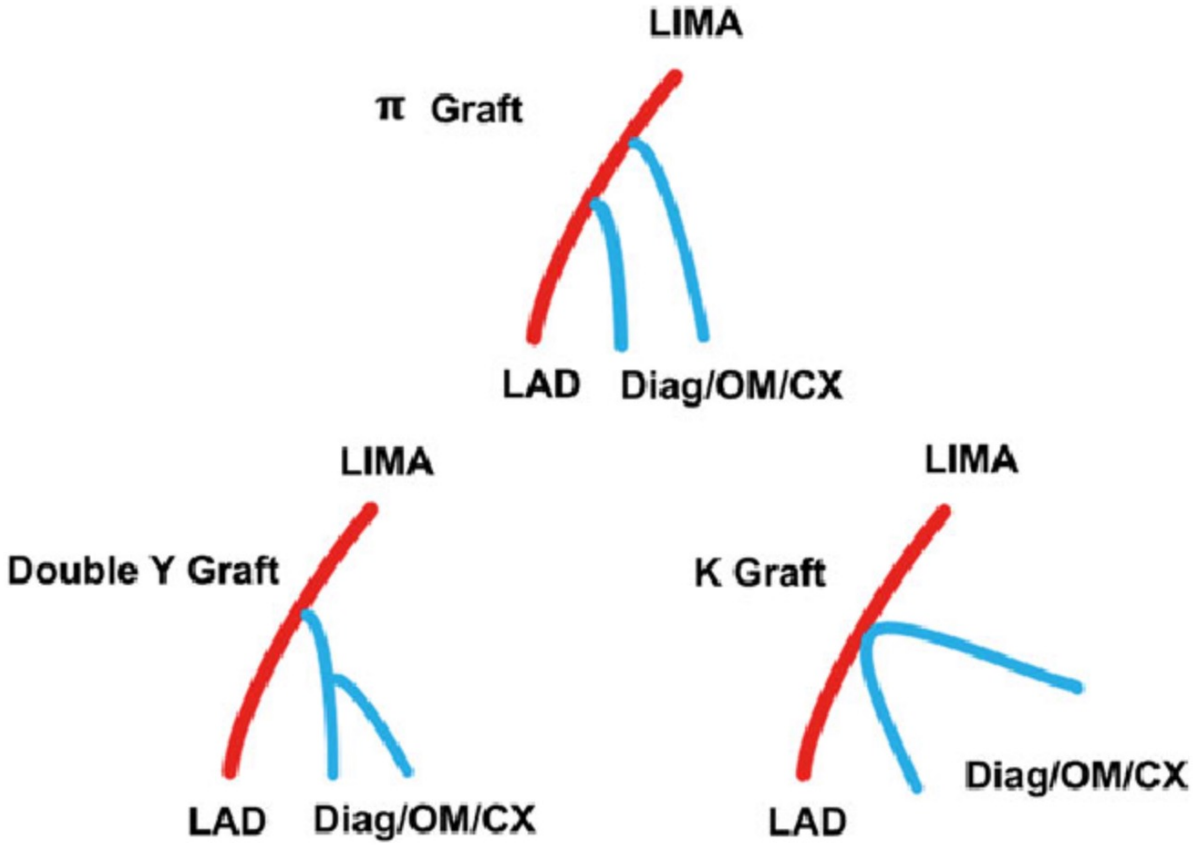
Sequential side to side

- Diamond
- Size of arteriotomy
- Not longer than donor artery
- IMA – use interrupted
  - Small 8.0 prolene
- Radial – more forgiving

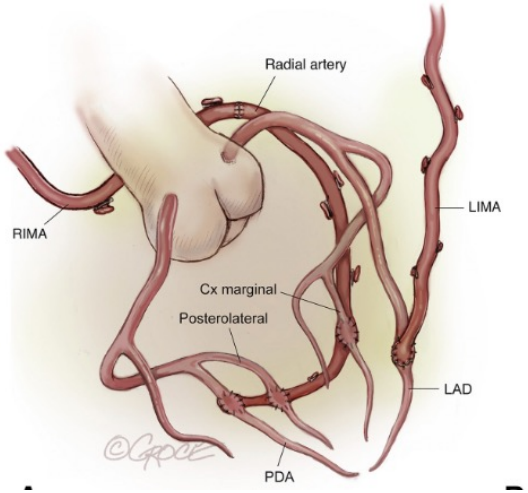


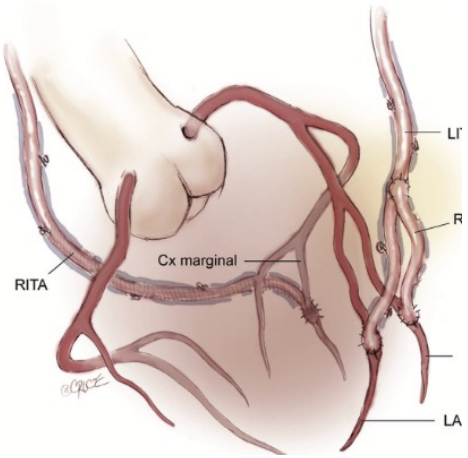


Composite configurations



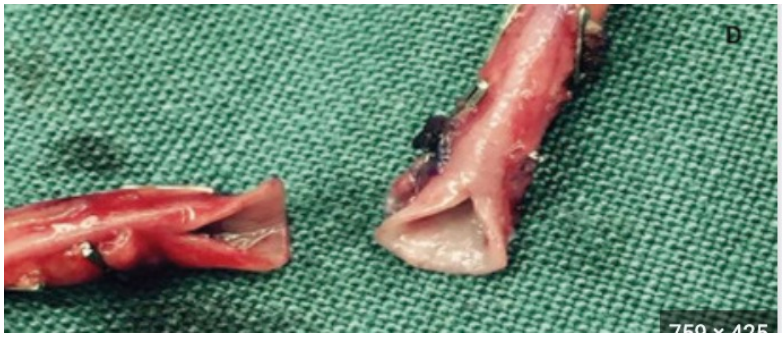
End to End extension- IMA with radial

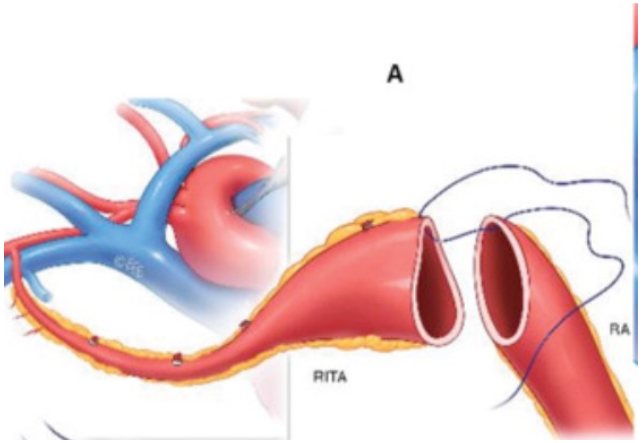




End to end technique

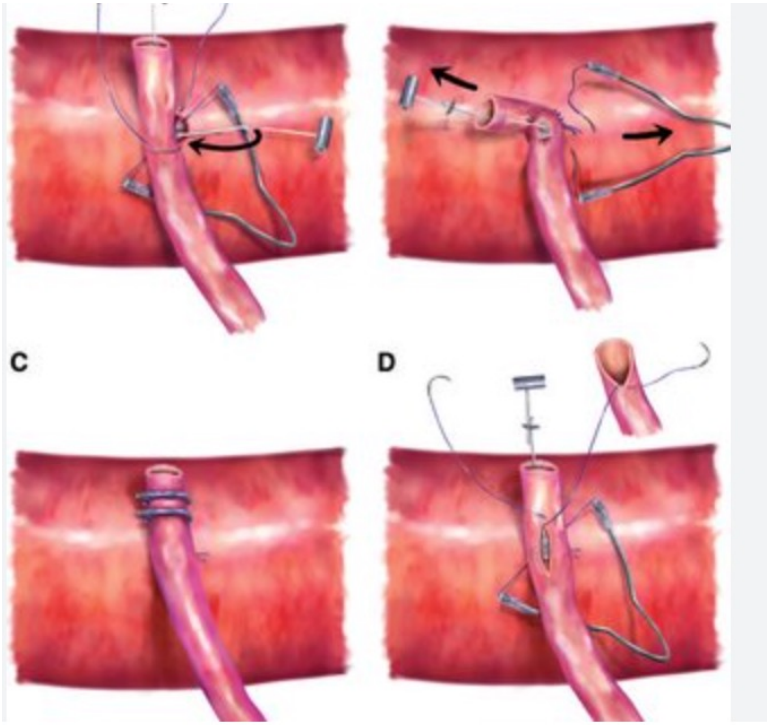
- Size of conduit
- 4mm end to end
- < 4 mm spatulated anastomosis
- Use intracoronary shunt
- Tie under pressure to avoid pursestring





Proximal Radial anastomosis on aorta

- Size > 4-5 mm
  - Smaller punch 2.8 mm
  - 7.0 prolene suture
- Size < 4 mm
  - Side to side anastomosis
  - Clip distal end
  - Can be used to do proximal piggy back
  - Free RIMA or baby radial



Step by step introduction of Multiple arterial grafts

- Skeletonizing of IMAs
  - Use in-situ grafts initially
- Use Radial
- Composite grafting
  - LIMA Radial Y – LIMA RIMA Y
  - T grafts
  - Baby - Y
- Sequential grafting
  - Vein first then radial and finally IMA
  - Interrupted suturing technique

OFF PUMP vs ON PUMP

Thank you