

Seven Ways To Improve Endoscopic Radial Artery Harvest Techniques And Outcomes

Michelle O. Dao, PA-C
Cedars-Sinai Medical Center, Los Angeles

Background

- Coronary artery bypass grafting (CABG) is a surgical procedure to treat severe coronary artery disease. The radial artery is one of the more commonly used conduits for this procedure and is preferred over the greater saphenous vein due to its long-term patency and patient’s survival rate with arterial graft.¹
- Endoscopic radial artery harvesting (ERAH) has been highly accepted due to insignificant differences found in the patency rates amongst the traditional open approach, but also the benefit of smaller incision leading to lower wound infection and neurological injury.² The concern with ERAH is that it requires more manipulation, therefore leading to increased risk of endothelium injury that could lead to graft spasm, thrombosis, and occlusion, causing an increased risk for cardiac events.¹

Purpose

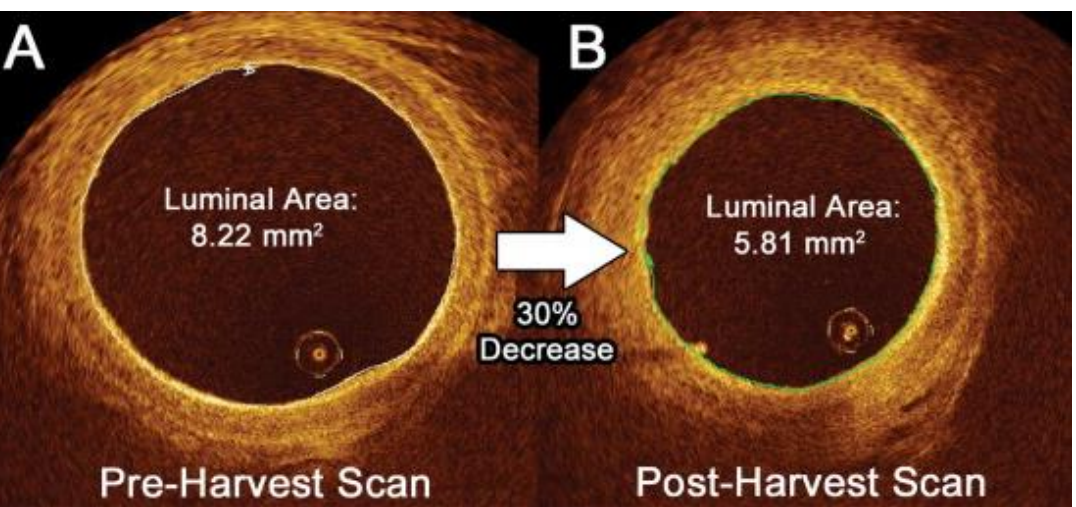
- To identify areas in ERAH that may result in poor conduit quality and address modification in the approach or methodology to improve long-term radial artery patency and outcomes, thus improving patient’s survivability.

Literature Results

- 1 Reduced CO₂ insufflation pressure to decrease microscopic endothelial injury caused by CO₂ and reduce arterial spasms.^{3,4}
- 2 No-touch approach to minimize contact and manipulation with the artery by keeping the adventitia, vasa vasorum, and surrounding perivascular fat intact is recommended.^{4,10}
- 3 Using optical coherence tomography, it was shown that 86% of endothelial injury occurred during he initial blunt dissection step. Therefore, careful manually blunt dissection and advancing of the dissection tip at the insertion site to minimize endothelial injury.⁶
- 4 Deploying the tourniquet during ERAH can lead to cellular ischemic changes. Therefore, adopting the no tourniquet technique could lead to improved and longer blood perfusion time to the vessel before transecting, thus decreasing ischemic time of the graft, and potentially improving patency rate.^{4,6,8}
- 5 Use of antispasmodic prophylaxis agents to avoid vasospasm of the artery can increases radial artery patency.⁵
- 6 Avoid over distension of the vessel when preparing conduit to minimize endothelial tissue injury.⁶
- 7 Quality of endothelial tissue can be attributed to storage in a crystalloid solution versus continuous perfusion of the graft using autologous blood.¹⁰



Cedars Sinai Medical Center (2022)



Nicholas Burris, et al. (2008)

Limitations

- Variation in the harvester’s experience, skillset, and volume of endoscopic radial artery harvests in the institution.

Conclusion

- The endoscopic radial harvesting technique is superior to the conventional open as it decreases risk of infection, pain reduction, lower neurological injuries, and overall patient satisfaction.
- Applying the seven modifications in ERAH techniques can improve the patency rates and long-term survival rates in CABG patients.

References

1. Cancelli G, Audisio K, Chadow D, et al. The evidence for radial artery grafting: When and when not? JTCVS Techniques. 2021;10:114-9
2. Tamim M, Alexiou C, Al-Hassan D, Al-Faraidy K. Prospective randomized trial of endoscopic vs open radial artery harvest for CABG: Clinical outcome, patient satisfaction, and midterm RA graft patency. Journal of Cardiac Surgery. 2020;35(9):2147-2154. doi:10.1111/jocs.14706
3. Bisleri G, Mahmood D, Payne D, et al. Endoscopic radial artery harvesting with a non-sealed approach. MMCTS. <https://mmcts.org/tutorial/1258>. Published April 9, 2019. Accessed November 1, 2022.
4. Samano N, Souza D, Botelho Pinheiro B, Kopjar T, Dashwood M. Twenty-five years of no-touch saphenous vein harvesting for coronary artery bypass grafting: Structural observations and impact on graft performance. Brazilian Journal of Cardiovascular Surgery. 2020;35(1). doi:10.21470/1678-9741-2019-0238
5. Naik A, Rahouma M, Spadaccio C, et al. Endoscopic radial artery harvesting for coronary artery bypass grafting. Vessel Plus. 2018;2:38. doi:10.20517/2574-1209.2018.62. <https://vpjournal.net/article/view/2888>. Published November 7, 2018. Accessed October 28, 2022.
6. Nicholas S, Burris BS, Emile N, et al. Optical coherence tomography imaging as a quality assurance tool for evaluating endoscopic harvest of the radial artery. Annals of Thoracic Surgery. 2008;85(4):1271-1277.
7. Huang TY, Huang TS, Cheng YT, Wang YC, Chen TP, Yin SY, et al. Radial artery harvesting in coronary artery bypass grafting surgery—Endoscopic or open method? A meta-analysis. PLoS ONE. 2020. 15(7): e0236499.
8. Abdelkarime E, Eisa A. The pneumatic tourniquet technique for endoscopic radial artery harvest; Does it affect patient hemodynamics? U.S. National Library of Medicine. <https://clinicaltrials.gov/ct2/show/NCT05349773>. Published August 3, 2022. Accessed November 7, 2022.
9. Wang H, Bilbao M, Miller S, et al. Endoscopic radial artery harvesting during anesthesia line placement reduces the time and cost of multivessel coronary artery bypass grafting. Innovations. 2020;15(1):43-50. doi: 10.1177/1556984519882014.
10. Hayashi I, Kashima I, Yoshikawa E. Use of the no-touch saphenous vein harvesting technique via small incisions. Innovations: Technology and Techniques in Cardiothoracic and Vascular Surgery. 2019;15(1):81-84. doi:10.1177/1556984519886549
11. Swinamer S, Fox S, Nagpal D, et al. Endoscopic radial artery harvest – Outcomes and lessons learned after 1000 harvests. Canadian Journal of Cardiology. 2017; 33(10):2.
12. Ferdinand D, MacDonald J, Balkhy H, et al. Endoscopic conduit harvest in coronary artery bypass grafting surgery. International Society for Minimally Invasive Cardiothoracic Surgery. 2017;12(5):301-319.