

Background:

The Ross Procedure was first introduced in the 1960s by Donald Ross as a technique for aortic valve replacement (AVR) via a pulmonary valve autograft.¹ The pulmonary valve is the closest anatomical match of the aortic valve, as both share a common embryonic origin from the bulbus cordis, along with similar tri-leaflet anatomy. A key advantage of this procedure is the autograft’s innate ability to remodel and adapt to the aortic hemodynamics.

The Amish perspective on healthcare should be taken into account when providing treatment to this unique community. Modern medicine is, at times, approached with caution and patients may opt for complementary and alternative medicine (CAM).²

Case Description

A 56-year-old Amish woman presented with dull chest pain and worsening dyspnea on exertion. She reported a history of a childhood heart murmur as well as rheumatic fever that damaged her aortic valve, the extent of which was unknown. A subsequent TTE revealed severe aortic stenosis with a mean gradient of 45 mmHg and an AVA of 0.5, and she was scheduled for valve replacement. However, given her cultural considerations as a member of the Amish community, the decision was made to proceed with a Ross Procedure. On the day of surgery, the patient tolerated the induction of anesthesia and was placed on cardiopulmonary bypass after the chest was opened. A 23mm pulmonary autograft was placed at the aortic valve position and a 28mm pulmonary homograft (LifeNET) was implanted in place of the native pulmonic valve. The patient tolerated the procedure well and had a stable post-operative course.

Discussion

Medical

The Ross procedure offers distinct medical advantages over conventional valve replacements. Using a pulmonary autograft for an AVR is the only technique which preserves the aortic root functionality, a structure significant to transvalvular flow. It has been shown that the autograft AVR demonstrates similar eccentricity, helicity, and vorticity flux when compared to controls, suggesting close resemblance to physiological states. Laurin et al. reviewed several studies that demonstrated superior all-cause mortality, stroke, and bleeding rates with the pulmonary autografts when compared to others.¹

Lifestyle

Research suggests improved hemodynamic recovery of Ross patients, leading to resumption of a more physically active lifestyle post-operatively.¹ For this patient, this translates to resumption of daily community and family activities. A study by *Takajo et al.* demonstrated that Ross patients maintained their exercise capacity, measured in METs (metabolic equivalents), compared to prosthetic valve patients who exhibited a decline.¹ Additionally, AVR with mechanical or bioprosthetic valves necessitates anticoagulation, which requires precautionary measures to avoid activities which may cause injuries as well as consistent prescription medication. The lack of anticoagulation requirements with the Ross Procedure eliminates these issues.

Cultural

This case was notable due to the considerable cultural considerations. First, the patient endorsed physical activity as an important aspect of her community involvement. Current data suggests the pulmonary autograft is best able to support post-operative physiological activity levels. Second, with anticoagulation requirements absent, the procedure aligns with the Amish preferences to avoid medications, when possible, preventing a lifelong medication regimen.² This also removes the requirement of frequent follow-ups for INR checks and reduces the likelihood of needing close follow ups with potential injuries and falls. These factors subsequently limit the cost burden on the patient, as most Amish patients do not carry medical insurance.² For this patient, her local Amish church community raised funds for the entire surgical course, including testing, hospital stays, and medication costs.

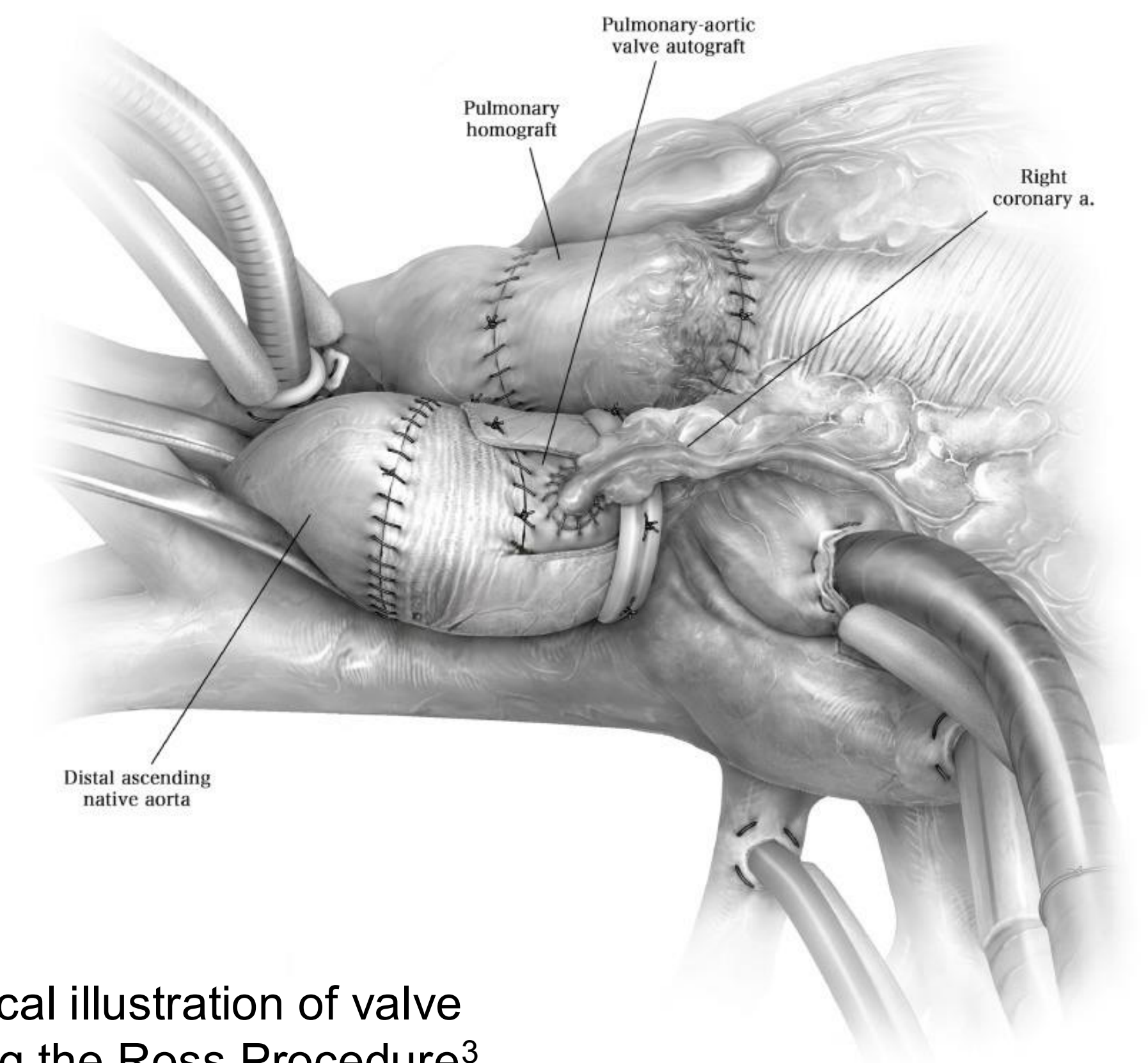


Figure 3: Anatomical illustration of valve placement following the Ross Procedure³

Conclusions:

- Pulmonic autografts have been associated with improved transvalvular flow dynamics when compared to mechanical and bioprosthetic valves
- Recent data is suggestive of improved hemodynamical recovery and maintenance of METs (metabolic equivalents), a marker of exercise capacity
- The Ross Procedure uniquely does not require a lifelong anticoagulation regimen for the patients, making it an ideal option for active lifestyles

This case illustrates unique considerations for an Amish patient undergoing an aortic valve replacement, highlighting the necessity to consider not only medical, but cultural considerations when deciding on medical interventions.



Figure 1AB: Transesophageal Echocardiogram (TEE) image in a mid-esophageal short-axis view demonstrating the aortic valve pre-operatively (A, native valve) and post-operatively (B, pulmonary-aortic valve autograft)



Figure 2AB: TEE image in a mid-esophageal long-axis view demonstrating the aortic valve pre-operatively (A, native valve) and post-operatively (B, pulmonary-aortic valve autograft)

References:

- Laurin, C., Notenboom, M. L., Chen, L., Williams, E. E., & El-Hamamsy, I. (2025). The Ross procedure in adults. *Journal of the Heart Valve Society*, 1(1). <https://doi.org/10.1177/30494826241296678>
- Anderson, C., & Potts, L. (2020). The Amish health culture and culturally sensitive health services: An exhaustive narrative review. *Social science & medicine* (1982), 265, 113466. <https://doi.org/10.1016/j.socscimed.2020.113466>
- Williams, E. E., & El-Hamamsy, I. (2021). The Ross procedure. *Operative Techniques in Thoracic and Cardiovascular Surgery*, 26(2), 189-209. <https://doi.org/10.1053/j.optechstcvs.2020.12.004>