

Objective

This study aimed to evaluate the effect of cannulation site on DO₂, as well as the association of DO₂ with clinical outcomes.

Methods

Consecutive 124 patients undergoing robotic or minimally invasive cardiac surgery from July 2024 to August 2025 were prospectively included. The decision for cannulation site was made on preoperative contrast-enhanced computed tomography images. Intraoperative parameters including DO₂, DO₂/VCO₂ ratio, near infrared spectrometry (NIRS), lactate were monitored continuously during CPB. Postoperative renal, hepatic, and hematologic markers were assessed.

Results

Mean patient age was 59.3 ± 14.1 years and 37 (29.8%) was female. Of the 124 included patients, 84 received an axillary cannulation and 40 received a femoral cannulation. DO₂ remained stable and above critical thresholds (>272 mL/min/m²) in both groups throughout CPB, with no significant differences. Axillary cannulation was more frequent in coronary artery bypass (CABG) procedures. Femoral cannulation showed higher VCO₂ [70.750 (59.375-89.000) vs 84.250 (70.775-106.625), p=0.004] and PaCO₂ [36.833 (34.150-40.750) vs. 39.333 (36.917-46.083), p=0.005], attributed to prolonged carbon dioxide insufflation in non-coronary artery bypass grafting cases, leading to lower DO₂/VCO₂ ratios [4.238 (3.290 - 5.102) vs. 3.583 (2.878 - 4.170), p=0.007]. NIRS values were higher in the femoral group (64.21 ± 8.62% vs. 57.96 ± 9.00%, p=0.001), consistent with CO₂-induced cerebral vasodilation. Lactate levels were within normal limits (<2.5 mmol/L) in both groups, with no evidence of inadequate organ perfusion.

Conclusion

Robotic surgery is a safe and advantageous approach for reoperative tricuspid valve interventions. The technique offers improved visualization during exposure of the right atrium and operating on the tricuspid valve. Operating on the beating heart and the dexterity of the robotic arms allow completion of the procedure with less extensive thoracic and mediastinal tissue dissection, resulting in a safer approach with good outcomes.

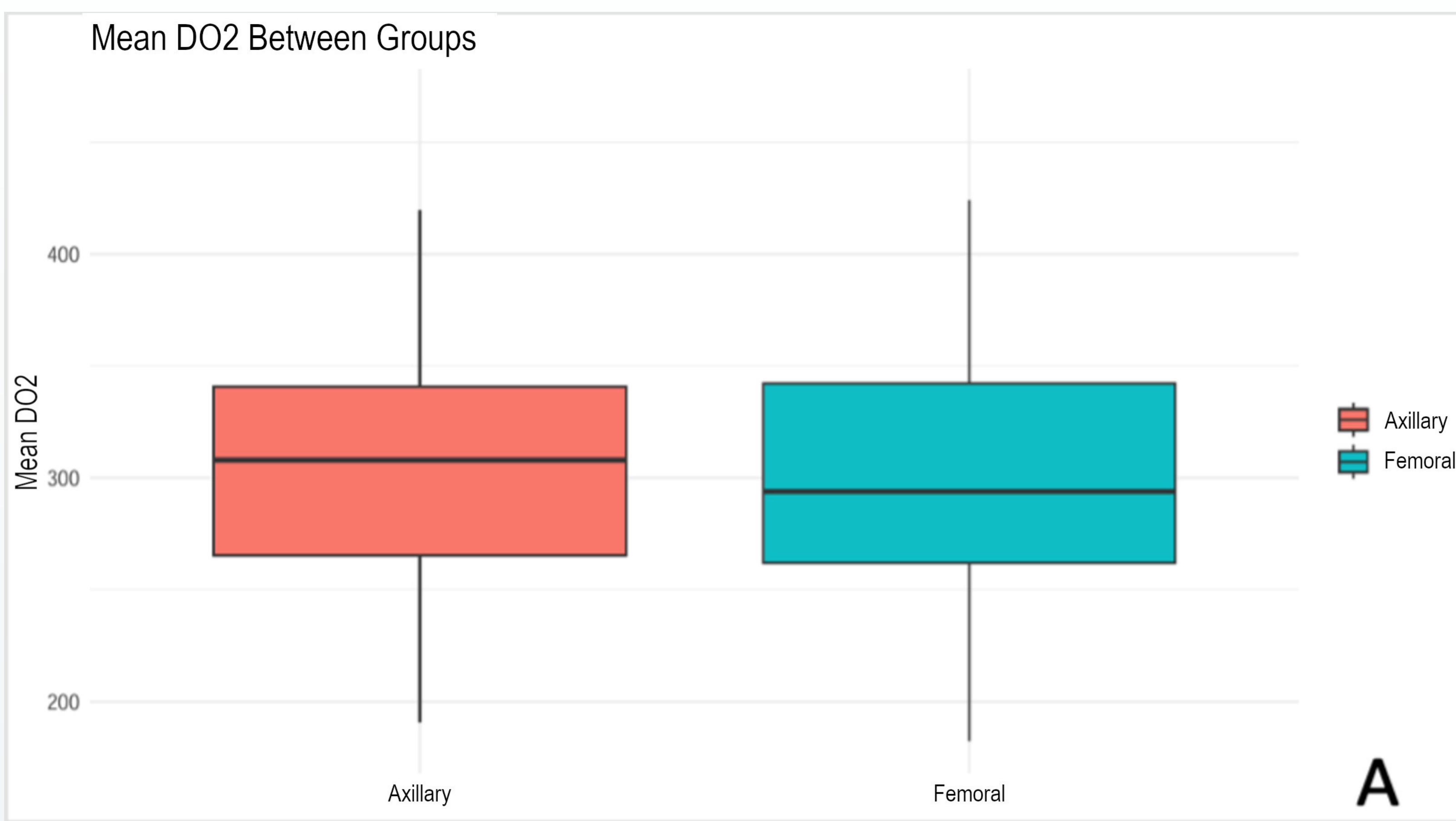


Figure A: Comparison of mean DO₂ values in the axillary artery and femoral artery cannulation groups .

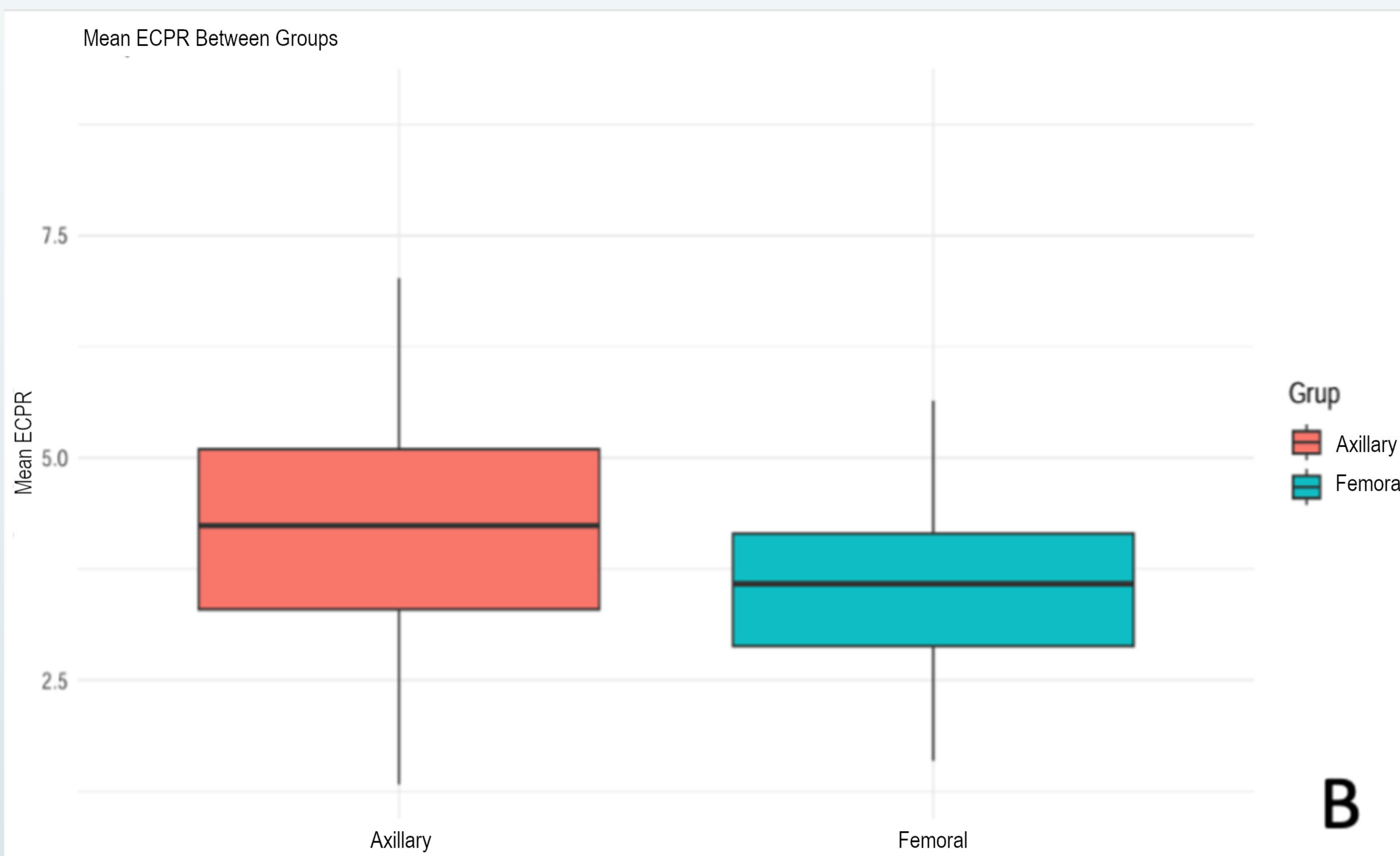


Figure B: Comparison of Mean DO₂/VCO₂ Ratios in Axillary and Femoral Artery Cannulation Groups.