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Short Communication

The novel Y-en-8 anastomosis of size mismatched vessels

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Background

Vessel size mismatch is a common challenge in a variety of anastomoses, including free flap surgeries. Potential complications in mismatched vascular anastomosis include altered flow dynamics, anastomotic leaks, and thrombotic events, which may compromise distal perfusion. Here, we describe our novel Y-en-8 technique to enable anastomosis of size mismatched vessels.

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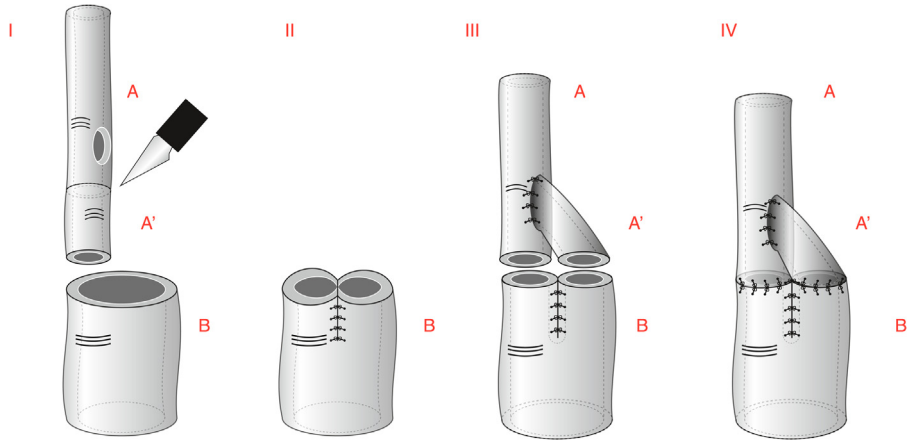

Figure 1. The Y-en-8 anastomoses overcomes vessel diameter discrepancies in vascular anastomoses. It can be performed in 4 steps: (I) identification of smaller caliber vessel A and transection generating vessel A', (II) division of larger caliber vessel B generating a figure of 8, (III) end to side anastomosis of A' (end) to A(side), and (IV) final suturing of A and A' into the figure of 8 of vessel B.

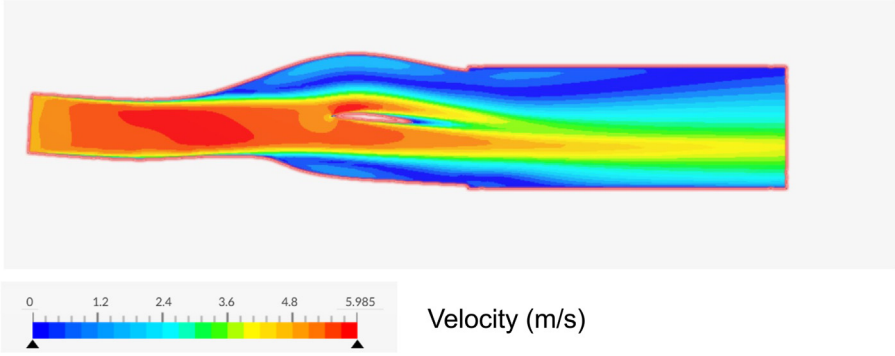

Figure 2. Computational Fluid Dynamics (CFD) analysis of the Y-en-8 anastomosis. The velocity is shown, demonstrating effective flow with minimal turbulence across the anastomosis. Scale bar shows velocity (m/s).

Technique

1. The smaller vessel (A) and larger vessel (B) are identified, such that vessel A is approximately half the diameter of vessel B. Vessel A is transected generating a vessel segment (A') and a shorter vessel A **(**Figure 1.**I).**
2. Next, stitches are placed down the middle of larger vessel (B), dividing the vessel into a dual lumen, with each lumen being approximately the same diameter as the smaller vessel. When viewed end on, the larger vessel will have a figure of 8 appearance **(**Figure 1.**II).**
3. An end to side anastomoses of A' (end) to A (side) is performed **(**Figure 1.**III).**
4. A and A' are each sutured into one of the circular areas of the figure 8 of vessel B. **(**Figure 1.**IV).**

We performed a computational fluid dynamics (CFD) analysis using SimScale to assess the and flow dynamics within the Y-en-8 anastomosis. Our results demonstrate effective flow with minimal turbulence across the anastomosis (Fig. 2 **and Video 1**).

Discussion

Several techniques in use involve mechanical dilation or vasculotomy that disrupts the vascular wall layers,[1,2] which may contribute to poor vessel function. Our innovative approach provides a method to anastomose vessels that are differ in diameter by a factor of 2. Our approach may be extended to a range of diameter mismatches, whereby a differential size and number of vessels may be utilized to achieve anastomosis. While superior technical skill is required for our method, we believe it is an important tool for the surgeon. Future studies are needed to further evaluate the Y-en-8 anastomosis.

Ethical approval

Not required.

Funding

none.

Declaration of competing interest

Authors declare no conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jpra.2024.04.012.

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