## End-to-side microvascular anastomosis

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- "Solving vessel caliber mismatch in microvascular anastomosis: A comprehensive review, novel techniques, and a surgical guide for optimal outcomes"
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End-to-side microvascular anastomosis is a surgical technique used to connect a small blood vessel (usually an artery or vein) from one tissue to a larger blood vessel in another tissue. This procedure is often performed under a microscope, as it involves extremely fine and delicate work, typically on vessels that are just a few millimeters in diameter.

## Applications

**Reconstructive Surgery**: Commonly used in plastic and reconstructive surgeries, such as free flap transfers, where tissue (skin, muscle, or bone) is transplanted from one part of the body to another. The anastomosis allows blood flow to be restored to the transplanted tissue, ensuring its survival.

Neurosurgery: Used in cerebral bypass surgery to reroute blood flow in cases of blocked or narrowed arteries in the brain, helping to prevent strokes.

Cardiovascular Surgery: Applied in coronary artery bypass grafting (CABG) and other vascular repairs, where blood vessels need to be reconnected or revascularized.

## Procedure

Preparation of the Vessels:

The surgeon identifies and isolates the recipient vessel (the larger blood vessel where the connection will be made). The donor vessel (the smaller one to be attached) is prepared by cutting it to an appropriate length and ensuring the end is clean and even.

Creation of the Opening:

A small opening (arteriotomy or venotomy) is made in the side of the recipient vessel. The size of this opening is carefully measured to match the diameter of the donor vessel. Suturing:

The surgeon then aligns the end of the donor vessel with the side opening of the recipient vessel.

Using microsutures (extremely fine sutures that can be as thin as a human hair), the surgeon carefully stitches the two vessels together. This step requires great precision to ensure the anastomosis is watertight and blood can flow freely through the connection. The sutures are typically placed in a circular or circumferential pattern around the connection site. Checking the Anastomosis:

Once the vessels are connected, the surgeon releases any clamps that were applied to control blood flow, allowing blood to flow through the anastomosis. The connection is inspected for leaks and patency (openness). Postoperative Monitoring:

After the procedure, the anastomosis site is closely monitored to ensure that it remains open and that there is no clotting or other complications that might compromise blood flow.

## **Technical Nuances**

Vessel Size Matching: Ensuring that the diameter of the donor and recipient vessels are compatible is crucial to prevent complications like turbulence, which can lead to clotting. Tension-Free Suturing: The sutures must be placed without tension to avoid narrowing (stenosis) or tearing of the vessels. Microsurgical Skills: The surgeon's ability to manipulate extremely fine instruments under a microscope is vital. Even a slight misalignment or improper suturing can lead to failure of the anastomosis. Blood Flow Considerations: Properly managing blood flow during the procedure is critical. Too much tension or improper handling can lead to vessel spasm, which might compromise the anastomosis. End-to-side microvascular anastomosis is a complex and highly specialized procedure that plays a critical role in various surgical disciplines, where restoring or redirecting blood flow is necessary for the success of the surgery and the survival of the tissue involved.

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Last update: 2024/08/14 08:49

