Microvascular Surgery

Microvascular surgery is a highly specialized surgical technique used to connect small blood vessels (typically <3 mm in diameter) using a microscope and microsurgical tools. It is essential in revascularization, free tissue transfer, and neurovascular reconstruction.

🧠 Core Principles

- Use of **operating microscope** (up to 40x magnification)
- Delicate **microsurgical instruments** (fine forceps, micro-scissors, needle holders)
- Use of ultrafine sutures (e.g., **8-0 to 11-0 nylon**)
- **Intraoperative patency assessment**:
    - Micro-Doppler
    - Indocyanine green (ICG) angiography
    - Direct visualization

🧠 Neurosurgical Applications

Indication	Purpose
EC–IC bypass	Augment cerebral perfusion (e.g., moyamoya, ICA occlusion)
Aneurysm trapping with bypass	Bypass flow before vessel sacrifice
AVM resection	Repair/reconstruction of feeding arteries
Skull base tumors	Reconstruction of vessels post-resection

🧠 Other Surgical Applications

- **Plastic surgery**: Free flaps (fibula, radial forearm, ALT)
- **Hand surgery**: Digital/limb replantation
- **ENT and urology**: Microvascular decompression, penile revascularization

🧠 Critical Success Factors

- Minimize **ischemia time**
- Precise **vessel size matching**
- Intra- and post-op **antithrombotic management** (e.g., heparin, aspirin)
- Continuous **flap monitoring**:
    - Doppler signal
    - Capillary refill
    - Skin temperature and turgor

⬚ Training and Simulation

- **Microsurgical labs** with:
    - Chicken wing or rat femoral artery models
    - Synthetic vessel simulation
    - VR-based microanastomosis simulators

Related topics:

- EC–IC Bypass
- Free Flap Transfer
- ICG Angiography in Neurosurgery

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