

MICROVASCULAR TECHNIQUES

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I. BACKGROUND

Microsurgery has become an essential technique in many surgical specialties.

Microsurgery is a complex task that requires hand-microscope-eye coordination, respectful handling of delicate tissues with microvascular instruments and steady surgical technique.

Microsurgical skills can be improved with regular practice. Mastering the technique is not possible when the surgeon is limited to observation and performing infrequent clinical cases.

Various models can be used to train and assess technical skills and dexterity. The medical profession is under increasing pressure to be able to objectively assess skills and competence.

II. MICROSURGICAL TECHNIQUE

A. BASIC AIMS

Water-tight anastomosis with the least number of sutures (arteries 1 mm in diameter ~5 to 8 and veins ~7 to 10)

Place sutures perpendicular to anastomosis and equally spaced.

Maximize patency by avoiding constriction or suturing walls together.

B. MICROSCOPE ADJUSTMENT

There is an ON-OFF switch on the main arm next to the brightest control. When you switch off the microscope during breaks, turn the brightness way down first as – this helps to reduce the risk of damaging the light.

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There is a dial on top of the binocular eye pieces to adjust the interpupillary distance. Adjust this as needed to get a binocular image.

Gross focus is obtained by slowly moving the lens assembly up or down. There is a fine focus dial on the side of the base of the lens assembly.

The magnification is adjusted by the small dials either side of the lens assembly. The effective magnification is calculated by multiplying the figure on the dial with the objective magnification, usually 10x. Thus 0.4 is equivalent to 4x. Use the middle range of magnification rather than the highest as it is easier and has better depth of field.

C. END-TO-END ANASTOMOSIS

Vessel Exposure & Preparation

Adventitia is cleared from the vessel ends

for about 2 mm to prevent accidentally incorporating it into the suture line.

“Circumcise” or pull the adventitia down over the vessel end, cut it and let it retract and then carefully trim in a circumferential fashion.

The vessel ends can be dilated to 1.5 times normal diameter. Do so judiciously in living tissue as there is a risk that this may injure the intima.

Freeing more of the vessel from the surrounding tissue may help to reduce retraction when you cut the vessel.

Sutures

8-0 to 10-0 Ethilon is used depending on the size and thickness of the vessels.

Take full thickness bites, approximately twice the thickness of the vessel and tie until the sutures are just visible.

Forcep tips can be gently placed in the

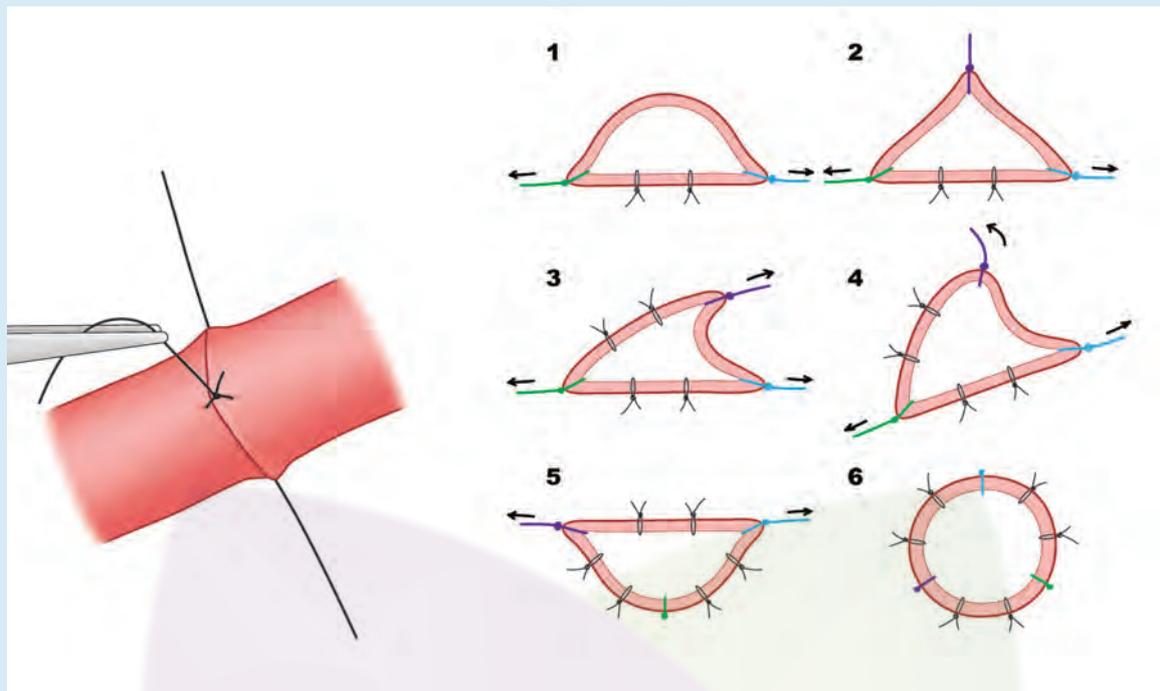


Figure 1

Three suture technique. The first two stay sutures are placed at 120 degrees to encourage the posterior wall to fall away from the anterior wall when traction is exerted laterally

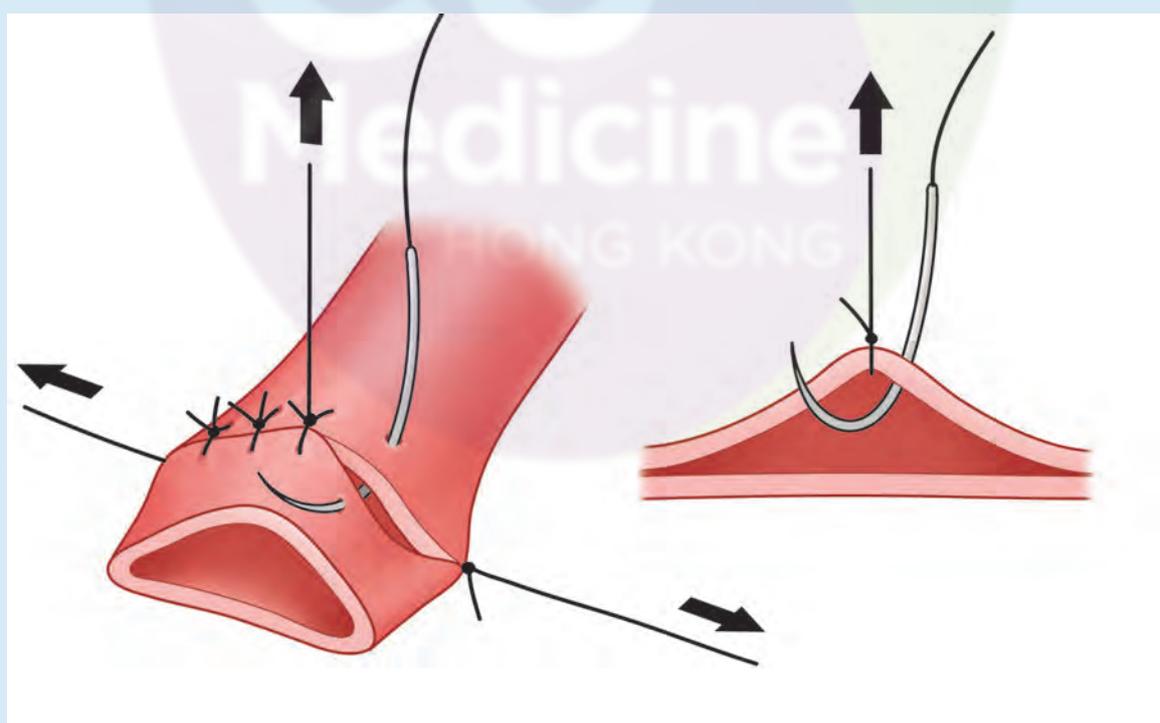


Figure 2

Use of traction and stay sutures to keep the back and front walls apart

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lumen to protect the back wall and to provide counter pressure. Alternatively gently grasp the adventitia.

Interrupted sutures reduce constriction compared to continuous sutures.

Three suture technique

Place the first two stay sutures approximately 120 degrees apart on vessel's circumference. The back wall will fall away making it less likely to capture both walls.

Figure 1

Leave the suture ends long for use as traction sutures. There are various ways of holding these sutures apart from a framed clamp, choose the method that suits you best. Complete the anterior wall. Use a central stay suture to help you manipulate the vessel ends. **Figure 2**

Rotate the anastomosis to expose the posterior vessel wall and place a traction

stitch 120 degrees from the initial two traction stitches.

Place stitches in the remaining spaces to complete the anastomosis

Surgeon's knots are used for traction or stay sutures and simple square knots for the other stitches.

Back wall first

Clamps are not needed with this technique which allows an improved view of the back wall. The vessel does not need to be flipped over and it works well even in cavities. **Figure 3**

The first suture is placed in the back wall at the most difficult point to place a suture (for right handed surgeons), right-to-left, out to in and then in to out. An assistant can hold the vessel ends together while the knot is tied.

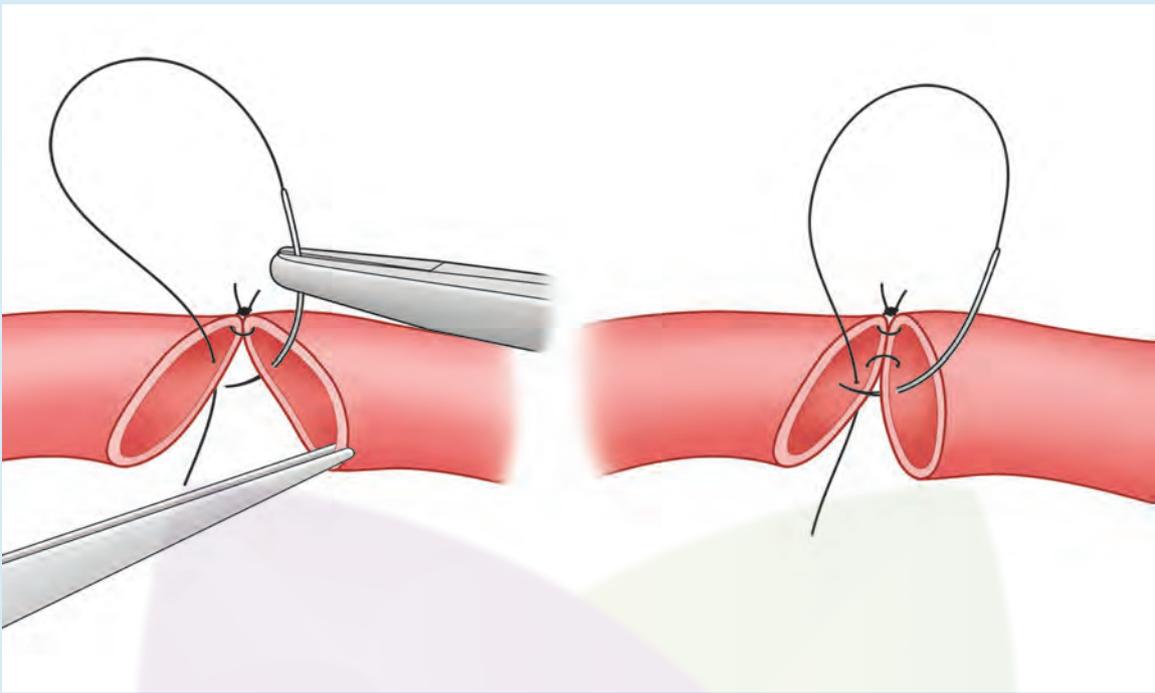


Figure 3
Back wall first technique showing the first few sutures.

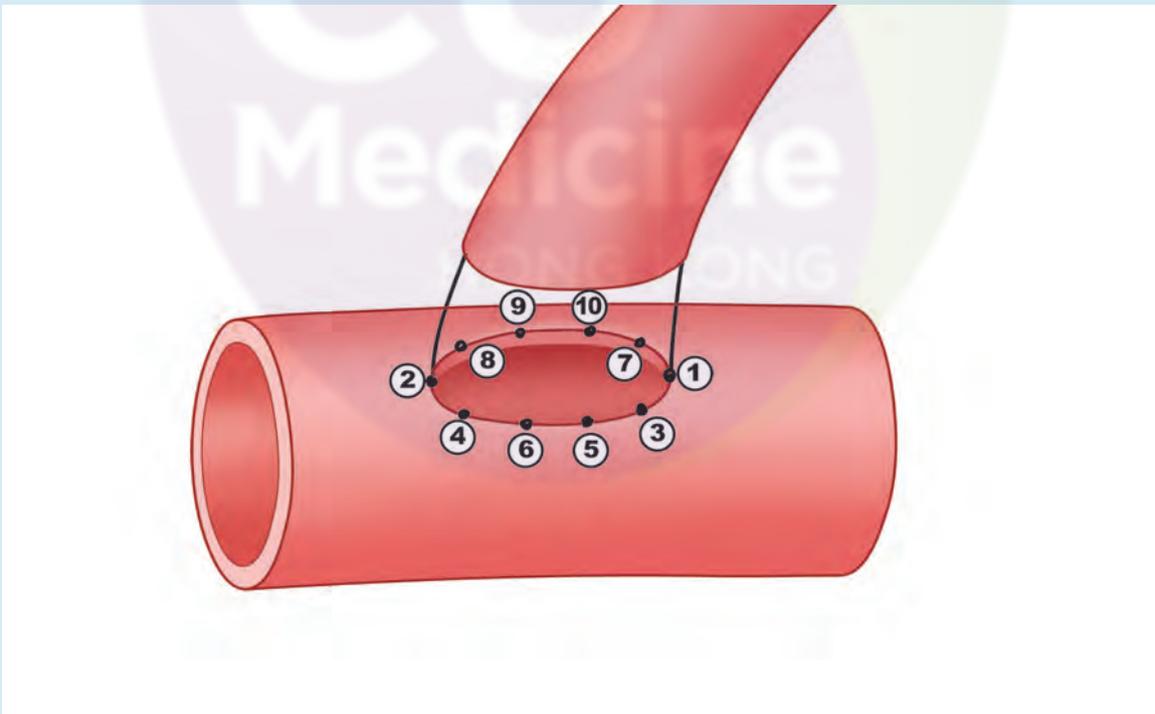


Figure 4
End to side anastomosis, front wall first technique

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The remainder of the back wall sutures are placed left-to-right. The second suture should be close to the first and subsequent sutures can be spaced further apart. Make liberal use of saline to visualize the vessel intima. "Too few sutures" is easier to fix than "too many sutures". Front wall sutures are placed right-to-left.

D. END-TO-SIDE ANASTOMOSIS

The vessel is pinched up and a piece of wall is carefully removed. Aim for a hole that is about 1.5x the diameter of the vessel to be plumbed in. The flap vessel can be trimmed at an angle to improve flow through a perpendicular arrangement.

The first suture is placed in the right corner of the hole from right-to-left, out to in and in to out.

The placement of the second suture depends partly on the mobility of the vessels. A back wall first technique is useful when there is limited mobility.

Back wall first – subsequent sutures are placed along the back wall.

Front wall first – the second suture is placed at the left corner. **Figure 4**

KEY POINTS

1. Anastomoses should be water-tight with the least number of sutures.
2. Place sutures perpendicularly and with equal spacing.
3. Maximize patency by avoiding constriction or suturing vessel walls together.
4. Adventitia is cleared from vessel ends for approximately 2 mm to prevent incorporating it into the suture line.
5. Vessel ends can be dilated to 1.5 times normal diameter.
6. Take full thickness bites, approximately twice the thickness of the vessel and tie until the sutures are just visible.
7. Interrupted sutures reduce constriction compared to continuous sutures.

