# Starting a transradial programme

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## Introduction

**For an inexperienced operator starting a new transradial programme is never easy. Initially the doctors, catheter lab and nursing staff find the procedures difficult, technically demanding and time-consuming. Laboratory throughput is reduced, and some patients experience considerable discomfort or unpleasant vasovagal reactions. There is a high rate of puncture and procedure failure in the early stages, but these procedures can be easily completed from another access site if necessary. It is important that all the staff are clear about the reasons for starting a transradial programme (reduced vascular access site complication rate, easy and reliable haemostasis even when aggressive antithrombotic therapy is used, immediate patient mobilisation) and that there exists an important learning curve.[1] Extra time needs to be allowed for these early procedures, and staff members need to be aware that the procedure will initially be technically challenging. Even an experienced cardiologist will need to perform 75–150 procedures before the technical demands of reliably puncturing the radial artery and operating from a distal site in the arm are overcome.**

**After this, the procedures become smooth and complication-free. In our unit there is no increase in procedure duration for experienced transradial operators. Prior to starting a programme, it is important to get some 'hands on' training from an experienced transradial operator. The initial programme should begin with diagnostic cases in selected patients, moving on to interventional procedures when the learning curve has been completed. It is important to do as many cases as possible each week, as this will help to build up experience rapidly. The catheter lab table set-up will need to be adjusted, with a triangular arm board configuration to provide a working area and prevent blood spillage.**

## Patient selection

The best patients to choose early in the learning curve will be men with large, easily palpable radial arteries. It will be more difficult to cannulate the radial artery in small women whose radial arteries are difficult to palpate, anxious individuals, the elderly and diabetics. Patients with peripheral vascular disease that precludes femoral catheterisation will be technically challenging whichever access site is chosen. Extensive atheroma and vascular tortuosity in the abdominal and leg vessels implies that similar difficulties will be present in the upper limb, and these patients should be avoided early in the learning curve. Radial artery spasm is more common in anxious women whereas vasovagal reactions are more common in anxious young men. It is worthwhile inserting an intravenous (IV) cannula before the procedure, to allow prompt treatment of vasovagal reactions and administration of sedation in anxious patients.

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## Radial artery cannulation

Assess the Allen test before starting, and choose another access site if the collateral circulation of the hand is suboptimal (if it fails to flush within 10 seconds of releasing pressure over the ulnar artery). The radial artery can be cannulated with a conventional open needle or with a dedicated introducer system (Arrow UK).[2] Similar success rates can be achieved with either system, but many operators find the Arrow introducer easier to use. The position of the radial artery at the wrist is very variable and you will need to modify your puncture site to account for this.

A common mistake is to try to puncture the artery in a distal position over the flexor skin creases: cannulation is usually difficult at this site. The best position to choose for arterial puncture is the point of maximal pulsation proximal to the skin creases. A vasodilator cocktail containing nitrate, verapamil and heparin will help to minimise the risk of spasm or radial artery occlusion. Short or long (23 cm) sheaths can be used. A specially designed long transradial sheath (Cook UK Ltd) is available that has significant advantages for transradial use, helping to facilitate sheath insertion and minimise the risk of spasm.

If you experience difficulty in advancing a guidewire up the radial artery, remove the wire and check the angiographic appearance of the forearm blood vessels. This may show spasm, local dissection or an arterial anomaly. Spasm usually responds to intra-arterial vasodilators. Although experienced operators can overcome dissection or arterial anomalies, less experienced operators should change access site. The commonest anatomical variation encountered is an anomalous radial artery that arises in the upper arm close to the shoulder joint. This can cause discomfort in the upper arm with catheter exchanges, but does not usually prevent completion of the procedure. Catheters should always be exchanged over a wire. Catheter usage and management of complications are dealt with in subsequent articles.

## Sheath removal and haemostasis

The radial sheath should be removed at the end of the procedure, before the patient leaves the catheterisation laboratory.[2] In the rare situation of early re-intervention, an alternative access site can be used. When removing long sheaths, exert steady constant pressure to remove the sheath over 5–10 seconds. If extreme resistance

occurs, sedate the patient, give IV verapamil 2.5–5 mg, apply a warm compress and give intra-arterial nitrate. After 15–20 minutes attempt sheath removal again. If this fails, consider an axillary nerve block to relax the radial artery. Short sheaths can usually be removed easily, even in the presence of spasm.

Apply direct pressure to the puncture site to achieve haemostasis. If using a simple tourniquet system, first apply a tight elastoplast dressing (avoiding circumferential compression of the wrist, which will induce venous stasis and discomfort), which should be kept in place for several hours after tourniquet removal. A dedicated transradial compression system (RADI medical) that applies unilateral compression to the puncture site is available. This has the advantage of allowing continued arterial perfusion of the hand via the ulnar artery, while avoiding venous congestion. This system can be left *in situ* for a prolonged time period if aggressive adjunctive antithrombotic therapy is employed. If the patient has suffered no adverse effects from the catheter or percutaneous transluminal coronary angioplasty (PTCA) procedure, he can walk as soon as the sheath is removed and the haemostasis system is *in situ*. It is important to educate staff to ensure that rapid mobilisation occurs, as this is one of the major advantages of this access site.

## Conclusions

A transradial diagnostic or interventional programme has the potential to improve patient care. A learning curve is always present, and the initial procedures can be technically challenging. Getting some 'hands on' training from an experienced operator and optimising patient selection will help to minimise the early difficulties. Once the learning curve has been overcome, transradial procedures are simple, fast, highly efficient and cost-effective.

## References


1. Eccleshall SC, Nolan J. The transradial access site for cardiac procedures; a clinical perspective. *Stent* 1999;**2**:74-9.
2. Al-Allaf K, Eccleshall SC, Nolan J. Arterial access for cardiac procedures. Utilising the percutaneous transradial approach. *Br J Cardiol* 2000;**7**: 548-52.