Miscellaneous Helpful Techniques

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This chapter discusses some techniques and tricks that are helpful for all vascular surgeons and interventionalists.

Snaring

Snaring is effective in removing retained and foreign objects from the vascular system. Occasionally snaring a wire is needed to achieve through-and-through wire "body floss" for stability and support. Snares and microsnares come in a variety of shapes, lengths, and diameters. They can be angled, and the loop snare can consist of one loop or multiple loops. The diameter of the loop also can vary: Removing a retained object from the tibial artery, for example, requires a microsnare (Fig. 36.1), but a bigger loop is needed to snare a retained wire in a large vessel. Successful snaring requires two individuals who are familiar with the technique and the device. For example, assume a wire is being snared to allow going up and over the aortic bifurcation. First, advance the snare and its catheter into the optimal spot where the wire can be advanced to be captured (Fig. 36.2). Then open the snare and the leaflets. (Often the snare must be rotated to free the leaflets and ensure that they are wide open and not trapped by the vessel wall.) Then advance the wire to be snared through the snare loop. Keeping the wire in its place, pull back on the snare while advancing the catheter to tighten the snare. See if the wire is captured. If not, then redo the steps. An oblique image might be helpful to make sure that the snare loop and the wire are in the correct position. Once the wire is captured, tighten the snare on its catheter by tightening the torque device. Then pull the snare, catheter, and wire as one system, making sure that the individual handling the wire is no longer holding onto the wire; otherwise the wire will slip out of the loop.

If a foreign body is being removed, the best approach is to get close to the foreign body by placing a sheath or catheter

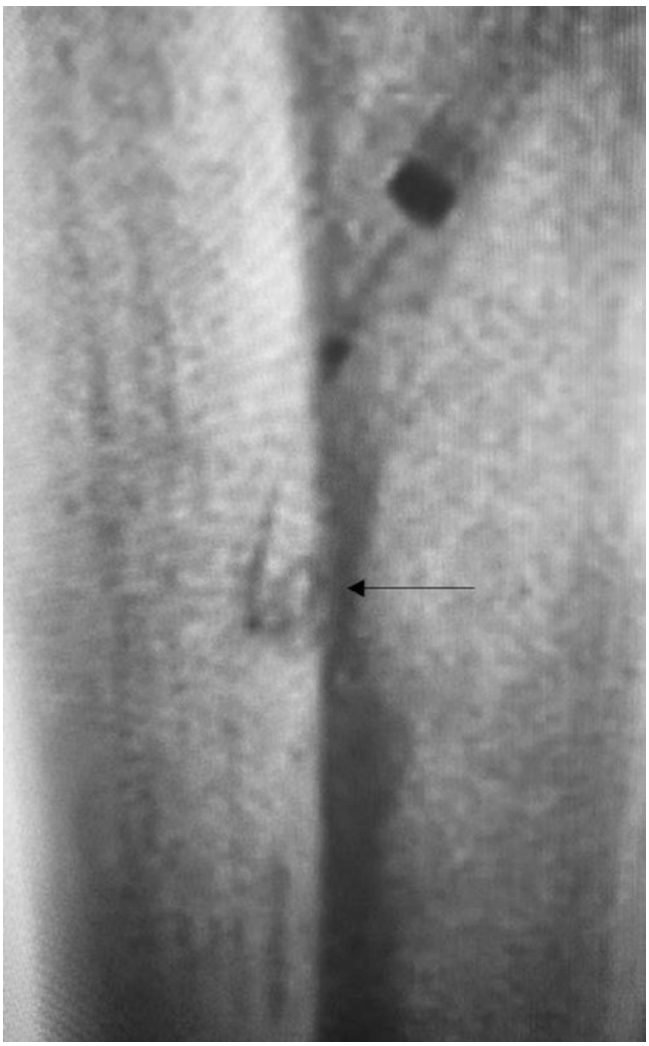

Fig. 36.1 Microsnare passed to retrieve a retained piece of microcatheter in an anterior tibial artery. *Arrow* indicates the microsnare loop

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J. J. Hoballah, C. F. Bechara (eds.), *Vascular Reconstructions*, https://doi.org/10.1007/978-1-0716-1089-3_36

Fig. 36.2 How to snare a wire using a multiloop snare

with the snare close to the foreign body. Open and rotate the snare loop(s) to catch a part of the foreign body. Then pull on the snare and catheter to lock it and retrieve the foreign body if is captured (Fig. 36.3). If the attempt is not successful, repeat the same steps but change the angle of the C arm or use a different type of snare (one-loop vs. multiple, straight vs. angled, smaller or larger loop).

Use of Touhy-Borst Adapter

The advantage of the Touhy-Borst (TB) adapter is that it allows the interventionalist to take an angiogram or inject medication like nitroglycerin while maintaining wire access through the lesion without a long sheath. To do that, you need a lower-profile wire than the size of the catheter. For

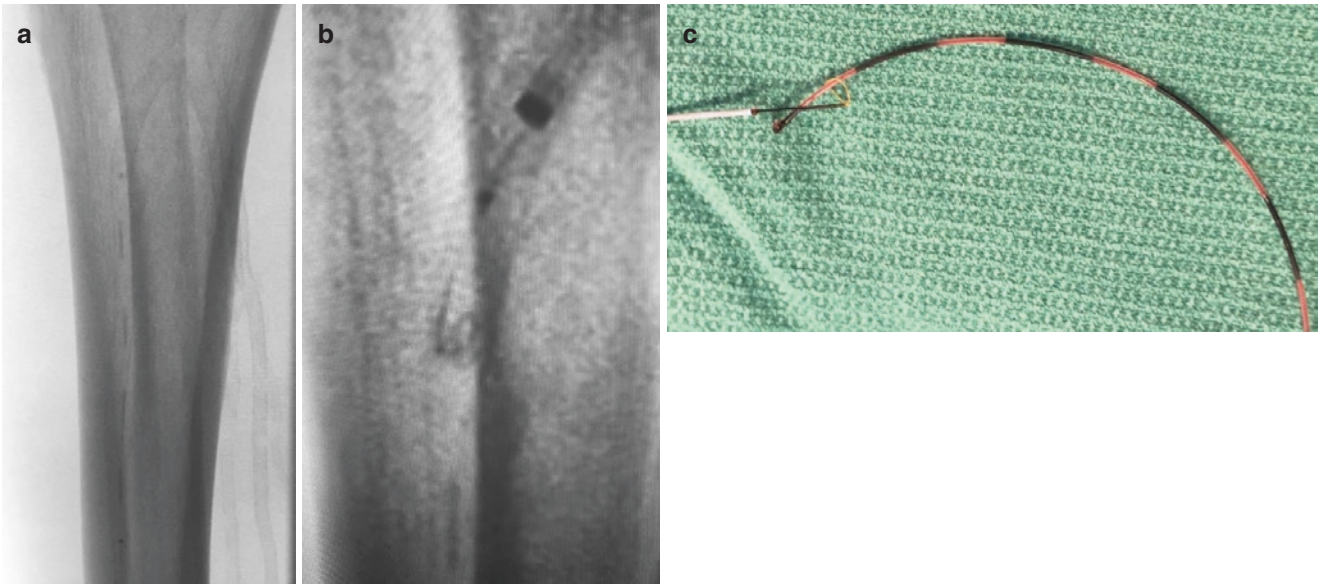

Fig. 36.3 Use of a single-loop microsnare to remove a retained catheter tip from the tibial artery. (**a**) Retained microcatheter in the anterior tibial artery. (**b**) Microsnare retrieving the microcatheter. (**c**) The retained catheter once outside the body

example, assume you have an 0.035″ wire through a high-grade focal popliteal artery stenosis, but the sheath is in the contralateral femoral artery. You pass a balloon and perform angioplasty of that lesion. Then remove the balloon and advance the 0.035″ catheter distal to the lesion, remove the 0.035″ wire and replace it with 0.014″. Then pull the catheter back proximal to the lesion and perform an angiogram using the TB to assess the angioplasty result. If you keep the 0.035″, the same profile wire as the catheter, you will not be able to inject through the TB. If the procedure is more complex, then it is best is to place a long sheath.

Brachial Access

With improvements in radial access, the need to access the brachial artery is expected to dwindle, but when it is used, brachial access hematomas and thrombosis can be minimized by using the technique described here. (For details on upper extremity access, please refer to Chap. 2). Starting with a proper access technique is essential. Access the brachial artery at or above the elbow, just above the humerus bone, to allow for proper compression against the bone. Assuming a long (6 Fr × 90 cm) sheath was introduced in the brachial artery, once the procedure is concluded, the sheath is replaced with a shorter (6 Fr × 11 cm) sheath. The heparin is reversed with protamine. To avoid thrombus formation around the sheath and brachial artery, nonheparinized saline is injected through the sheath every few minutes until the heparin is fully reversed. Place your left index finger on the radial artery (should be prepped in the field); then place one finger above and one below the sheath near the puncture site. Let the nurse or assistant pull out the sheath. Gently compress the brachial artery with your two fingers for 10–20 minutes, until you feel a faint radial pulse with your left index finger. This allows for proper hemostasis while maintaining blood flow to avoid brachial artery thrombosis.

Palmaz Stent

Because of better technology in endovascular aortic aneurysm repairs and better patient selection, the Palmaz stent is rarely used to treat a type IA endoleak after exhausting other techniques. The Palmaz stent is a balloon-expandable stent that comes in 10-mm diameter and variable lengths (30, 40, or 50 mm). This stent will foreshorten when deployed in large vessels like the aorta. It needs to be hand mounted on a balloon such as the Z-MED™ valvuloplasty balloon (Braun). It can be molded with compliant or semicompliant balloons. Mounting the stent on the balloon is a very crucial step. The balloon must be longer than the stent to avoid the watermelon effect when it is deployed. A large sheath is placed at the desired location and the stent is advanced through the sheath under fluoroscopy, to ensure that it does not come off the bal-

Fig. 36.4 Positioning a Palmaz stent in a patient with type IA endoleak. The sheath and mounted Palmaz stent are positioned in the aortic neck, with the shoulders of the balloon (*red arrow*) extending outside the edge of the Palmaz stent (*black arrow*)

loon (Fig. 36.4). Some deploy the stent within the sheath, allowing the proximal balloon to expand the proximal shoulder to prevent it from being displaced. Then the sheath is pulled back for full stent deployment.

Evaluating Proximal Dialysis Access

When intervening on failing or failed hemodialysis access, the sheath is typically inserted towards the venous anastomotic side, which is the most common site for failure, but it is also important to assess the entire access, including the proximal anastomosis. To visualize the proximal access as well as the arterial anastomosis, dye is injected in the sheath and the access is compressed, forcing the dye to fill the proximal graft and anastomosis retrogradely. The access can be compressed manually, but manual compression results in high radiation exposure to the hand, particularly if digital subtraction is performed. An alternative method is to compress the access using a sterile, large Penrose drain tourniquet around the upper arm, tied and supported by a clamp. A third approach is to perform a retrograde angiogram while performing balloon angioplasty of the access or the venous anastomosis by injecting through the sheath during the balloon insufflation. The balloon will replace the hand in occluding the access (Fig. 36.5), avoiding radiation exposure to the hand. It is important to ensure that the sheath size is one French size larger than needed for the balloon, to make it easier to inject the contrast. For instance, if the balloon will go through a 5 Fr sheath, make sure to use at least a 6 Fr sheath to allow injection of contrast around the balloon.

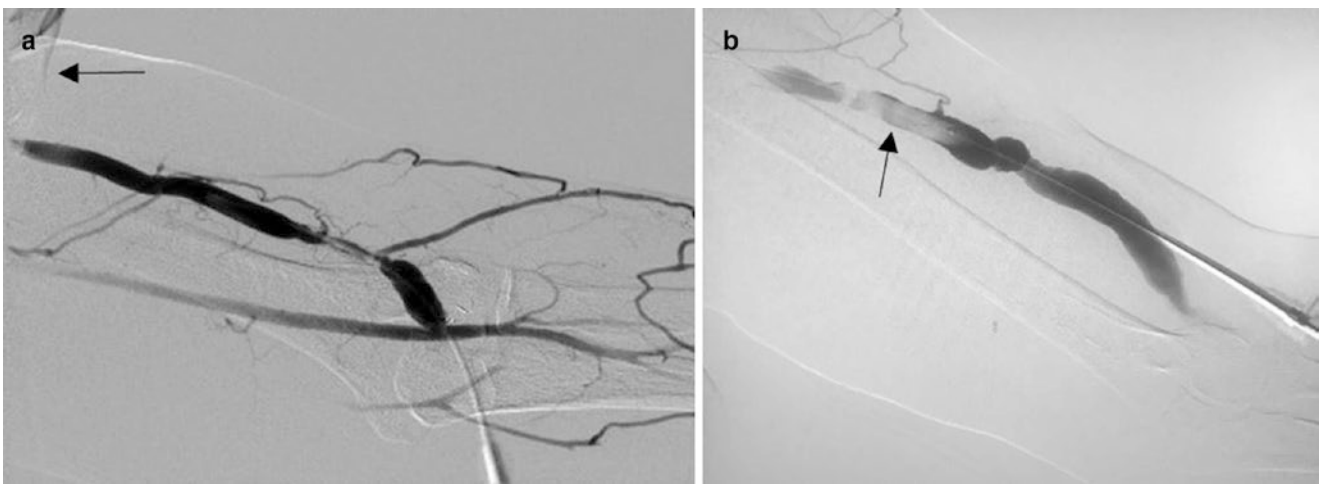

Fig. 36.5 Evaluation of proximal dialysis access. (**a**) Index finger (*arrow*) compressing the arteriovenous fistula (AVF) to allow for retrograde visualization of the access. (**b**) Using the balloon instead of the finger to avoid direct radiation