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Access

Back hand approach to radial access: The snuff box approach☆

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ABSTRACT

Transradial access is becoming the default strategy for routine coronary procedures, but there is still room for improvement. For instance, left radial access is known to offer some advantages for graft cases, less tortuosity, amongst other potential benefits. The downside has been the applicability of this access point on patients with a larger body mass index both from the viewpoint of the patient and the operator. The patient must lay with their arm in a supine position and the operator as a result must stand in a flexed position for an unknown period of time. Additionally, patients with various orthopedic injuries, including frozen shoulders, on may be unable to supinate their wrist for optimal access. One solution to this dilemma is to approach the radial artery from the dorsal aspect of the hand so the wrist can pronate naturally if body habitus requires the arm to be shifted towards the operator. This report outlines the steps and background behind this approach and an educational opportunity for those interested in expanding their access skills.

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1. Introduction

Transradial access is becoming the default strategy for routine coronary procedures, but there is still room for improvement. For instance, left radial access is known to offer some advantages for graft cases, less tortuosity, amongst other potential benefits. The downside has been the applicability of this access point on patients with a larger body mass index both from the viewpoint of the patient and the operator. The patient must lay with their arm in a supine position and the operator as a result must stand in a flexed position for an unknown period of time. Additionally, patients with various orthopedic injuries, including frozen shoulders, on either the left or right upper extremity may be unable to supinate their wrist for optimal access. One solution to this dilemma is to approach the radial artery from the dorsal aspect of the hand so the wrist can pronate naturally if body habitus requires the arm to be shifted towards the operator. This report outlines the steps and background behind this approach and an educational opportunity for those interested in expanding their access skills.

2. History

The radial artery's anatomic location along the forearm to the base of the thumb is well known, with its continuation beyond the thumb on the dorsal surface of the hand and not into the palm [1]. Arterial access for blood pressure monitoring via the dorsal radial artery was described in children in 1977 and noted the best access point at the radial apex formed by the intersection of the axis of the first finger and thumb [2]. Isolated reports of further use appeared in the literature for arterial access in the operating room or critical care unit [3–7]. There has also been some interest in the dorsal radial artery and its accompanying vein as a potential hemodialysis fistula site [8]. Recently, its use for transradial cardiac catheterization was reported by Kiemeneij [9].

3. Technique

The artery is typically palpable at the junction of the intersection of the thumb and first finger over the boney structures of the snuff-box. Fig. 1 shows the basic anatomic set up for access with the best access at the radial apex (black arrow). The patient is positioned with the arm in a neutral position, and a roll of 4 × 4 gauze or a small towel can be given to the patient to hold as seen in Fig. 2. This serves to keep the dorsal area opened for access by separating the thumb and first finger. It also gives the patient something to hold during the procedure, which ultimately provides the patient with increased comfort. At the conclusion of the procedure, the gauze can then be used for hemostasis. The hand is thus prep with the snuff box region facing superiorly rather than the palmer aspect of the wrist (which is the typical approach during radial access).

Once the wrist is prepped, the access is obtained. Fig. 3 shows the ultrasonic image at the radial apex just beyond the extensor pollicis brevis tendon (black arrow). The vessel is very superficial and is usually accompanied by one or two veins of similar size. Ultrasound has an advantage over tactile location in that the operator can also measure the

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Fig. 1. Demonstrates the ideal access point (black arrow) of the distal radial artery located within the anatomical snuffbox.

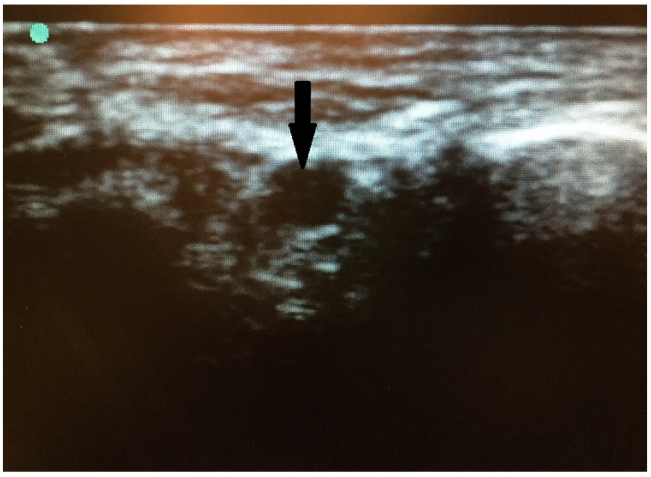

Fig. 3. Ultrasonic image of the distal radial artery (black arrow) just beyond the extensor pollicis brevis tendon.

arterial diameter to confirm adequate sizing for planned, or potentially needed, procedures allowing an increased sheath size to be placed in order to accommodate larger equipment. Additionally, venous access can also be easily obtained at the same time as arterial access, which is demonstrated in Fig. 4. Routine angiography is not needed although angiography may be helpful if resistance is encountered. With angiography shown in Fig. 5, one can appreciate the course of the radial artery (black arrow) and the relatively small superficial palmar artery (white arrow) near the base of the thumb.

After sheath placement Fig. 6, the arm can be located in a neutral position comfortable for the patient and operator. Moving the arm towards the operator no longer requires rotation of the wrist as the elbow is flexed to optimize position, and the patient remains orthopedically comfortable as the joints are not stressed. Vasodilator cocktails can be given per local norm and patient likewise anticoagulated to prevent radial artery occlusion. The procedure itself should be similar to a radial procedure thru the classic base of the thumb approach.

Hemostasis is different after snuff box radial access. The common hemostasis bands used for the typical radial hemostasis depend on the relative immobility of the distal wrist. The dorsal part of the hand is more mobile, and rigid hemostasis devices may be loosened by the patient's wrist movements. One solution that has worked is to use the gauze initially given to the patient at the beginning of the case, and roll it up tight to form a plug to place at the arterial entry site as seen in Fig. 7. This is then wrapped with a tight elastic bandage to tamponade the artery in place. The recovery area staff then observes for hemostasis. Unlike rigid hemostasis bands, the elastic materials tend to loosen with time and often provide a slow release of pressure without interference from the staff, although vigilance to minimize the net pressure and time for hemostasis is prudent.

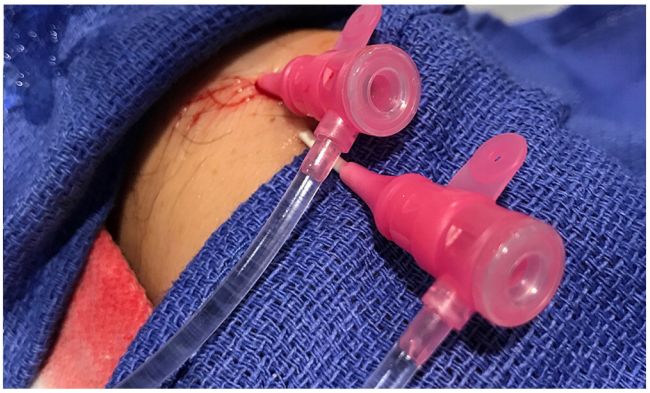

Fig. 4. Demonstrates placement of the sheaths within distal radial artery and vein.

Fig. 2. The patient is positioned with the arm in a neutral position and a roll of 4 × 4 gauze (or a small towel) can be provided for the patient to hold.

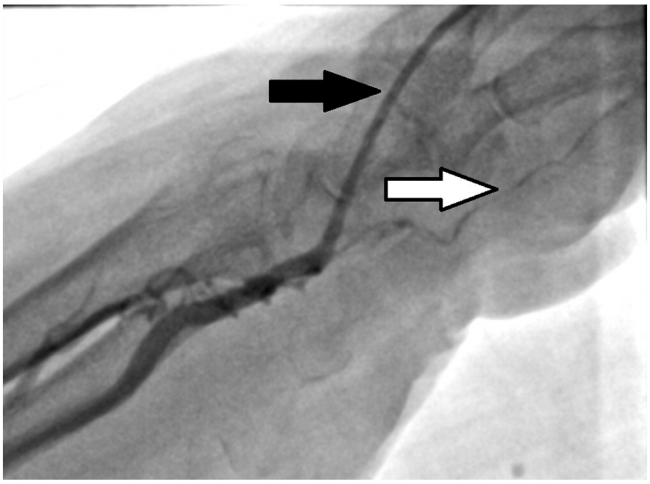

Fig. 5. Demonstrates the course of the radial artery (black arrow) and the relatively small superficial palmer artery (white arrow) near the base of the thumb.

Fig. 6. After sheath placement, the arm can be moved to a position that is comfortable for both the patient and the operator.

An example of a recent case, involves a 55-year old male, with a significant history of ischemic cardiomyopathy who presented in cardiogenic shock requiring inotropic support with hemodynamic monitoring via right radial arterial line, an intra-aortic balloon pumped via the left femoral artery, and VA-ECMO cannulation within the right femoral artery and vein. The remaining left radial artery had an excellent pulse, but the usual access location had diffuse ecchymosis from multiple attempts at trying to place an arterial line in the ICU. The patient was positioned with his left arm in a neutral position with the dorsal, snuff-box, region maximally exposed and accessed under ultrasound into an artery measuring 2.2 mm in diameter with a standard 4-French(F) radial micropuncture kit. The 4-F sheath was transitioned to a 6-F sheath system, and stent placement was subsequently accomplished without difficulty. Hemostasis was accomplished with elastic pressure as described above.

Fig. 7. Demonstrates sheath removal post procedure, with the recommendation of rolling a 4 × 4 gauze tight to form a plug to place at the arterial entry site.

Table 1
Potential advantages and uses for dorsal radial (snuff box) access.

1. Improve left radial access for patient and physician
2. Permit radial access in patients with limited arm motion
3. New entry site when common radial site has been recently used
4. Potential site for retrograde recanalization of radial artery occlusion
5. Arterial entry is beyond compartments of forearm reducing risk of compartment syndrome

4. Summary

Understanding different approaches to transradial access can increase options for operators and improve comfort for patients. Some patients who suffer from shoulder injuries or other orthopedic problems may have difficulty with supination of their arms difficult, and the dorsal radial option would allow these patients to continue to benefit from the radial approach. More importantly, this approach has the potential to markedly improve the experience for both the patient and operator when accessing the left radial artery or even the right radial artery if the patient has limited supination. Other potential benefits are listed in Table 1.

At this point in time, no unique complications have been seen in using this access point versus the traditional entry site. Whether there is a measurable advantage to this approach versus the traditional access site would require a very large clinical trial as expected events such as radial artery occlusion are on the order of 1% in experienced centers. Being slightly more distal, the potential for problems with end-vessels of the finger might exist, on the other hand, this location is geographically removed from the small vessels branching off the distal radial at the wrist that support palmer collaterals and therefore may potentially be a safer entry point. The radial artery is smaller in the dorsal location and may be less suitable for some patients. Ultrasound is a key aid in evaluating the appropriateness of the vascular size and location. Experience reported using ultrasound suggests that the radial artery is at least 80% of the size found in the forearm with mean diameter at the snuff box of 2.5 mm (range 1.5–4.1 mm), suggesting size may be a problem for only a minority of patients [10]. Additionally, the vein that runs next to the dorsal radial artery is also of similar diameter and therefore offers the potential for arterial and venous access at the same site if appropriately sized equipment if available.

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