SUPPLEMENTARY DATA

ENDPOINT DEFINITIONS

Success of the distal radial access (DRA) was defined as the correct placement of the introducer sheath in the first-choice distal artery punctured. The success of the coronary procedure was considered as the completion of the coronary procedure through the initial DRA.[1,2]

The DRA time was measured since the anesthesia needle contacted the skin to ensure that the introduction sheath was placed correctly in the distal radial artery.[2] Total procedure time was recorded from the moment the patient entered the catheterization laboratory until she/he left the room[1,2]. Radial artery spasm (RAS) was defined as the need for a second dose of a spasmolytic agent or the presence of 2 of the following signs: persistent forearm pain, pain during catheter manipulation, pain during introducer removal, and difficult catheter manipulation after being trapped by the radial artery.[3] Exposure to ionizing radiation was evaluated using the dose area product (DAP) in Gy.m2 and the fluoroscopy time (min).[4] Comfort related to DRart puncture and hemostasis was evaluated using a visual analog scale (VAS) for pain; a score ≤ 3 was considered mild. [1,4,5] The hemostasis time was measured from the removal of the introducer sheath to the successful removal of the arterial compression bandage or device.[4] In-hospital radial artery occlusion, hematoma, pseudoaneurysm, radial artery dissection, and arteriovenous fistula were evaluated as access-related complications. In-hospital radial artery occlusion was defined as the absence of radial pulse or arterial flow in the US color Doppler after removal of the hemostasis device.[1,4] The hematoma associated with DRA was defined as follows: I-a, distal to the styloid process of the radius; I-b, up to 5 cm proximal to the styloid process; II, up to 10 cm proximal to the styloid process; III, forearm; and IV, arm above the elbow.[6]

DISTAL RADIAL ACCESS TECHNIQUE

Pre-procedure ultrasound evaluation

Before the DRA attempt, a US Doppler color evaluation of the radial artery course (from the first dorsal space of the hand, continuing in the anatomical snuffbox (AS), to the radial artery to its junction with the brachial artery) was recommended and performed with an ultra-high frequency probe (L25 X [(6-13MHz) (FUJIFILM Sonosite, United States)]). A linear probe with an ultra-high frequency of 6-18 MHz is recommended due to the superficiality of the structures.[7] We focus on patency, diameters, and depth of the proximal radial artery (PRart) and DRart, in addition to identifying landmark structures and the presence of arterial calcifications or significant loops. The recommended puncture site is where the DRart is superficial, over the scaphoid and trapezium bones, which contributes to reduced hemostasis times. According to our standard clinical practice, we use arterial accesses in which a 6F introducer is feasible (DRart ≥ 1.8 mm).

Patient position

For the right DRA (rDRA), the hand is placed on the ipsilateral side in a natural position, flexing the thumb with a slight ulnar deviation of the wrist. For the left DRA (lDRA), the ipsilateral hand is comfortably placed toward the right groin in a pronated position, flexing the thumb with a slight ulnar deviation of the wrist.

The evaluation of the strength of the distal radial pulse is performed using a modified scale in which it is subjectively documented and rated on a scale of 1 to 4, with 1 indicating an absent pulse, 2 a barely detectable (weak) pulse, 3 a normal pulse and 4 a strong (bounding) pulse.[8]

Ultrasound-guided distal radial access procedure

After a US-guided infiltration of 3-5 ml of 2% Mepivacaine (to avoid pain in case of contact with the periosteum of the scaphoid or trapezium bones) the probe is placed in an axial plane (longitudinal plane is also used) at the puncture site, then a 21-gauge needle is placed at 30-degree and 45-60-degree angles in the horizontal and vertical planes, respectively, directed from the ulnar to the radial, and perform a single-wall technique puncture. Once the blood is seen with continuous drip or steady pulsatile flow through the hub, the guidewire is advanced, the needle is removed and its position is confirmed by ultrasound or fluoroscopy. Finally, the introducer sheath is placed.[2,4,9] A thin-walled introducer sheath is recommended, with minimal outer diameter in relation to the inner diameter, with sufficient rigidity to prevent its collapse due to the bends in the course of the DRart, is recommended.[2] We used the Prelude Ideal Hydrophilic Introducer Kit (Merit Medical Systems, United States) and Radifocus Introducer II Kit A (Terumo Corporation, Japan).

Blind with palpation distal radial access procedure

Once the puncture site was located in the AS by arterial pulse palpation and infiltration of anesthesia was performed, the 21-gauge needle was directed to the strongest pulse point from lateral to medial at an angle of 30 degrees, in the direction of the wrist course of the DRart. If the arterial pulse was not palpable, the ultrasound-guided technique was used. After puncture, we continue the procedure similar to the ultrasound-guided technique.[4,5,10,11]

After successful DRA, an intraarterial bolus of the spasmolytic agent and a weight-adjusted dose of unfractionated heparin are administered.

Hemostasis

The introducer sheath is withdrawn immediately after the procedure is finished, and gauze plugs wrapped with an elastic bandage or a specific hemostasis device are placed. After 1-4 h, in the absence of bleeding at the puncture site, the hemostasis device is removed. If bleeding persists, compression was maintained for another hour. To confirm patency of the artery, a post-procedure evaluation by pulse palpation or ultrasound is recommended.[1,4,5,10]

Table 1 of the supplementary data. Relationship between arterial pulse strength and the use of the ultrasound-guided technique with DRA success.

Arterial pulse strength	US-guided DRA technique	DRA success	*P*
Absent, *n (%)*	Yes	10/12 (83.3%)	NA
	No	0	
Weak, *n (%)*	Yes	152/162 (93.8%)	.292
	No	4/5 (80%)	
Normal, *n (%)*	Yes	585/597 (100%)	.613
	No	55/55 (100%)	
Strong, *n (%)*	Yes	77/77 (100%)	1.0
	No	91/92 (98.9%)	

DRA, distal radial access; US, ultrasound.

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