Cardiovascular Revascularization Medicine xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Cardiovascular Revascularization Medicine

Trans-ulnar catheterization and coronary interventions: From technique to outcomes

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ARTICLE INFO

Article history:
Received 17 November 2016
Received in revised form 22 January 2017
Accepted 27 January 2017
Available online xxxx

Keywords:
Ulnar artery
Radial artery
Arterial access
Coronary angiography
Coronary interventions

ABSTRACT

The ulnar artery is similar in size to the radial artery, however it is more difficult to palpate and access. For those physicians who mastered trans-ulnar access (TUA) this access site serves as an alternative to trans radial access (TRA) when the radial artery access is rendered suboptimal (by palpation, ultrasound examination or previous procedural records) or when encountering TRA difficulties or failure.
The manuscript describes the anatomy, suggested technique, procedural success and complications associated with TUA. Data from single center registries and randomized studies show that TUA has a lower and more variable success rate than TRA, however these 2 approaches carry similar safety profile and complications rates.
The authors suggest that interventionalists should consider, learn and master TUA to maintain higher success rate of wrist based interventions while avoiding the potential complications, discomfort and costs of trans-femoral approach.

Contents

1. Introduction

The use of trans-radial access (TRA) for cardiac catheterization and percutaneous coronary intervention has increased substantially in recent years. However, trans-radial approach may not be feasible in 5%–10% of patients. Trans-ulnar access (TUA) can serve as an alternative approach in some of these patients but this approach is infrequently used.

This manuscript discusses the anatomy and technique of TUA interventions. We analyze the success and complication rates reported in the literature and present the analyzed content in a structured fashion addressing both feasibility and safety of this approach.

2. Anatomy

The ulnar artery is the larger of the two branches arising from the brachial artery. The ulnar artery typically originates distal to the bend of the elbow (5 to 7 cm. distal to the elbow or medial epicondyle) and courses obliquely and distally and reaches the medial (ulnar) aspect of the forearm (midway between the elbow and the wrist) and subsequently courses along the ulnar nerve towards the medial aspect of the forearm. After the ulnar artery crosses the transverse carpal ligament on the radial side of the pisiform bone and immediately beyond this bone divides into two branches which connect to the formation of

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http://dx.doi.org/10.1016/j.carrev.2017.01.013
1553-8389/

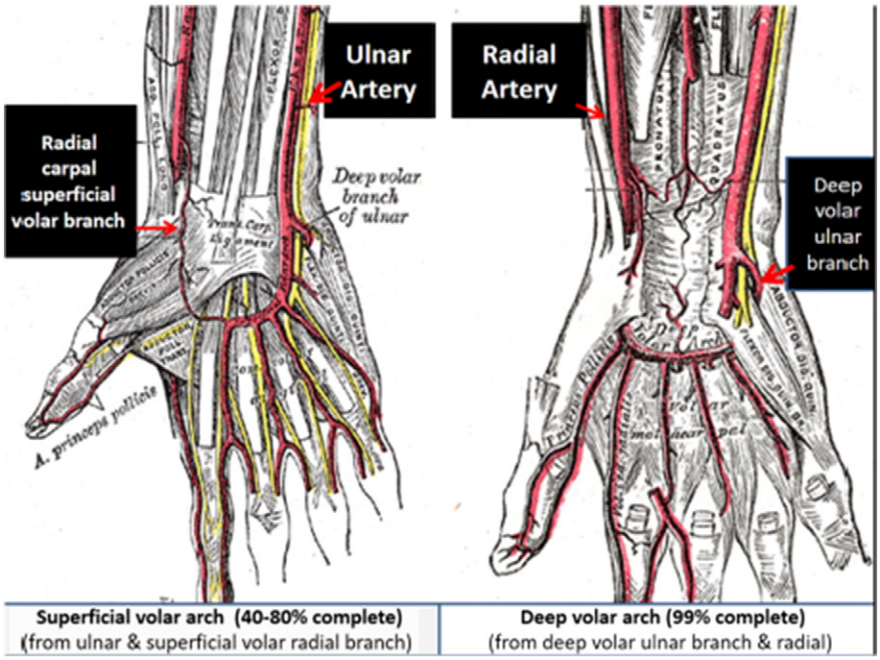

Fig. 1. Superficial and deep volar (palmar) arches. Adapted and modified from anatomygroup.files @wordpress.com

the superficial and deep volar or palmar arches (Fig. 1) The deep volar arch is fed by the radial artery (laterally) and the deep volar branch of the ulnar artery (medially) and is 99% complete (Fig. 2). The superficial volar arch is fed by the ulnar artery (medially) and by the radial carpal superficial volar branch laterally (and is complete only in 40%–80% of patients). The ulnar nerve runs medial and parallel to the ulnar artery in the distal forearm and both of them are encased by the restrictive Guyton's canal in the wrist. The ulnar artery is best palpated on the anterior medial aspect of the proximal wrist crease when the wrist is hyperextended. The ulnar artery varies in its origin and course in a significant proportion of cases. Occasionally the ulnar artery may emerge directly from the axillary artery proximal to the elbow. Most anatomy reports suggest that the ulnar artery is usually larger in size than radial artery especially in its proximal segment. Ultrasound based studies observed no significant differences between the diameters of the two arteries adjacent to the wrist.

Liu at al [1] reported that ulnar artery was slightly bigger than the radial artery both before intervention (3.62 ± 0.36 versus 3.26 ± 0.22 mm) and 1 year post intervention (3.33 ± 0.49 versus 3.01 ± 0.48 mm). However large diameters of both radial and ulnar arteries reported in this study could not be duplicated in any other study. The radial artery was slightly larger than ulnar artery in a report by Aptecar et al. [2] (2.87 ± 0.6 and 2.83 ± 0.9 mm respectively, P = NS). In an ultrasound based study Bauman et al. [3] showed that there was no significant difference (<20%) between the distal ulnar and radial distal diameters in most of the patients (58.5%) however, in 35% of patients the radial was bigger, while in 65% of them the ulnar was larger [4].

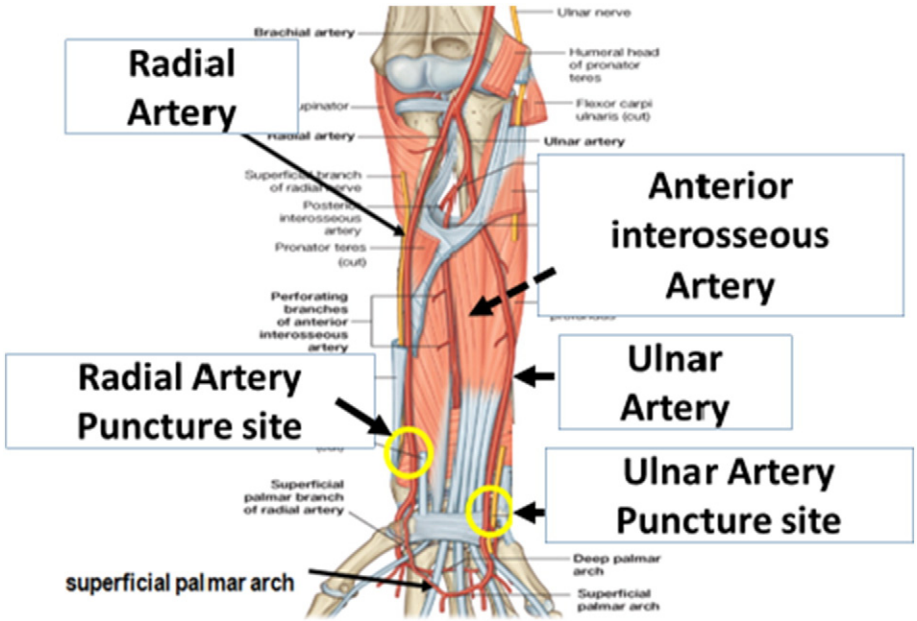

Fig. 2. Forearm and palmar blood flow and puncture sites for radial and ulnar access. Adapted and modified from anatomygroup.files @wordpress.com

Please cite this article as: Sattur S, et al, Trans-ulnar catheterization and coronary interventions: From technique to outcomes, Cardiovasc Revasc Med (2017), http://dx.doi.org/10.1016/j.carrev.2017.01.013