

Original Article

Distal radial access for routine consideration in coronary angiography-safety and feasibility study

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ABSTRACT

Study Objective: This study sought to determine the safety, feasibility and advantages of the distal radial artery as routine access site for percutaneous coronary interventions.

Background: Traditionally transfemoral and proximal radial access sites are chosen for pci but both these access sites have periprocedural complications with respect to bleeding and radial artery occlusion respectively. Distal radial arterial access has advantages over the two in terms of patient comfort and almost nil per procedural complications including radial artery occlusion (as the access is distal to the palmar arch) and preservation of proximal radial artery for future procedures like chronic hemodialysis and bypass graft conduit.

Methods: Between March and August 2019 a total of 70 patients were taken up for distal radial intervention (33only CAG, 37 adhoc PCI) after obtaining written informed consent before procedure.

Results: Of all the patients' undergone cag and pci the success rate for puncture and access was 94% with 4 failures with crossover to proximal radial thereof. Periprocedural course remained uneventful and radial pulse palpable well in both distal and proximal course at the time of discharge. Follow-up for further 1 months also showed no access site related complications.

Conclusion: Among patients undergoing pci distal radial access is definitely a low risk, feasible procedure without any periprocedural complications. It should ,therefore be recommended the first choice access site for all pci procedures

Keywords: Percutaneous coronary intervention; distai radial route; safety and feasibility

1. INTRODUCTION:

Percutaneous coronary intervention (PCI) are important tools for the diagnosis and treatment of Coronary Artery Disease(CAD).[1] The access routes for coronary angiography (CAG) and subsequent intervention include the femoral artery, radial artery, brachial artery access, and ulnar artery. Although the femoral approach is still mostly adopted and conventional one ,there is a paradigm shift from femoral to radial approach with the improvement in technology and

equipment in coronary interventional treatment in the world.[2,3]

In 2017, Kiemeneij[4] reported that radial artery cannulation in the anatomical snuffbox is safe and feasible. The distal part of the radial artery passes through the anatomical snuffbox.[5] The anatomical snuffbox is a hollow space located on the dorsal side of the hand and can be clearly observed after the thumb is fully extended. The ulnar border of the anatomical snuffbox is the tendon of the extensor pollicislongus muscle. The radial border includes the tendons of abductor pollicislongus and extensor pollicisbrevis muscles. The base of the anatomical snuffbox is the scaphoid and trapezium bones. There is an increasing interest has been generated on recent time as this new approach can overcome some shortcomings of standard radial artery cannulation in several aspects.

The purpose of this study is to evaluate the safety and feasibility of the radial artery access in the routine clinical practice.

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2. METHODS

This was a retrospective, single-center, observational study. Ethical approval was obtained from the hospital committee. Seventy (70) patients who were contemplated for CAG/PCI from March 2019 to August 2019 by distal radial route were enrolled for the study.

2.1. Patients' selection

The most important inclusion criterion was the presence of a pulse in the snuffbox on examination by the interventional physician. All patients underwent Allen test. The pre-procedural exclusion criteria were:

- (1) Absence of pulse
- (2) Severe forearm artery malformation
- (3) Shock and primary PTCA
- (4) History of previous coronary artery bypass grafting and radial artery use.

2.1.1 Technique

After obtaining the proper informed consent patients were taken in cathlab and procedure was performed in fasting and non-sedated state. The patients were positioned comfortably supine on the angiography table with the right upper arm was positioned comfortably next to in a side-board. For left sided access, patient's left arm was naturally placed over the patient's abdomen and the hand was positioned over the right groin as described by Kiemeneij,[4].(Fig1) Patients were asked to hold his thumb under the other 4 fingers with the intention to bring the radial artery on the surface of the radial fossa. The operator stood on the right side of the patient. After subcutaneous injection of 2mL lidocaine through a 5 ml needle, Seldinger's technique puncture was performed in the anatomical snuffbox. Through and through puncture was preferably avoided because the pain caused by the needle tip touching the periosteum of the underlying bones. The radial artery puncture was performed with a 20 G puncture needle and a 0.025" wire. 6F radial sheath(Terumo) was used routinely for all cases which was upgraded in selective cases for PTCA later. A spasmolytic cocktail consisting of 200 mcg of nitroglycerine, 50 mcg Diltiazem and weight-based heparin was given intraarterially after successful insertion of the sheath.



Fig 1: Arm and forearm position in right and left distal radial access

2.1.2. Vascular hemostasis

A small rolled up sterile gauze piece was placed over the puncture site and compressed tightly manually followed by with a semi-elastic bandage approximately for 2hrs, without including the thumb.

2.1.3. Data collection

Besides the baseline characteristics of the patients following parameters were also considered and analysed:

- (1) Success of taking access
- (2) Number of puncture attempts
- (3) Access time
- (4) Total procedure time

(7) Postoperative complications (major and minor bleeding, hematomas, vasospasm, arteriovenous fistula, radial artery occlusion (RAO), hand movement disability.

3. RESULTS

March 2019 to August 2019, a total of 70 patients were included in our study. Demographic characteristics are shown in Table 1. The mean age of the patients (72% males) was 54± years. Hypertension, diabetes, dyslipidemia and smoking were present in 70%, 61%, 64% and 72%, respectively.

Out of 70 patients access was taken successfully in 67 patients with failure in 3 patients requiring cross-over to conventional radial artery approach. According to preference of the operator, mostly the right sided approach was adopted for distal radial artery access with left sided access in N number of cases .In 7 cases, the traditional short hydrophilic wire (Terumo) could not negotiate through the puncture needle which was overcome by light tip weight PTCA wire (Run-through Floppy) because of see saw course of the artery. The cannula was inserted deep sliding over the PTCA wire helped to negotiate hydrophilic short wire to cross the tortuous course.

The mean time for artery access time was 1.9±1.2 minutes. On average, the number of puncture attempts was 2±1 -, with maximum no of puncture of 3- for -4-- patients.

The VAS scores at 3hours after procedure was 2± 1-. The postoperative compression time was 3.4±0.8 hours.

The mean hospitalization duration was 2 days. The mean X-ray exposure time was 3.23±1.66 minutes in the CAG group and - 12.5--± -6.2 minutes- for PTCA.

No patient developed local hematoma after procedure, vasospasm. No major bleeding, arteriovenous fistula, RAO or other complications were noted. No patient complained of dysfunction of the hand or arm. The patients were followed up for next 1 month for further complications. (Tables 1, 2 and 3).

Table 1: Demographic characteristics of study population:

Age mean(yrs.)		54			
Sex M/F %		72%male			
Smoking		74%			
Hypertension		70%			
CKD		14%			
Diabetes		61%			
Presentation	Chronic Stable angina	Unstable angina	STEMI	NSTEMI	
	5%	9%	59.3%	18.7%	

Table2: Procedural characteristics

CAG	
Disease extent	
SVD	43.75%
DVD	26%
TVD	21%
Introducer sheath	
6F	100%
7F	
Dx Catheter	Tiger 6F
Crossover to proximal radial due to failure distal radial	3

PCI	35%
Ad hoc	All
Elective	
Bifurcation	2
CTO	none
Crossover	--1----- -- -

Table 3: Study outcomes

Primary endpoint
CAG success 94%
PCI success 98%
Secondary endpoints
Puncture success 94%
Crossover 6%
Left radial 49%
Right radial 51%
Procedural variables
Puncture time(mean) 1.9 min
Procedure time(mean) CAG:15mins; PCI:40mins
Fluoroscopy time(mean) CAG:4mins; PCI 18mins
Contrast volume(mean) CAG:30ml; PCI: 130ml
Hemostasis time:90mins-2hrs
Access site complications
Bleeding -none
Artery occlusion-none
Perforation-none
Pseudo aneurysm-none
Dissection none
AV fistula none

4. DISCUSSION

The radial artery and femoral artery are two commonly used access as standard approaches for CAG and PCI. A large number

of studies have confirmed that transradial access can eliminate some of the deficiencies of femoral access and becomes more prevalent in recent times reducing local complication of the procedure (6).

Despite the fact that radial access lowers the mortality and major adverse cardiac events in STEMI patients compared to femoral approach, the standard radial artery approach has its disadvantages (7-10). The most common complication is RAO due to multiple puncture. [11, 12]

After Kiemeneij [4] firstly reported left distal transradial access in the anatomical snuffbox for interventional therapy, several studies [13–15] have found that coronary artery interventional therapy through this access is feasible. The new access has become a new hot spot by allowing a more comfortable posture during the procedure and shorter postoperative hemostasis time. In addition to availability of radial artery as better conduit than saphenous graft for future CABG, there may be a reduced risk of RAO in case of distal radial artery access.

Our study found that coronary intervention through the distal radial artery in the snuffbox is safe and feasible, especially in the right distal radial artery. The VAS score is low and the hemostasis time is short, using minimal resources. No major complications were reported, and the patients tolerated it well. This is the first study from eastern part of this country to best of our knowledge addressing the novel technique.

Although the sample size of this study was small, it was consistent with other studies relative to patient comfort.

In this study, the success rate of distal radial artery access was as high as 94%, the number of punctures was 1–3 times, minimizing the risk of peripheral nerve injury, arteriovenous fistula and thrombosis.[5] Radial artery, cephalic vein and superficial branch of radial nerve pass through the anatomical snuffbox.[16] Radial nerve injury is a common peripheral nerve injury, which can cause abnormal sensation in the back of the hand. Although there were no neurological problems in this study, we still need to further clarify the relationship between the radial artery and the distribution of nerves in the snuffbox.

From the anatomical point of view, the radial artery in the snuffbox is located at the distal end of the radial artery. The diameter of the puncture site being smaller access is more difficult and the learning curve is longer.

In this present study all the procedures have been performed using 6F sheath. 7F sheath as the preferred guiding catheter for the management of high complex lesions because of its stronger support and instrument traffic ability. [19] Could not be tried or advocated because of the size of the smaller caliber of distal radial artery.

5. CONCLUSION

Cardiac catheterization through the distal radial artery is safe and feasible. The right distal radial artery access can be routinely carried out.

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