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Original Article

A single center multioperator initial experience of 4195 patients at a primary radial intervention program in a tertiary level center



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ABSTRACT

Background: There has been an increase the acceptability and the number of the procedures via the radial approach. We present our experience pertaining to the clinical characteristics, procedural details and post procedural outcome of patients undergoing radial artery access, coronary angiographies over a period of 4 years at a primary care tertiary level center.

Materials and methods: A retrospective analysis of all the coronary artery procedures during the last 4 years was done and the various parameters related to these procedures noted.

Results: In 4195 procedures performed, success in radial artery procedures was achieved in 3975 (94.8%) procedures. The average puncture time and total procedure time was 9.5 + 3 min (min) and 15 + 2.5 min in the initial 500 patients, whereas the times taken in the final 695 patients were just 1.5 + 0.5 min and 3.0 + 1.5 min respectively. The total fluoroscopy time was not significantly different among the groups, when performed by an operator with training in the femoral route for angiography. Cardiology fellows needed more fluoroscopy time when mastering the radial route. Crossover of access sites was seen in 220 patients (5.2%).

Conclusions: After 100 procedures, radial access coronary angiographies take less than 4.5 min, with first attempt radial artery access and negligible complication rates. Prior experience of coronary angiography helps in the reduction of fluoroscopy time during the learning curve.

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1. Introduction

Transradial access has proven to have better outcomes as compared to the transfemoral access for coronary artery interventions with respect to procedural complications and post-procedural outcomes. Evidences of lower cost, better patient experience and possible mortality benefit have also been demonstrated.^{1–4} Despite these advantages, the routine use of radial access site for the purpose of coronary interventions remains low and underutilized.⁵ Worry about the learning curve needed and the possibility of under-reported complications still stifles the routine use of this procedure which we feel should now be the default site of access for all coronary interventions barring obvious contraindications. Our article details our experience in this regard and hopes to clear the reluctance surrounding the use of this access site.

2. Methods

2.1. Study patients

We analyzed a total of 4195 patients with normal Allen's test, who underwent radial angiography at our center from Aug 2008 to Aug 2012. PTCA with stenting were done in these patients when indicated. Our center used the radial artery access site as the default site of access for performing coronary angiography. The Barbeau method of documentation of the adequacy of palmar arch flow was used. Radial access for the procedure was deemed contraindicated if the D type of response to the procedure was documented.^{6,7} The other pre-procedural contraindications were upper limb deformities, prior CABG (in the first 2000 patients) and in those in whom a pre-angiographic decision to perform ad hoc coronary angioplasty had been taken (first 2500 patients). Written informed consent was taken from all the patients prior to the procedure.

2.2. Procedure and vascular access

Crossover from the radial to the femoral or alternative site was done at the discretion of the operator and the cause for the same was documented. Radial sheaths for diagnostic and interventional procedures had a diameter of 5F and 6F respectively and were manufactured by Terumo Corporation, Japan. After the insertion of the sheath, an 8 ml solution made up of 1 ml nitroglycerine (50 µg) + 1 ml Diltiazem (2.5 mg) + 2 ml of 2% Xylocard with 4 ml of normal saline was given as a rapid bolus in less than 5 s so that it can reach upto the arm upto the brachial artery against the blood flow. 2500 U of unfractionated heparin was additionally given with 4 ml of Normal saline as flush. If angioplasty was to be performed after the coronary angiography, an additional 5000 U of heparin was given intravenously along with routine intracoronary and post PTCA use of glycoprotein IIb/IIIa inhibitors if indicated. For coronary angiography, 5F Tiger catheter was used along along with hydrophilic guide wires.

2.3. Vascular hemostasis

Arterial sheaths were removed immediately after coronary angiography and local hemostasis was achieved using a pressure bandage with sticky straps attached to the bandage to occlude the site of puncture, which was removed the next morning. Recording of blood pressure was however avoided in the arm of access till removal of the straps. In patients undergoing coronary angioplasty via the radial route, the sheath was either removed or left in on a case-to-case basis. In all cases however the activated clotting time (ACT) was maintained below 300 s.

2.4. Review parameters

In all patients history related to diabetes, hypertension and chronic kidney disease were acquired and preprocedural echo parameters and EKG findings were noted. Procedural parameters include:

1. Total procedure time
2. Number of attempts taken to gain radial access
3. Time for fluoroscopy
4. Associated upper limb arterial tortuosity
5. Vasospasm of the arterial tree upto the aorta
6. Early and late post procedural complications like major and minor bleeds, Volkmann's ischemia/contracture, and forearm hematomas, pseudo aneurysms, arteriovenous fistula, acute closure of the radial artery and gangrene of the upper limb were noted. If there was the presence of vasospasm during the procedure, additional use of spasmolytic cocktail at the discretion of the operator was allowed. Additional manoeuvres included local injection of NTG (50 micro G), waiting for 3–5 min till disappearance of the spasm

The definitions of major and minor bleeding were used according to those of the RIVAAL study¹. The definition of non-CABG related major bleed were according to the definitions as used in the ACUITY trial.⁸ Intractable vasospasm was defined as a condition where the operator had to change the access site. The manoeuvres for improving the passage of the catheter including deep breathing, Valsalva manoeuvre, repeating the cocktail intra-arterially, talking to the patient to divert attention in an anxious patient, waiting for the spasm to improve, were all performed before the patient access site was changed. No record exists on the use of these manoeuvres and these form part of our routine protocol for performance of a radial angiogram.

2.5. Statistical analysis

For data analysis, the patients were classified into groups depending on the experience in radial procedures, of the primary performing operator at the time of performing the procedure, in slabs of 500 procedures and all further analysis was performed on this model. Qualitative variables were analyzed using the paired t test while quantitative variables were analyzed using the unpaired t test. Complications encountered during the procedure were noted and their relative

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