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Effect of learning curve in transradial approach to coronary angiography and percutaneous intervention

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Abstract

Background: TR approach is suitable for most patients and limitation of this approach is very low. It became more popular and approved in international guidelines because of increase success rate and low complication rate and low cost. There is also parallel advancement in instruments used in TR approach.
Method and Result: patients admitted for CA or PCI. Data collected from patient and procedure including age, sex, contrast volume, total procedure time. flouro time, radial artery spasm and number of cases that transformed to femoral. We divided the study in two groups: group A first half of patient and group B the second half
Total numbers of patients (139) and there age ranging from 28 to 80 years (mean of 55.13). Number of males 131 (94.2%) and females 8 (5.7%).The mean value of contrast volume used in group A that underwent CA, ad hoc and PCI ,(was 63.10,124.20 and 106.91 ml) respectively and for group B (50.07,88.19 and 49.56 ml).The mean total time of procedure of group A underwent CA, ad hoc and PCI was (17.16,24.9 and 26.13 minutes) respectively and for group B(13.66,26.3 and 16.4 minutes).The mean fluorotime of group A underwent CA, ad hoc and PCI was (4.61,7.2 and 6.62 minutes) and for group B (3.06,7.32 and 3.51 minutes). Seventeen case subjected to radial artery spasms divided into 11 cases (15.7%) in group A and 6 cases (8.69 %) in group B. There were 8 cases (11.4 %) of group A transferred to femoral approach and 4 cases (5.79 %) of group B transferred to femoral access.
Conclusion: There was much benefit from the effect of learning curve in doing TR approach to CA and PCI.

Keywords: TR approach, CA, PCI, fluorotime.

1. Introduction

1.1 Anatomical considerations

Operators should be prepared for these approaches theoretically. The knowledge of anatomy of the femoral, brachial and radial arteries is necessary and helpful for doing these techniques successfully.

1.2 Femoral Access

Common femoral artery(CFA) is the continuation of external iliac artery. It begins just below the inguinal ligament outside the femoral vein and inside to the femoral nerve. CFA and vein enclosed in a fibrous sheath that has been called, femoral sheath. It lies anterior and adjacent to the one third of internal aspect of the head of femur and crosses to the median side of the body of the femur. One of the reasons that TF approach is prone to more complication is its proximity to the femoral nerve, femoral vein and pelvic cavity. Because puncturing of superficial

femoral artery is more susceptible to pseudo-aneurysm, CFA(first 3 centimeter) must be chosen for arterial puncture.

1.3 Radial access

The radial artery (RA) is the continuation of the brachial artery. It begins at the bifurcation of the brachial artery in the cubital fossa, and passes along the radial side of the forearm to the wrist toward the styloid process of the radius [(1)]. Then it passes between the two heads of the first Interosseousdorsalis into the palm of the hand. At the wrist where arterial puncture should be done there is no nerve, vein or cavity at the vicinity of the RA, i.e. they are not enclosed in the same fibrous sheath. Deep palmar arch is a connection between the (RA) and the ulnar artery (UA), that protect hand from ischemia due to the occlusion of each branches. The RA serves mainly as an arterial conduit to the hand [(2)]

Radial access was associated with lower risks of access site bleeding, vascular complications, and need for transfusion. Importantly, there was a significant mortality benefit in patients allocated to the transradial access site, which reinforced previous observations from the Radial Versus Femoral Access for Coronary Intervention (RIVAL) access for coronary intervention trial, [(28)]and the Radial Versus Femoral Randomized Investigation in ST-Elevation Acute Coronary Syndrome (RIFLE-STEACS) trial.[(3)]

No significant interaction was observed in the MATRIX trial between the type of ACS and treatment benefit, suggesting that the results of this investigation can be extended with confidence to the treatment of patients with STEMI.

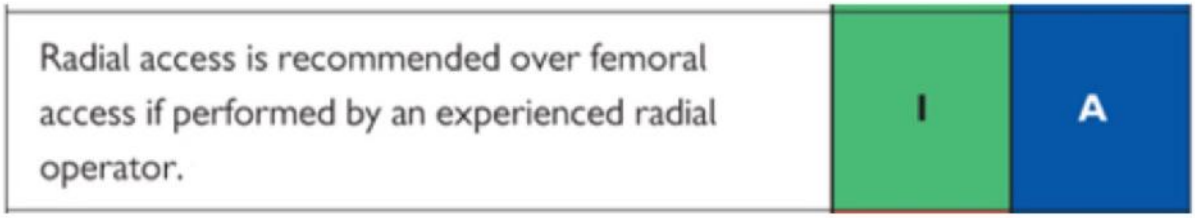

Figure (1) Procedural aspects of the primary percutaneous coronary intervention strategy according to 2017 ESC guidelines for the management of AMI.

Aims of the study

To establish the rule of learning curve in transradial approach to CA and PCI and encourage the operator for doing more transradial catheterization.

2. Patients and Methods

The study population was drawn from 139 patients admitted to (cathetrization department in BaqubaTeachingHospital , Diyala , Iraq) for CA & PCI between February 2017 and August 2017 .

Written informed consent was obtained from every patient. All patients who underwent the TR approach had Barbuae test[(4)]. If the test suggested incomplete palmer arch flow, the TR approach was deferred and transferred to TF access.

The study group included patients who underwent CA & PCI for stable angina, post revascularisation angina and for assessment of coronary anatomy before valvular surgery and for early invasive strategy for high risk unstable angina.All patients were prepared according to the American College of Cardiology/American Heart Association (AHA/ACC) task force on Cardiac Catheterization.Patients at high risk for contrast induced allergic reaction had premedications by IV hydrocortisone. Routine laboratory investigations including blood urea ,serum creatinine, viral screen includes human immune deficiency virus (HIV),hepatitis B surface antigen (HBS Ag) and hepatitis C virus (HCV) antibody.

The patient was placed in a decubitus supine position with the arm along the side of the body. Under local anesthetic (xylocaine 1%), we performed the puncture with a 21-gauge needle or plastic canulla and then introduced a straight 0.021-inch guide catheter, followed by the introduction of a 6 F 11-cm introductory catheter (Transradial Kit, Cordis Corp, Miami, Fl., USA). All patients received 3000 units of sodium heparin in conjunction with a spasmolytic 150 µg nitroglycerine) via the lateral catheter before the procedure was begun; this cocktail was re-administered if the patient complained of forearm pain or if there was resistance to manipulation of the catheters. The introductory catheter was exchanged for a 0.035-inch angiography guide (Medtronic, Danvers, Mass., USA) up to the ascending aorta, and then the radiography-controlled catheters were inserted.

The choice of catheters was depend on planned procedure. After finishing of procedure the sheath remove immediately and access site secured by manual compression or some time with hemostatic band. The bandage was kept in place for at least 4 hours. The patient was allowed to be ambulatory immediately following the procedure All patients were evaluated (4-24 hours) after the procedure and we noted the presence of palpable hematoma at the puncture point, hemorrhage, pain on palpation of the puncture area, and the presence of a distal radial pulse.

For each patient we gathered the data from the procedure: total length of time for the procedure, fluoroscopy time, contrast material volume, crossover to TF approach, incidence of spasm, subcalvian artery tortuisty.

So as to determine the impact of the learning curve, we divided the study population into 2 groups: group A was the first 70 patients on whom the procedure was performed and group B the second 69 patients.

Exclusion criteria

1- abnormal Barbuae test
2-weak thread radial pulse
3- the existence of a known arterial circulatory disease in one of the upper limbs
4-prior CABG
5- extreme anxious patient

2.1 Statistical analysis

Data of the patients were entered and analyzed by using the statistical package for social sciences (SPSS) version 21, IBM, US, 2014.

Descriptive statistics were presented as mean, standard deviation (SD) for continuous variables and as, frequencies (No.) and percentages (%) for categorical variables.

Student's t test (independent two groups type) was carried out to detect the differences, if any, between two means. Similarly, Chi square and Fisher's exact test were used alternatively, to detect differences in categorical variables in the same groups., odds ratio was calculated to estimate the higher risk group . Level of significance (P.value) <0.05 considered significant. Level of significance (P.value) <0.01considered highly significant. Finally results and findings were presented in tables and figures with explanatory paragraphs.

3. Results

Study done in 139 patients with age range from 28 to 80 years, giving to a mean of 55.13.Gender distribution were male 131 (94.2%) and female 8 (5.7%) as shown in table 1 and figure 2.Cases divided into group, group A first 70 cases (50.4%) and group B second 69 (49.6%),and each group is further divided according to procedure into CA,AD HOC and PCI. The mean value of contrast volume used in group A that underwent CA was 63.10 ml while mean value of contrast volume used in group B that underwent CA was 50.07 ml, and there was significant p value (P value= 0.029).The mean value of contrast volume used in group A that underwent ad hoc was 124.2 ml while mean value of contrast volume used in group B that underwent ad hoc was 88.19 ml, there was highly significant p value (P value=0.004).The mean value of contrast volume used in group A that underwent PCI was 106.9 ml while mean value of contrast volume used in group B that underwent PCI was 49.6 ml ,and there was highly significant p value (P value= 0.0003).as shown in table 2 that show contrast volumes used in Group A and B in CA,ad hoc and PCI.

The mean total time of procedure of group A underwent CA was 17.16 minutes while mean total time of procedure of group B underwent CA was 13.7 minutes, and there was highly significant p value (P value=0.015).The mean total time of procedure of group A underwent ad hoc was 24.9 minutes, while mean total time of procedure of group B underwent ad hoc was 26.3 minutes, and there was no significant p value (P value=0.45).The mean total time of procedure of group A underwent PCI was 26 minutes ,while mean total time of procedure of group B underwent

PCI was 16.4 minutes ,and there was highly significant p value (P value=0.01) as shown in table 3 that show total time spent in the whole procedure in group A and B in CA, ad hoc and PCI.

The mean fluorotime of group A underwent CA was 4.61 minutes, while mean fluoro time of group B underwent CA was 3.06 minutes ,there was high significant p value (P value=0.005).The mean fluoro time of group A underwent ad hoc was 7.2 minutes, while mean fluoro time of group B underwent ad hoc was 7.32 minutes ,there was no significant p value (P value=0.91).The mean fluoro time of group A underwent PCI was 6.62 minutes, while mean fluoro time of group B underwent primary coronary intervention was 3.51 minutes,there was significant p value (P value=0.035) as shown in table 4 that show fluoroscope time that spent in Group A and B in CA,ad hoc and PCI.

The incidence of radial artery spasms were about 17 cases (12.23%) in both group,11 cases (15.7%) in group A and 6 cases (8.69 %) in group B. There were about 9 cases (6.47 %) with severe tortuosity, 5 cases (3.59 %) with moderate tortuosity and 4 cases (2.87 %) with mild tortuosity. There were 8 cases (11.4 %) of group A transferred to femoral approach and 4 cases (5.79 %) of group B transferred to femoral access.

Table (1) gender distribution.

Gender	NO (%)
Male	131 (94.2)
Female	8 (5.7)

Table (2) distribution of contrast volume used in Group A and B.

Group	Procedure	Mean
Group A	CA	63.10
	AD HOC	124.20
	PCI	106.91
Group B	CA	50.07
	AD HOC	88.19
	PCI	49.56

Table (3) distribution of total time of procedure in Group A and B.

Group	Procedure	Mean
Group A	CA	17.16
	AD HOC	24.9
	PCI	26.13
Group B	CA	13.66
	AD HOC	26.3
	PCI	16.4

Table (4) distribution of fluoro time in group A and B

Group	Procedure	Mean
Group A	CA	4.61
	AD HOC	7.2
	PCI	6.62
Group B	CA	3.06
	AD HOC	7.32
	PCI	3.51

Figure 2 show gender distribution with male about 94% and female about 6% as shown below.

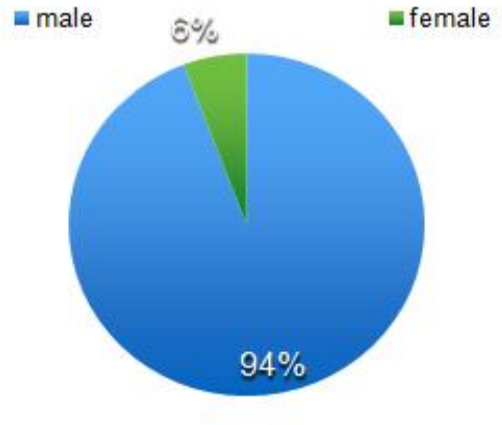

Figure (2) gender distribution.

Figure 3 show volume of contrast that used in group A and B that underwent CA, AD HOC and PCI, as shown in figure 2.

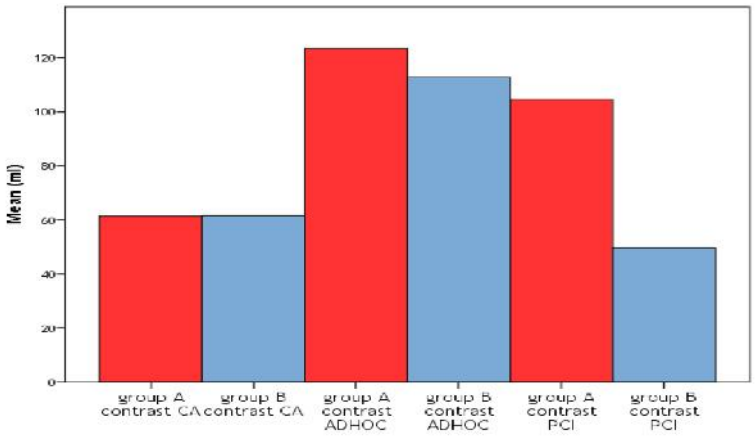

Figure (3) show contrast volume that used in group A and B that underwent CA, AD HOC and PCI.

Figure 4 show total time of procedure of group A and B that underwent CA, AD HOC and PCI.

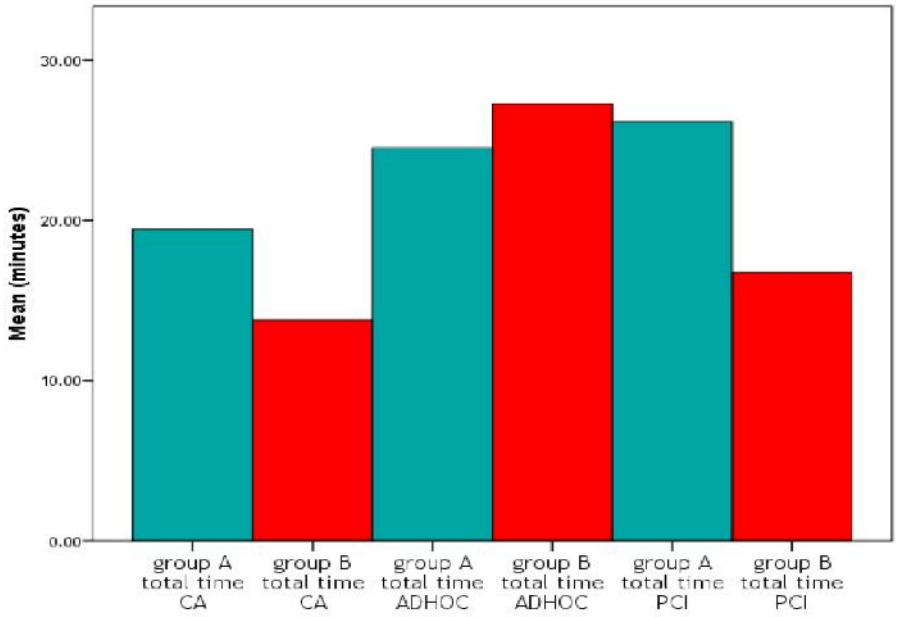

Figure (4) show total time of procedure of group A and B that underwent CA,AD HOC and PCI.

Figure 5 show time of fluorotime that used during procedure of group A and B that underwent CA, AD HOC and PCI.

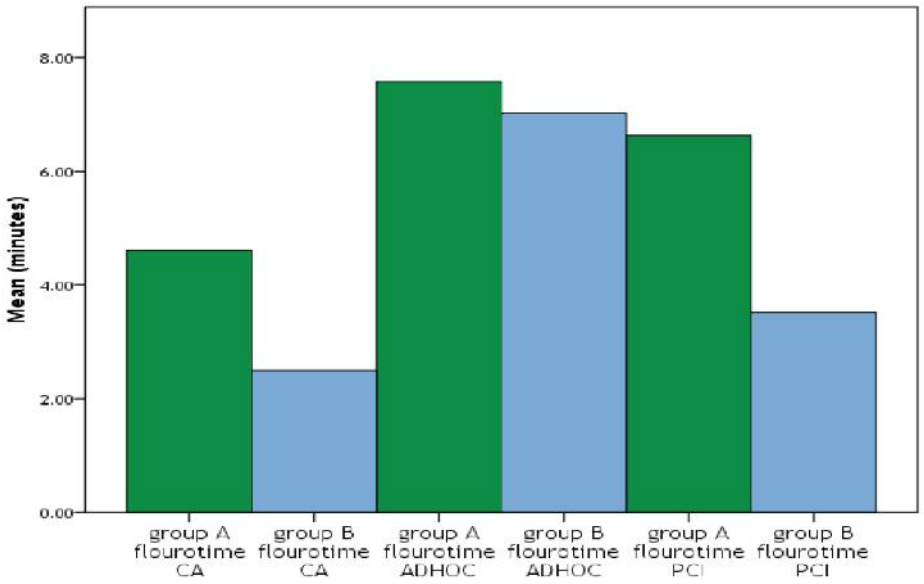

Figure (5) show duration of fluoro time that used of group A and B that underwent CA, AD HOC and PCI.

4. Discussion

The mean age of our study was 55.13, and it consider as low mean age for the incidence of ischemic heart disease in comparison with the western countries ,while in study of Ruzsa et al,. mean age was higher (68+8)[5].Also study of Warren et al,. show higher mean of age (62+11). [5]this is could be explained by referral of young age to coronary angio in our community, also older age not accept to be referred to coronary angiography, also could be due to inadequate preventive measure in our community.

In this study, gender distribution were male 94.2% and female 5.7%,if we compare this result with study of Warren et al,. Which show little difference in gender distribution of male (81%) and female (19%) [5] but study of Ruzsa et al,. [48] differ in gender distribution as male 67% and female 33%.

The male predominancy in IHD goes with international data but the female percentage in our study is lower than percentage of other studies and this could be explained by anxiety and small radial artery are more common in females and accordingly less transradial approach choose in females.

Mean volume of contrast that used in group A that underwent CA, AD hoc and PCI higher that of group B that underwent CA, AD HOC and PCI respectively, there were significant P value, this is could be explained as with time there is much effect of learning curve in TR approach as with time less numbers of catheter needed to complete the procedure and easy with proper engagement of coronary Ostia.

The mean total time of procedure of group A longer in duration than of group B that underwent CA and PCI. And show highly significant P value.

This could be explained also by learning curve experience with the time, as less access site difficulty, less spasm, easy engagement, with more cases lead to more experience in doing procedure in less time, and this is agree with study of Fernandez et al,, as show less time of procedure need in group B. [6]

But the mean time of group A less in duration than group B that underwent ad hoc and no significant P value.

This is attributed partly to percentage of complex cases in group B including dealing with total occlusion lesion or complex PCI needed more than one balloon and stent and in some cases treating more than one artery in one stage and in some cases severe subclavian artery tortuousity, and this is disagree with study of Fernandez et al,, as show less time of procedure need in group B underwent ad hoc. [50]

The mean fluorotime time needed in group B less than of group A that underwent CA and PCI and show significant P value and this is again agree with study of Fernandez et al,, as show less time of fluoro time need in group B as this is approve learning curve in transradial approach . [6]

The mean fluoro time needed in cases underwent AD HOC procedure show non significant P value and this is can be explained earlier by complicity of cases in group B in AD HOC cases.

There was significant reduction in incidence of radial artery spasm between group A and B, this is also support effect of learning curve in TR approach.

There was significant reduction in number of cases that transferred to TF approach between group A and B, because of various reasons including difficulty in getting the access, intractable radial artery spasm, uncrossable severe subclavian artery tortuosity, or inability to get left, right or both coronary Ostia engagement.

This is also support the effect of learning curve in TR approach.

5. Conclusion

The TR approach is a good choice for doing coronary catheterization and there was much benefit from the effect of learning curve in doing the procedures.

Recommendation

1-We encourage TR approach in doing coronary catheterization.
2-we suggest further studies with more number of cases and more parameters to investigate.
3-we encourage primitive operator to enter in learning curve.

6. References

1- Karlsson S, Neichajev IA. Arterial anatomy of the upper extremity. Acta Radiol Diagn 1982; 23: 115-2.

2- Haerle M, Hafner HM, Dietz K, Schaller HE, Brunelli F. Vascular dominance in the forearm. Plast Reconstr Surg 2003;111: 1891-8.

3- Fernández SJ, Santos SC, Rodríguez JM, González VN, Rey EV, Fernández RP, Zubeldía BB and Beiras CA. Transradial Approach to Coronary Angiography and Angioplasty: Initial Experience and Learning Curve.Rev Esp Cardiol. 2003;56:152-9 - Vol. 56 Num.02.

4.Campeau L. Percutaneous radial artery approach for coronary angiography. Cathet Cardiovasc Diagn. 1989; 16:3–7.

5-Jolly SS, Yusuf S, Cairns J, Niemela K, Xavier D, Widimsky P, Budaj A, Niemela M, Valentin V, Lewis BS, Avezum A, Steg PG, Rao SV, Gao P, Afzal R, Joyner CD, Chrolavicius S, Mehta SR, RIVAL Trial Group. Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL): a randomised, parallel group, multicentre trial. Lancet 2011; 377(9775):1409–1420.

6-Romagnoli E, Biondi-Zoccai G, Sciahbasi A, Politi L, Rigattieri S, Pendenza G, Summaria F, Patrizi R, Borghi A, Di Russo C, Moretti C, Agostoni P, Loschiavo P, Lioy E, Sheiban I, Sangiorgi G. Radial versus femoral randomized investigation in ST-segment elevation acute coronary syndrome: the RIFLE-STEACS (Radial Versus Femoral Randomized Investigation in ST-Elevation Acute Coronary Syndrome) study. J Am Coll Cardiol 2012;60(24):2481–2489.

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