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Coronary Procedures by Left vs. Right Transradial Approach in Bangladeshi Diabetic Population

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Abstract:

Background: Radial arterial approach is the usual option for coronary procedures in our hospital. Our aim was to evaluate the safety and efficacy of left radial approach (LRA) compared with right radial approach (RRA) for coronary procedures.

Methods: This study is a single centre, single operator randomized study. Only diabetic patients more than 18 years old with bilateral normal allen's test requiring coronary procedures (CAG and PCI) were included in this study. Study period was since January, 2011 to February, 2012. Primary PCI were excluded from this study. The patients were randomized to LRA or RRA arm for coronary procedures. Primary endpoint for diagnostic CAG was contrast volume and fluroscopy time and secondary endpoint was the prevalence of high grade subclavian tortuosity and number of diagnostic catheters used. Size of the conventional guide catheter (5 or 6 F) was compared in both arms irrespective of left or right coronary PCI.

Results: Total 512 diabetic patients were enrolled for CAG and equally divided into LRA (256 patients) or RRA (256 patients) arms. Total 290 PCI was performed (145 LRA and 145 RRA). In CAG, LRA arm showed significantly lower fluroscopy time (p = 0.006) and contrast volume (p= 0.005) though more use of double diagnostic catheter (5 F TIG and JR) was present in LRA group. In PCI, RRA arm needed signicantly more 5 F guide catheter (p=0.001). Subclavian tortuosity were more observed in female RRA group.

Conclusions: In diabetic population, CAG by left radial approach was superior to right in terms of amount of contrast and fluroscopy time. Subclavian tortuousity was more observed in right and especially more in female. In PCI, 6 F conventional guide catheters were commonly used in both approache though 5 F guide catheter were used more in right radial approach due to extreme subclavian tortuousity and diffuse disease. Dedicated sheathless guide catheter may resolve this issue.

Keywords: Percutaneous coronary procedure, Transradial approach.

Introduction:

Transradial approach is more than a default technique for coronary procedures nowadays.[1] The transradial approach reduces access site bleeding complications[2,3] and procedural discomfort.[4,5] Historically, transradial catheterization was developed using the left radial artery as the primary access site. In the original description of the technique by Lucien Campeau in 1989, the patient's left wrist was hyperextended to facilitate puncture of the left radial artery with an 18-gauge needle and subsequent cannulation using a 5-F sheath. Coronary angiography was successfully completed using 5-F catheters.[6] The right radial approach was utilized in the first description of transradial PCI in 1993, as described by Ferdinand Kiemeneij.[7]

At present, the choice for the right radial approach (RRA) or the left radial approach (LRA) largely depends on the operator's preference. Most of the studies assessing the safety and efficacy of transradial approach have been performed through RRA[8] probably because of the familiarity in performing the study from the patient's right side as commonly used in the femoral approach. However, several studies have shown that the LRA may provide similar[9] or even better procedural efficacy[10] and technical superiority compared with the RRA.

The LRA may also have an important anatomical advantage because of the vascular anatomy of epiaortic vessels with a more direct access to the ascending aorta. This anatomical advantage of the LRA could play a role in reducing fluoroscopy time and cerebrovascular complications[11] compared with the RRA. The aim of this study was to evaluate the safety and efficacy of LRA compared with RRA in exclusively diabetic population coming for coronary interventional procedures.

Methods:

This study is a single centre, single operator randomized study. Only diabetic patients more than 18 years old with bilateral normal allen's test requiring coronary procedures (CAG and PCI) were included in this study. Study period was since January 2011 to February 2012. Exclusion criteria were ST-elevation–acute myocardial infarction, need of catheters >6F, ischemic Allen test, simultaneous right heart catheterization, hemodialysis patients with an arteriovenous fistula, and age <18 years. The patients were randomized to LRA or RRA arm for coronary procedures. The study has been approved by an institutional ethical committee, and written informed consent was obtained to take part of the study.

A 5 or 6F artery sheath was used in all cases. The Allen test was performed before the procedure. The radial artery approach was performed using a hydrophilic guide wire and hydrophilic sheath by the modified Seldinger technique.

After sheath insertion, 2,500 U of unfractionated heparin was injected directly into the radial artery through the sheath. Additional units of unfractionated heparin were given before the interventional procedure, according to the activated clotting time results. A spasmolytic cocktail to reduce radial spasm was routinely used. In both approaches, the arm was positioned along the patient's leg.

Selective catheterization of the right and left coronary arteries was carried out using TIG or Judkins curve catheters (right and left). All the procedures were performed in the same angiographic room.

For those patients in whom a PCI was performed after the diagnostic procedure, the measurement of fluoroscopy time (expressed in seconds), and contrast amount (expressed in mL) was reset and restarted after the end of the diagnostic procedure.

Arterial sheaths were removed immediately after either diagnostic or interventional procedures, and hemostasis was obtained according to the protocol of the centre by direct digital pressure, using a pressure bandage with 3 elastic sticky straps.

Primary endpoint of this study for diagnostic CAG was contrast volume and fluroscopy time and secondary endpoint was the prevalence of high grade subclavian tortuosity and number of diagnostic catheters used. Size of the conventional guide catheter (5 or 6 F) was compared in both arms irrespective of left or right coronary PCI.

Continuous variables for each of the 2 subject groups were reported as mean and SD for variables and were compared using Student t test. Categorical variables were indicated as the absolute number and percentage and were compared by Pearson ÷2 test or, if the number expected of patients was <5, with the Fisher exact test. A 2-tailed P d" .05 was considered statistically significant. The SPSS version 17.0 (IBM, Armonk, NY) was used for all analysis.

Results:

Total 512 diabetic patients were enrolled for CAG and equally divided into 2 arms (256 LRA & 256 RRA) as diagnostic group. Total 290 PCI was performed after the diagnostic angiography (145 LRA and 145 RRA) & these patients represented the PCI group. The baseline characteristics of the patients are summarized in Table I and were similar between the 2 groups.

Table-I

Characteristics of patients

Characteristics	LRA (n=256)	RRA (n=256)	*p* value
Age (y)	50.4 ± 8	49.9 ± 9.3	.088^{NS}*
BMI (Kg/m²)	24.7 ± 2.8	25.1 ± 2.8	.085^{NS}*
LVEF%	49.8 ± 7.8	51.5 ± 7.5	.090^{NS}*
Hypertension, n(%)	156 (60.9%)	140 (54.6%)	.425^{NS}#
Dyslipidaemia, n(%)	111 (43.3%)	95 (37.1%)	.052^{NS}#
Male, n(%)	156 (60.9%)	168 (65.6%)	.920^{NS}#
Female, (%)	100 (39.1%)	88 (34.4%)	

Results were expressed as Mean±SD, LRA = Left Radial Approach, RRA = Right Radial Approach, NS = Not Significant, * t-test was done to measure the level of significance, # Chi-square test was done to measure the level of significance.

In the diagnostic group, LRA was associated with significantly lower fluoroscopy time (143±22.8 and 172±17.4 sec, p=0.005) and contrast volume (37±16 and 47±11.9 mL, p=0.006) compared with the RRA (Figure 1) though more use of double diagnostic catheter (5 F TIG and JR) was present in LRA group (Figure 2).

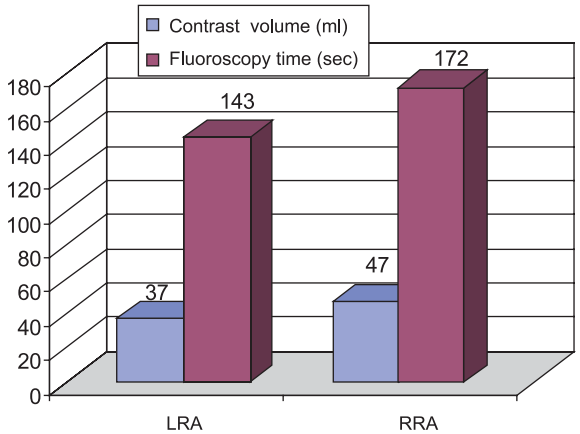

Fig.-1: *Fluroscopy time (sec) and contrast volume (mL) in the diagnostic group*

In PCI group, there were no significant differences regarding the procedural data between LRA and RRA (Table II).

Table-II

Stent & lesion characteristics in the PCI group

Characteristics	LRA (n=145)	RRA (n=145)	*p* value
Stent/patient	1.8±1	1.7±1	.051^{NS*}
stent length (mm)	23±16.6	22.2±15.8	1.000^{NS*}
stent diameter (mm)	2.7±0.4	2.7±0.5	.672^{NS*}
DES, n(%)	163 (63%)	134 (54%)	.086$^{NS\#}$
BMS, n(%)	95 (37%)	110 (46%)	.761$^{NS\#}$
1 vessel disease, n(%)	27 (18.6%)	30 (20.6%)	.323$^{NS\#}$
2 vessel disease, n(%)	39 (26.9%)	40 (27.5%)	.842$^{NS\#}$
3 vessel disease, n(%)	70 (48.2%)	65 (44.8%)	.583$^{NS\#}$
Left main disease, n(%)	9 (6.3%)	10 (7.1%)	1.00$^{NS\#}$

Results were expressed as Mean±SD, LRA = Left Radial Approach, RRA = Right Radial Approach, NS = Not Significant, * t-test was done to measure the level of significance, # Chi-square test was done to measure the level of significance.

In PCI group, RRA arm needed signicantly more 5 F guide catheter (60 vs. 20, p=0.001) compared to LRA arm (Table III & Figure 2)

Table-III

Guide catheters used in PCI

Guide catheter	LRA (n= 145)	RRA (n= 145)	p value*
5 Fr Guide cath, n(%)	20(13.8%)	60 (41.4%)	.001^{S}
6 Fr Guide cath, n(%)	125 (86.2%)	42 (59.3%)	.091^{NS}

Results were expressed as Mean±SD, LRA = Left Radial Approach, RRA = Right Radial Approach, S = Significant, NS = Not Significant, * Chi-square test was done to measure the level of significance.

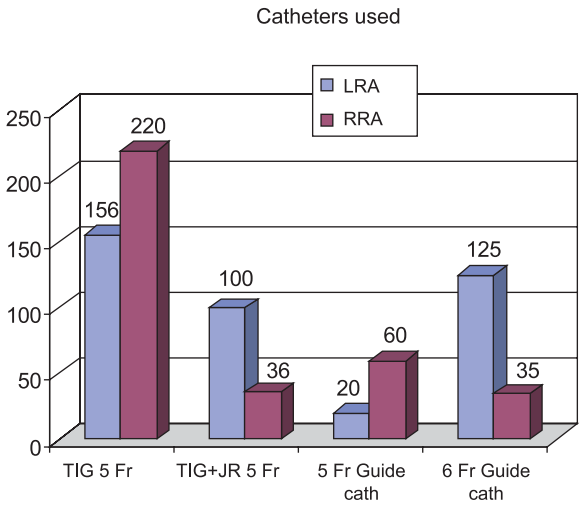

Fig.-2: *Use of diagnostic & guide catheter in coronary procedures via LRA & RRA.*

Of note, a double incidence of subclavian tortuosity in the female RRA compared with female LRA was observed (40 vs. 15), and this difference was highly significant (P=0.001) (Figure 3).

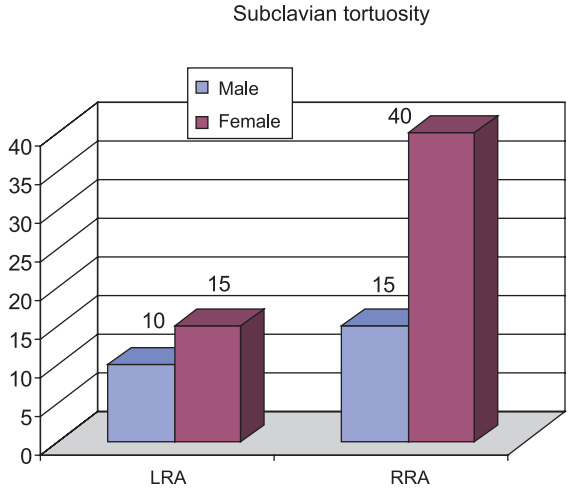

Fig.-3: *Subclavian tortuosity in LRA & RRA*

Discussion:

The radial approach is an appealing technical strategy to reduce bleeding complications in patients with coronary artery disease undergoing percutaneous invasive management.[12,13] A major effort in increasing the rate of invasive procedures performed through transradial approach is expected worldwide in the next years[14] so that data regarding transradial techniques are of great interest. When planning a transradial procedure, the first operator's doubt is represented by the upper-arm selection (right or left). The main findings of our prospective, randomized study is that the LRA is associated with shorter fluoroscopy time and reduced contrast volume dose compared with the RRA. There was a lower amount of contrast medium used in patients using 5 Fr sheaths & guiding catheters.

The RRA is commonly used by most operators probably because the catheter manipulation can be performed more easily from the patient's right side as in the femoral approach. However, the LRA may have at least 3 important advantages compared with the RRA. First of all, in using Judkins preshaped curves, the catheter manipulation is very similar to the femoral approach with direct access to the left coronary ostium, whereas in the RRA, the catheters must be rotated to afford the S-shaped geometry of the subclavian-innominate- aorta axis. The different catheter manipulation may prolong fluoroscopy time particularly by nonexpert operators. Indeed, we observed highly significant differences in fluoroscopy between the 2 approaches. Because a series of anatomical variations may be encountered during the arterial path from both wrists to the ascending aorta,[15] another possible advantage of

the LRA may be related to a lower impact of subclavian tortuosity. Indeed, in our study, we observed a double incidence of subclavian tortuosity associated with the female RRA compared with the LRA. The presence of subclavian tortuosity is a major issue in prolonging the length of the procedure because of increased difficulty in catheter manipulation. The third explanation for LRA advantage can be ascribed to patient comfort. Indeed, for right-handed patients, the use of RRA is associated to some discomfort and disabilities[16] lasting for at least 6 to 12 hours. This disadvantage can be avoided with LRA.

In PCI, 6 F conventional guide catheters were commonly used in both approach though 5 F guide catheter were used more in right radial approach due to extreme subclavian tortuousity and diffuse disease.

The TALENT (Transradial Approach (Left vs Right) and Procedural Times during Percutaneous Coronary Procedures) study randomized 1,540 patients to left or right transradial catheterization and demonstrated that left transradial access was associated with a reduction in fluoroscopy time and radiation exposure, driven exclusively by cases performed by trainees as primary operators. Of note, subclavian tortuosity, an important predictor of transradial access failure, was less common with left transradial catheterization procedures.[17]

The major limitation of the LRA consists of some difficulty to reach the left side leaning over the patient, particularly for shorter operators or in obese patients. However, after adequate positioning of the left arm over the left leg, this discomfort may be significantly reduced. Another possible concern of LRA is a greater exposure of the operator to x-rays, related to the closer position to the patient during catheter manipulation.

Finally, our results are obtained in high-experienced centers in transradial approach in Bangladesh, and conclusions might look different in centers with lower experience in this approach.

Conclusion:

In diabetic population, CAG by left radial approach was superior to right in terms of amount of contrast and fluroscopy time. Subclavian tortuousity was more observed in right and especially more in female. In PCI, 6 F conventional guide catheters were commonly used in both approach though 5 F guide catheter were used more in right radial approach due to extreme subclavian tortuousity and diffuse disease. Dedicated sheathless guide catheter may resolve this issue.

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