Slender Percutaneous Coronary Intervention ("Slender PCI") via Transradial approach by using 5Fr Guide Catheter- An Updated Single Center Experiences

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Key Words:
Slender PCI, Trans-radial approach

Abstract:

Background: *Aim of the study was to evaluate the primary procedural success of slender PCI via transradial approach using either Bare-metal stents (BMS) or Drug Eluting Stent (DES).*

Methods: *Total 10 patients were enrolled in this very preliminary study. Among them, Male: 8 and Female: 2. Clinical presentation were Ant MI: 4 (40%), Inf. MI: 2 (20%), Angina II-III: 3 (30%), and NSTEMI: 1 (10%). Total 10 stents were deployed. Mean age were for Male: 44yrs, for Female: 55yrs . Associated CAD risk factors were Dyslipidemia, High Blood pressure, Diabetes Mellitus, Positive FH for CAD and Smoking (all male).*

Results: *Among the study group; 9 (90%) were Dyslipidemic, 5 (50%) were hypertensive; 6 (60%) patients were Diabetic, FH 6 (6%) and 8(63%) were all male smoker. Female patients were more obese (BMI M 24: F 27) and developed CAD in advance age. Common stented territory were LAD: 5 (50%) followed by RCA: 3 (30%) and LCX: 2 (20%). Average length and diameter of stent for LAD, RCA and LCX were 3.25, 3.16, 2.5 and 21.4, 20.3, 20 respectively. Stent used: BMS 3 (30%), Everolimus 5 (50%), Sirolimus 1(10%) and Zotarolimus 1(0.75%). Less contrast used (49.5ml), reduced radiation exposure (4727Gym2) and less fluoroscopy time (193 sec) with overall no procedural complication were observed.*

Conclusion: *Our study has shown that the slender PCI via radial artery with a 5F guide catheter is safe with no procedural complication. It is also associated with less radiation exposure, less fluoroscopy time, good backup support and quick mobilization of patient.*

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Introduction:

The most common access site uses is Trans-femoral approach (TFA) for any interventional procedure specially in case of coronaries. Radial artery (RA) access for CAG was first described by Campeau,[1] with coronary intervention performed shortly after. Now a day, transradial coronary intervention (TRI) is being increasingly performed. TRI has been shown to result in reduced local access complication rates and major adverse cardiac events.[2,3] One of the important drawback in procedural failure by using 6Fr Guide Catheters via transradial approach was due to small and tortuous artery gave less favorable condition. Thus, the need for use of small guide catheter for transradial intervention is well addressed and Japanese are doing trans-radial Slender PCI by using 5Fr or 4Fr Guide Catheters.[4] Data on slender PCI by using 5F Guide Catheters via radial approach in Bangladeshi stent era is yet to be available. Therefore, we have analyzed this non-randomized preliminary study, in order to assess the procedural success and the Guide Catheters back up support in performing "Slender PCI" with fluoro time and contrast uses in our patient population.

Methods:

Total 10 patients were enrolled in this very preliminary study. Among them, Male: 8 and Female: 2. Clinical presentation were Ant MI: 4 (40%), Inf. MI: 2 (20%), Angina II-III: 3 (30%), and NSTEMI: 1 (10%). Total 10 stents were deployed. Mean age were for Male: 44yrs, for Female: 55yrs. Associated CAD risk factors were Dyslipidemia, High Blood pressure, Diabetes

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Mellitus, Positive Family History for CAD and Smoking (all male).

Procedure: CAG was performed as per standard protocol. Individual discretion was applied as per operator’s choice, depending on patient’s problem. Significant lesion was defines as stenosis as greater than 70% narrowing in angiogram with clinical symptoms. Patient were selected and analyzed from those who underwent for slender PCI of their coronary status. Most of the patient population in this study, had PCI either with bare metal stent or drug eluting stent. PCI were done with the BMS and DES. Among the stent used; BMS used were micro-Driver (Medtronic, USA), Cypher (Cordis, USA), Promus Element (Boston Scientific, USA) and Endeavor Resolute (Medtronic, USA). Coronary angioplasty was performed according to standard rules. Predilatation was optional before stent implantation with a shorter balloon to avoid geographic miss. A successful procedures was defined as TIMI-3 antegrade flow, and <20% residual stenosis in two orthogonal views. Post-deployment dilation was performed at high inflation pressure in all patients.

Drug Therapy

All the patients received Aspirin 300 mg/day and Clopidegrol as a loading dose 300 mg prior to PCI and continued for 3-6 months and received atorovastatin along with standard Medical management for CAD. During the procedure, an intravenous heparin bolus (100IU/Kg) and GP IIb/IIIa receptor blocker Integrilin were administered as required. The use of GP IIb/IIIa Receptor blocker was recommended as per protocol. Quantitative angiographic measurements of the target lesion were obtained in order to deploy correct size stent. In the event of chest pain, post-procedural ECG and CPK were measured and compared with the baseline. Check angio were taken, whenever indicated.

Statistical analysis: Data were presented as mean ± SD with percentage.

Results:

Table I shows the profile of studied population. Female patients were more obese (BMI; M 25: F 27) and developed CAD in advance age. CAD risk factors were more in male than female.

Table-I

Demographic Profile of patient

	Male	Female
Number	8	2
Age (yrs)	44±6.5	55.5±20.1
BMI(kg/m^2)	25.3±1.6	27.0±2.98
SBP(mmHg)	133±10.3	135±7.1
DBP(mmHg)	77.5±7.1	75.7±6.1
No. of CAD Risk Factor	3.3±1.1	2.5±0.7

Table II shows the clinical diagnosis on admission. Among them, patient with anterior MI were more, followed by Angina CCSS II-III.

Table-II

Clinical presentation on Admission

	Dye Used
Angina CCS II-III	3
NSTEMI	1
Anterior MI	4
Inferior MI	2

Table III shows the average size of stent used. LAD territory lesion was longer, and followed by RCA and LCX. Therefore LAD territory needs longer stent, then RCA and LCX.

Table-III

Average size of Stent used with inflation pressure

	Length (mm)	Diameter (mm)	Inflation Pressure (ATM)
LAD	21.4±4.8	3.25±0.4	13.6±0.9
LCX	20.0±11.3	2.5±0.0	12.0±0.0
RCA	20.3±2.5	3.16±0.3	12.6±1.2

TableIV shows the contrast used, Fluoro time, Fluoro used, and procedure time. Average dye used 50ml, Fluro times 195sec, procedural time 15 min, Fluro used 4727 mGy, Hospital stay 36 hrs and full mobilization 4-6 hrs.

Table-IV
Average Dye used, Fluoro Time and Fluoro used

	Dye Used
Dye Used (ml)	49.5±8.9
Fluoro Time(msec)	193.0±24.4
Fluoro used(Grmy)	4727.5±343.7

Fig. 1 shows the percentage distribution of the stented territory LAD 5 (50%) followed by RCA 3 (30%) and LCX 2(20%).

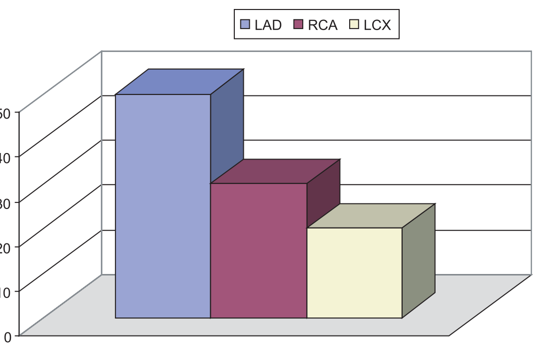

Fig.-1: *Percentage Distribution of Stented artery*

Fig. 2 shows the percentage distribution of CAD risk factors. Among the study group; 9 (90%) were Dyslipidemic, 5(50%) were hypertensive: 6(60%) patients were Diabetic, FH 6 (60%) and 5(62.5%) were all male smoker.

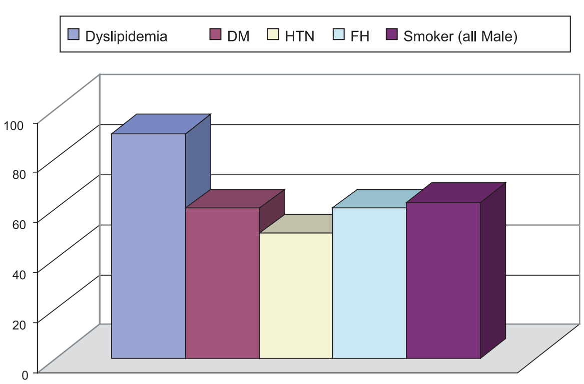

Fig.-2: *Percentage of distribution of CAD Risk Factors*

Fig. 3 shows the percentage distribution of common stent used. Among the Stent used: BMS 3 (30%), DES 7 (70%).

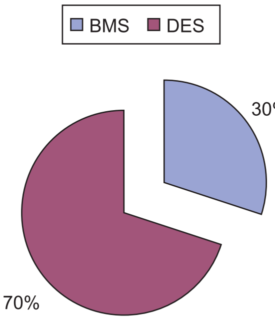

Fig.-3: *Percentage distribution of stents*

Fig. 4 shows the percentage distribution of different DES used. Among the DES, Everolimus 5 (72%), Sirolimus 1 (14%), and Zotarolimus 1(14%).

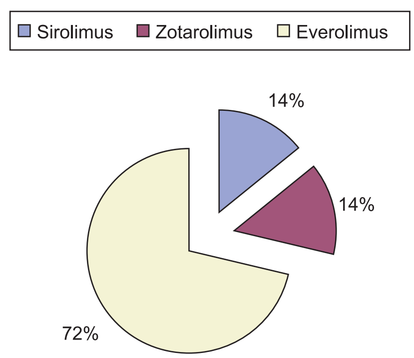

Fig.-4: *Percentage distribution of Different DES*

Discussion:

The transradial approach for coronary procedures has gained progressive acceptance since its first introduction by Campeau[1] in 1989 for diagnostic CAG and its improvement by Kiemeneji et al[5] for Percutaneous coronary Intervention. Trans Radial Intervention (TRI) is increasingly performed with 6Fr Guide catheters (GCs) in most centers and operators. However, Saito et al demonstrated that based on radial artery inner diameter, only 72.6% of female and 85.7% of male Asian patient can physically accept the 6 Fr sheath.[6] The ratio between the radial artery to sheath diameter has been shown to be an important predictor of reduction of radial artery flow after TRI and radial occlusion rates are significantly lower if the ratio of radial artery inner diameter / sheath outer diameter is equal or greater than 1.0. Thus, smaller diameter GCs and sheath (termed "Slender TRI") would be expected to reduce radial artery spasm and occlusion rates. Although the slender PCI has several limitations, however, some of this limitation has been overcome by using new slender devices and techniques. The less invasive strategy such as TRI and Slender PCI may be the future direction of PCI because they can prevent the complication and improves the quality of Life.[4]

Since, the catheterization of a human heart was first performed by Werner Frossmann in 1929, access site practice has undergone considerable evolution and technical refinement.[7] Improvement in technique and equipments have resolved this problem and more recent success rates are comparable to those of femoral access[8] Several Meta-analysis of randomized trials confirmed that radial access is associated with significant reduction in access site bleeding. Prevention of excess bleeding by radial approach, many has explained its association of reduction in significant bleeding related complication and thereby mortality in trans-radial approach.[3]

Indeed, transradial access has been shown by some authors to have several advantages over transfemoral approach. In the Bangladeshi stent era, we have published before, for the first time that the transradial PCI is safe with reduced radiation to exposure.[9] It has well established that the radial artery is easily compressible, thus hemorrhagic complication is significantly reduced. Additional benefits of radial access include improved patient comfort and quality of life, [10] reduced nursing requirements, early mobilization, facilitation of daycare procedure and cost reduction.[11] Brueck M et al., demonstrated that TRI is safe, feasible and effective with similar results as compare to TFI.[2] Also, the rate of major vascular complication was negligible or less than in TRI. Some of the observational study suggests that TRI is associated with an increase radiation exposure for patients and operators.[12-14] Patient body weight and procedure complexity can generate large variation in radiation dose regardless of access site. Operator experience is very important in relation to radiation exposure due to learning curve issues.

Spasm is also predominantly a learning curve issue and often precipitated by painful or difficult radial artery puncture. Tortuous and small in caliber radial artery are prone to develop spasm and are common cause of procedural failure even for experienced operators. Spasm that occurs with catheter exchange or manipulation often responds to downsizing the catheter size and administering vasodilators and analgesia and light sedation by benzodiazepine. Difficult or painful radial punctures sometimes precipitate Vasovagal reactions of bradycardia and hypotension, rapidly responds to atropine and fluid infusion. Small caliber , tortuous vessel are prone to spasm and is a common cause of procedural failure even for experienced operator.15 Uses of long sheaths can minimize spasm related to manipulation and torqing of catheter during radial artery PCI.[16]

sRecently, the growing concerns of increased radiation exposure in trans-radial approach PCI is also debatable[11]and can be alleviate by operators expertise in minimizing the cine-shot. The purpose of this very preliminary study was to evaluate the feasibility of slender PCI by using 5Fr GCs via transradial approach in our population subset at our center. We found, that less procedural time including less radiation exposure and reduce fluro time have additive benefit.

Conclusion:

We may conclude that this very preliminary "Slender PCI" via radial approach is safe and effective alternate to femoral access.[24] Our study has revealed, that less fluro time with reduced radiation exposure were required. We didn't find any backup support related problem during PCI with 5Fr GCs. Our future perspective is to enroll more cases in the study and to do randomization to compare slender PCI's superiority even in more complex PCI including CTO lesion. Therefore, the radial approach "Slender PCI" as an interesting choice in a broad range of patients, provided that experienced operators, state-of-the-art materials and willingness to crossover to the femoral approach ("always prep a groin") are available.

Conflict of Interest - None.

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