Arterial access site complications are the important predictor of successful percutaneous coronary interventions (PCI). We prospectively studied 722 consecutive PCI patients for access site complications. A total of 303 trans-femoral access (TFA) patients who had suture based vascular closure devices (VCD) were compared with 419 transradial access (TRA) patients. Incidence of hematoma was more in TFA (2.3% vs 0.23%, p 0.01). Median ambulation time (4 h vs 1 h, p < 0.01) was significantly higher in TFA. In conclusion, TRA had fewer access site complications like haematoma, compared to TFA with VCD. TRA also resulted in earlier ambulation and discharge, compared to TFA with VCD.

© 2021 Cardiological Society of India. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
2.1. Statistics

Normal distribution was tested using the Shapiro–Wilks test for continuous variables. The mean (± 1 standard deviation) or median (interquartile range) were calculated for continuous variables in normal and skewed distribution, respectively. Percentages were calculated for discrete variables. Statistical difference between the continuous variables was analysed using the Mann–Whitney U test. Categorical data were presented as frequencies and percentage and were compared by chi-square or Fisher’s exact tests. All statistical analysis was done using SPSS version-26.

3. Results

Out of a total of 722 enrolled patients, 419 had TRA and 303 had TFA. The median age was higher (59 vs 58 years, p 0.02) and females were more common (20.1% vs 14.1%, p 0.03) in the trans-femoral group (Table 1). The conventional CAD risk factors were comparable in both the groups except smoking which was more in TRA (p < 0.01). The majority of the patients with ST-elevation myocardial infarction had TRA and those with chronic stable angina had TFA (p 0.001). All transradial patients had a 6F sheath. Out of 303 trans-femoral patients, 28 (9.3%) had 7F sheath, while rest had 6F sheath. A total of 49 (6.7%) patients had local site complications. Incidence of access site oozing was similar between the two groups, while local hematoma was significantly more in TFA (2.3% vs 0.23%, p 0.01). None of the patients had any major bleeding requiring blood transfusion, or vascular complications such as arterio-venous fistula, pseudoaneurysm and local site infection. None of the patients had any device failure or death. The median ambulation time (4 vs. 1 h, p < 0.01) and duration of hospital stay (1.94 ± 1.1 vs. 1.78 ± 1.08 days, p 0.04) were significantly higher in TFA (Table 1).

4. Discussion

Access site bleeding complications is an independent predictor of adverse clinical outcomes following PCI. Its incidence varies from 1.1% to 2.9%, while overall bleeding and vascular complications range from 5% to 15%. The use of VCD helps in rapid hemostasis and early ambulation in post PCI patients. A recent meta-analysis had also suggested that TRA is superior in the prevention of access site bleedings and vascular complications, irrespective of usage of manual compression or VCD for TFA. Our study results are consistent with the published data, indicating TRA is a better strategy in achieving rapid hemostasis, early ambulation and reduction of access site complications, although VCDs are better in achieving rapid hemostasis and early ambulation with TFA. There are certain limitations in the present study. It was a single centre, non-randomized observational study with small sample size. We did not compare the two groups with the patients of manual or mechanical compression. We did not consider radial artery occlusion as a complication of TRA and did not assess its patency at 6 weeks of follow-up. In conclusion, TRA had fewer access site complications like haematoma, compared to TFA with VCD. TRA also resulted in earlier ambulation and discharge, compared to TFA with VCD.

Table 1
Clinical characteristic and outcomes of the study population.

| Access site | Radial (N = 419) | Femoral (N = 303) | P-value |
|-------------|-----------------|------------------|---------|
| Age (years) | 58 (50–65) | 59 (52–67) | 0.02 |
| Male (n %) | 360 (85.9%) | 242 (79.9%) | 0.03 |
| BMI (Kg/m²) | 25 (24–27) | 25 (23–27) | 0.15 |
| Risk factors | | | |
| Diabetes (n %) | 131 (31.2%) | 103 (33.9%) | 0.46 |
| Hypertension (n %) | 172 (41.0%) | 145 (47.8%) | 0.08 |
| Smoker (n %) | 114 (27.2%) | 55 (18.1%) | < 0.01 |
| Family history of CAD (n %) | 7 (1.6%) | 4 (1.3%) | 0.76 |
| Clinical presentation | | | |
| STEMI (n %) | 190 (45.3%) | 94 (31.0%) | < 0.01 |
| NSTEMI/USA (n %) | 137 (32.6%) | 100 (33.0%) | 0.91 |
| CSA (n %) | 93 (22.9%) | 109 (35.9%) | < 0.01 |
| Vascular access site complication | | | |
| Oozing | 22 (5.3%) | 19 (6.3%) | 0.62 |
| Hematoma | 1 (0.23%) | 7 (2.3%) | 0.01 |
| Discharge in days | 1.78 ± 1.08 | 1.94 ± 1.1 | < 0.01 |

P-value in the bold letter is significant.

Abbreviations: BMI - Body mass index, CSA - Chronic stable angina, NSTEMI - Non-ST-elevation myocardial infarction, STEMI - ST-elevation myocardial infarction, USA - unstable angina.

* Value in median (interquartile range).

** Value in mean ± 1 standard deviation.

Funding

None.

Author’s contribution

All the authors were involved in [1] substantial contributions to research design, acquisition, analysis, or interpretation of data; [2] drafting the paper or revising it critically; [3] approval of the submitted and final versions.

Declaration of competing interest

There is no conflict of interest of any of the authors about the present study.

Acknowledgement

No additional contribution by any other person.

References

1. Singh M. Bleeding avoidance strategies during percutaneous coronary interventions. J Am Coll Cardiol. 2015;65:2225–2238.
2. Verheugt FWA, Steinshubl SR, Hamon M, et al. Incidence, prognostic impact, and influence of antithrombotic therapy on access and nonaccess site bleeding in percutaneous coronary intervention. JACC Cardiovasc Interv. 2011;4:191–197.
3. Lee MS, Appleget B, Rao SV, et al. Minimizing femoral artery access complications during percutaneous coronary intervention: a comprehensive review. Cathet Cardiovasc Interv. 2014;84:62–69.
4. Rigatelli S, Sciallacci P, Rabk K, et al. Comparison between radial approach and femoral approach with vascular closure devices on the occurrence of access-site complications and periprocedural bleeding after percutaneous coronary procedures: a systematic review and meta-analysis. J Invasive Cardiol. 2016;28:473–479.
5. Biancari F, D'Andrea V, Di Marco C, et al. Meta-analysis of randomized trials on the efficacy of vascular closure devices after diagnostic angiography and angioplasty. *Am Heart J*. 2010;159:518–531.

6. Landes U, Rental T, Levi A, et al. Temporal trends in percutaneous coronary interventions thru the drug eluting stent era: insights from 18,641 procedures performed over 12-year period. *Cathet Cardiovasc Interv*. 2018;92:E262–E270.

7. Ferrante G, Rao SV, Juni P, et al. Radial versus femoral access for coronary interventions across the entire spectrum of patients with coronary artery disease: a meta-analysis of randomized trials. *JACC Cardiovasc Interv*. 2016;9:1419–1434.

8. Fram DR, Giri S, Jamal G, et al. Suture closure of the femoral arteriotomy following invasive cardiac procedures: a detailed analysis of efficacy, complications, and the impact of early ambulation in 1,200 consecutive, unselected cases. *Cathet Cardiovasc Interv*. 2001;53:163–173.

9. Morice MC, Dumas P, Leffere T, et al. Systematic use of transradial approach or suture of the femoral artery after angioplasty: attempt at achieving zero access site complications. *Cathet Cardiovasc Interv*. 2000;51:417–421.

10. Dahal K, Rijal J, Shahukhal R, et al. Comparison of manual compression and vascular hemostasis devices after coronary angiography or percutaneous coronary intervention through femoral artery access: a meta-analysis of randomized controlled trials. *Cardiovasc Revascularization Med*. 2018;19:151–162.

11. Marso SP, Amin AP, House JA, et al. Association between use of bleeding avoidance strategies and risk of peri-procedural bleeding among patients undergoing percutaneous coronary intervention. *J Am Med Assoc*. 2010;303:2156–2164.

12. Tavris DR, Wang Y, Jacobs S, et al. Bleeding and vascular complications at the femoral access site following percutaneous coronary intervention (PCI): an evaluation of hemostasis strategies. *J Invasive Cardiol*. 2012;24:328–334.

13. Patel MR, Jneid H, Derdeyn CP, et al. Arteriotomy closure devices for cardiovascular procedures: a scientific statement from the American Heart Association. *Circulation*. 2010;122:1882–1893.

14. Mann T, Cowper PA, Peterson ED, et al. Transradial coronary stenting: comparison with femoral access closed with an arterial suture device. *Cathet Cardiovasc Interv*. 2000;49:150–156.

15. Martin JL, Pratsos A, Magargee E, et al. A randomized trial comparing compression, Perclose Proglide and Angio-Seal VIP for arterial closure following percutaneous coronary intervention: the CAP trial. *Cathet Cardiovasc Interv*. 2008;71:1–5.