Radial versus Femoral Approach for Coronary Angiography and Intervention in Patients with CABG: Systematic Review and Meta-analysis

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Background Cardiac catheterization through the radial approach has been shown to significantly reduce vascular access complications and bleeding, as compared with the femoral approach, in multiple clinical settings. However, in the subset of patients with previous coronary artery bypass graft surgery (CABG) surgery, optimal vascular access site for coronary angiography and intervention is still a matter of debate, since conflicting results were reported. According to several observational studies, indeed, radial approach was as effective and safer as compared to femoral approach, but these findings were questioned by the only randomized trial available.

Methods In order to systematically review studies comparing radial approach with femoral approach in patients with previous CABG, we conducted a search on major electronic databases entering the following key words: “radial”, “vascular access”, “femoral”, “coronary artery bypass graft”, “coronary angiography” and “percutaneous coronary intervention”. We included in the analysis studies reporting outcomes on at least one of the following end-points: fluoroscopy time, procedural time, contrast volume, procedural success rate and vascular complications. Data were extracted by two independent reviewers; weighted mean differences and 95% confidence interval (C.I.) were calculated for continuous outcomes, whereas odds ratio (OR) and 95% (C.I.) were calculated for dichotomous outcomes. Summary statistics were calculated by random-effects model using Review Manager 5.3 software.

Results We included in the meta-analysis 1 randomized and 8 nonrandomized studies, amounting to 2763 patients. Radial and femoral approaches were comparable for fluoroscopy time (0.62 min [-0.83, 2.07]), procedural time (3.24 min [-1.76, 8.25]), contrast volume (-2.58 ml [-18.36, 13.20]) and procedural success rate (OR 1.42 [0.61, -0.83, 2.07]), procedural time (3.24 min [-1.76, 8.25]), contrast volume, procedural success rate and vascular complications. Data from nonrandomized studies were comparable for fluoroscopy time and vascular complications. However, radial approach was associated with lower risk of complications (OR 0.48 [0.28, 0.85]).

Conclusions Our meta-analysis, although limited by the inclusion of mainly nonrandomized studies, suggests that among prior CABG patients use of the radial versus femoral approach for coronary angiography and intervention is associated with similar fluoroscopy time, procedural time, contrast volume and procedural success rate, but lower risk of vascular complications.

Other Keywords: Vascular Access: Transradial

Ancillary radial versus femoral/brachial approach to reduce vascular complications in complex coronary, peripheral and structural interventions. Preliminary results of a study from the Italian Radial Club

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Background Little is known about the value of transradial approach for secondary (ancillary) vascular approach during complex coronary, peripheral and structural percutaneous interventions.

Methods In the present analysis we included all consecutive patients that underwent the following percutaneous interventions requiring 2 vascular approaches at 9 expert centers: complex CTO or left main trunk revascularization, TAVI, visceral vessel protection during endovascular aneurysm repair, complex lower limb angioplasty. For the purpose of this analysis we compared the outcome of those patients that received a transradial versus those that received a transfemoral or brachial ancillary approach. Primary endpoints of the study were procedural success (noninferiority) and in-hospital BARC types 3/5 total (both of primary and ancillary approaches) bleedings (superiority of the transradial group).

Results In this retrospective study we included 867 patients, 419 treated with a right/left radial and 448 with a femoral or brachial approach. Main basal characteristics did not differ significantly among study groups, except for a significantly higher incidence of arterial hypertension in the radial group. Patients underwent the following types of intervention: coronary CTO 17%, other complex PCI 23%, TAVI 50%, EVAR/TEVAR 9%. Procedural success was achieved in 90% of the transradial and 92% of the transfemoral/brachial approaches (p = NS). In-hospital BARC 3/5 total and ancillary approach-related bleedings were more common in the transfemoral/brachial group (respectively, 26% vs. 8%, p = 0.0002, and 15% vs. 0%, p = 0.0004). In the transfemoral/brachial group we also observed a higher hemoglobin drop (1.92 vs 1.13 g/dl, p = 0.008) and longer hospital length of stay (5.0 vs 6.4 days, p = 0.02), whereas in the transradial group contrast load use (254 vs. 227 ml, p = 0.067) and procedural time (130 vs. 114 minutes, p = 0.004) were significantly higher.

Conclusions A transradial ancillary approach, in expert hands, significantly reduces the risk of major bleedings, without jeopardizing...
the success of complex coronary, structural or peripheral percutaneous interventions.

**CATEGORIES OTHER:** Vascular Access: Transradial

**KEYWORDS** Complex lesion, TAVI, Transradial approach

**TCT-431**

Transradial Approach for Accessing Left Internal Mammary Artery Grafts

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**BACKGROUND** Transradial approach (TrA) has now been established as the routine method for coronary angiography and percutaneous coronary intervention (PCI) in many centers around the world. However, many operators still consider TrA as technically difficult, especially when trying to access the left internal mammary artery (LIMA) in patients with a history of coronary artery bypass grafting (CABG). Our aim was to examine the feasibility and safety of the TrA in this group of patients and evaluate any potential benefits when performing the procedure through the Left Radial (LR) versus the Right radial (RR) artery.

**METHODS** We performed 5,479 transradial catheterizations between Jan 2008 and Dec 2013. In our center, we established TrA as the routine method for elective, urgent and emergency procedures (primary or rescue PCI). Baseline characteristics, procedural success rates and major complications were recorded.

**RESULTS** A total of 247 transradial catheterizations were performed on patients with previous history of CABG involving the LIMA. Among these catheterizations, the initial approach was through the LR artery (209 cases, 84.6%), the RR artery (33 cases, 13.4%) and the Right Femoral (RF) artery (5 patients, 2%). The LIMA graft was successfully accessed in all 209 cases performed through the LR artery (100% success rate), in 32 out of 33 cases performed through the RR artery (97% success rate) and in all 5 RF artery cases (100% success rate). In 1 case, it was not possible to access the LIMA graft through a RR approach but this was possible after crossing over to a LR approach. No major complications were noted in any of the procedures involving access to the LIMA graft.

**CONCLUSIONS** Our findings indicate 100% procedural success rate when attempting access to the LIMA graft through the LR artery as compared to 97% success rate through the RR artery. Although, both approaches are associated with a high success rate, we identified a preference of our operators to perform such procedures through the LR (84.6%) instead of the RR artery (13.4%). Our study, provides evidence regarding the feasibility, efficacy and safety of the TrA in patients with history of CABG where LIMA was used. Presence of LIMA grafts should not prevent operators from using transradial access.

**CATEGORIES OTHER:** Vascular Access: Transradial

**KEYWORDS** Coronary artery bypass grafting, Left radial approach, Transradial

**TCT-432**

Predictors Of Upper Extremity Arterial Tortuosity Encountered During Transradial Access: Results From A Large National Registry

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**BACKGROUND** Anatomic variations affecting radial, brachial and subclavian arteries increase procedural complexity and duration. Preprocedural identification of these patients may improve procedural metrics.

**METHODS** Data from the ‘Cela Stara Databaza’ were prospectively collected during ongoing coronary procedures using transradial access (TRA) were included in the analysis. Radial, brachial and subclavian artery anomalies were systematically studied and radial angiography was performed on all patients. Patients with radial artery (RA), brachial artery (BA) or subclavian artery (SA) anomaly were categorized into “Hostile anatomy” (HA) group. Demographic and procedural variables were collected on all patients. Univariate analyses were performed to identify association between collected variables and HA. Multivariable analysis was performed using forward selection to identify independent predictors of HA.

**RESULTS** 2166 patients undergoing coronary procedures using TRA were included in the analysis. 68 patients had incomplete data and were excluded. HA was detected in 1934 (91.6%) patients. HA was significantly more frequent in women compared to men (10.6% vs 8.4%, P = 0.0001), hypertensive patients (9.9% vs 8%, P = 0.0001), smokers (10.1% vs 8.8%, P = 0.0002), older patients (61 to 80 vs 60 to 89, P = 0.004), shorter patients (169 + 8 vs 170 + 8, P = 0.014) and leaner patients (78 + 12 vs 79 + 12, P = 0.01). Logistic regression analysis using forward selection identified Age (O.R 1.1 [1.02-1.1], P = 0.007), Gender (O.R 1.3 [1.1-1.4], P = 0.0001), HTN (O.R 1.2 [1.1-1.4], P = 0.0001) and Smoking (O.R = 1.2 [1.1-1.4], P = 0.0001) as independent predictors of HA. The model had adequate fit (Hosmer-Lemeshow goodness of fit P = 0.57).

**CONCLUSIONS** Hostile arterial anatomy can be predicted in patients presenting for TRA using demographic variables. Preprocedural knowledge of expected complexity may allow the operator to modify equipment choices and procedural approach to lower procedural complexity, and choose alternative access in time-sensitive circumstances.

**CATEGORIES OTHER:** Vascular Access: Transradial

**KEYWORDS** Transradial, Transradial approach

**TCT-433**

Expansion of Iliofemoral Access to <5 mm with Recollapsible Sheath in High Risk TAVR Patients is Feasible with Zero Complication

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**BACKGROUND** Recommended iliofemoral diameter for transfemoral (TF) TAVR with Medtronic CoreValve is >5 mm, but the lowest limit has not been determined. Our study evaluates the feasibility of TF TAVR in patients with small iliofemoral access (<5 mm).

**METHODS** Retrospective analysis of the STS/ACC Transcatheter Valve Therapy (TVT) Registry at 2 institutions was performed on 227 consecutive patients who underwent TAVR from 1/2014 to 5/2015. 44 patients underwent TAVR with Medtronic CoreValve using the 11/19-French recollapsible Terumo Solopath sheath, which has a 4.45 mm outer diameter (OD) arterial entry expanding to 7.67 mm OD, then recollapses to approximately 4.45 mm at sheath removal. Valve sizing and vascular access were determined by computed tomography. Outcomes were determined using Valve Academic Research Consortium 2 (VARC-2) definitions.

**RESULTS** Eight of 44 Solopath patients had minimal luminal diameter (MLD) of iliofemoral artery <5.0 mm (mean 4.3±/1.0 mm, range 3.1-5.0 mm), with eccentricity ratio (maximum/minimum diameter) at MLD ranging 2-67%. Vessel calcification ranged <0% to >30% and tortuosity ranged <45° to >90°. At the MLD, sheath-to-artery (SAR) ratios, based on the fully expanded 7.67 mm OD, ranged 1.53-2.47, higher than previously reported ratios that risk vascular complications. Major comorbidities included severe COPD on home oxygen, extreme thrombocytopenia, cirrhosis, prior malignancy, prior cardiac surgery, poor ventricular function, diabetes mellitus, chronic renal failure, frailty. All, deemed unsuitable for TAVR using alternative access, had TF TAVR with IV sedation and local anesthesia, with 100% success, 0% vascular complications, and 0% bleeding in-hospital and at 30 days (Table 1).

**CONCLUSIONS** TF TAVR using the 11/19-French recollapsible Terumo Solopath sheath is safe in selected small iliofemoral access, even in diameter <5 mm without any complications. A more aggressive TF approach may be considered in select patients who are frail and high risk for alternative access.