Transradial access

Radial artery approach is based on the desire to diminish the incidence rate of haemorrhagic complications in the zone of the puncture and to avoid the necessity of a long-term bed rest in femoral artery approach. The findings obtained in numerous studies of coronary stenting and in a series of works on stenting of carotid arteries have demonstrated that the transradial approach reduces the risk of haemorrhage and local vascular complications.

It is important to be aware of the Aberrant right subclavian artery (ARSA) before surgical approaches to upper thoracic vertebrae in order to avoid complications and effect proper treatment. In patients with a known ARSA, a right transradial approach for aortography or cerebral angiography should be changed to a left radial artery or transfemoral artery approach ¹⁾.

Neurointerventionalists attempting the transradial approach can expect to achieve moderate early success and a low complication rate $^{2)}$.

They can overcome the right transradial learning curve and achieve high success rates and low crossover rates after performing 30-50 cases $^{3)}$.

The femoral artery is the most common access route for cerebral angiography and neurointerventional procedures. Complications of the transfemoral approach include groin hemorrhages and hematomas, retroperitoneal hematomas, pseudoaneurysms, arteriovenous fistulas, peripheral artery occlusions, femoral nerve injury, and access-site infections. Incidence rates vary among different randomized and nonrandomized trials, and the literature lacks a comprehensive review of this subject.

Oneissi et al. gather data from 16 randomized clinical trials (RCT) and 17 nonrandomized cohort studies regarding femoral access-site complications for a review paper. They also briefly discussed management strategies for these complications based on the most recent literature.



A PubMed indexed search for all neuroendovascular clinical trials, retrospective studies, and prospective studies that reported femoral artery access-site complications in neurointerventional procedures.

The overall access-site complication rate in RCTs is 5.13%, while in non-RCTs, the rate is 2.78%. The most common complication in both groups is groin hematoma followed by access-site hemorrhage and femoral artery pseudoaneurysm. On the other hand, wound infection was the least common complication.

The transfemoral approach in neuroendovascular procedures holds risk for several complications. This review will allow further studies to compare access-site complications between the transfemoral approach and other alternative access sites, mainly the trans-radial artery approach, which is gaining a lot of interest nowadays⁴⁾.

Books

Radial Access for Neurointervention.

Edited by Pascal Jabbour and Eric Peterson

The only book on the market on Transradial Access (TRA) Includes many movies and pictures to give practical help to people transitioning their practice to TRA Chapters are written by 2 pioneers in TRA who started the technique and have published most of the papers on TRA

Book Reviews

McPheeters MJ. Book Review: Radial Access for Neurointervention. Neurosurgery. 2022 Mar 1;90(3):e63-e64. doi: 10.1227/NEU.00000000001824. Epub 2021 Dec 27. PMID: 35849496.

Retrospective cohort studies

Roy et al. conducted a single-center retrospective study of patients who underwent diagnostic cerebral angiography between December 2019 and January 2024. Propensity score matching was used to create two similar cohorts (TR and TF). These cohorts were subdivided based on BMI: underweight (BMI < 18.5), normal (BMI 18.5-25.0), overweight (BMI 25.1-29.9), and obese (BMI \geq 30). Linear regression analysis and the chi-square test were used to compare outcomes.

Results: Nine hundred thirty-six patients were stratified into two groups of 468 patients each. Procedure time was significantly shorter for TR access for all BMI subgroups, with a 13-minute reduction in procedure time among underweight patients. Patients with normal BMI, overweight patients, and obese patients experienced a reduction in procedure time of approximately 11, 10, and 13 minutes, respectively. Obese patients experienced significantly shorter length of stay (LOS; 1.33 days) with TR access. There were no significant differences between each BMI subgroup in access site complications, postoperative complications, and conversion of access from TR to TF.

Conclusions: TR access in diagnostic cerebral angiography is associated with shorter procedure times

and no increased risk of complications compared to TF access across all BMI subgroups. Obese patients experienced shorter LOS with TR access. This study adds to the literature on the safety and efficacy of TR access across all BMI subgroups. Further studies are necessary to validate these preliminary results ⁵⁾.

Case series

In a high-volume, dual-center, retrospective analysis of each institution's data base between June 2018 and June 2020 and a collection of all patients treated with flow diversion via transradial access. Patient demographic information and procedural and radiographic data were obtained.

Results: Seventy-four patients were identified (64 female patients) with a mean age of 57.5 years with a total of 86 aneurysms. Most aneurysms were located in the anterior circulation (93%) and within the intracranial ICA (67.4%). The mean aneurysm size was 5.5 mm. Flow diverters placed included the Pipeline Embolization Device (Flex) (PED, n = 65), the Surpass Streamline Flow Diverter (n = 8), and the Flow-Redirection Endoluminal Device (FRED, n = 1). Transradial access was successful in all cases, but femoral crossover was required in 3 cases (4.1%) due to tortuous anatomy and inadequate support of the catheters in 2 cases and an inability to navigate to the target vessel in a patient with an aberrant right subclavian artery. All 71 other interventions were successfully performed via the transradial approach (95.9%). No access site complications were encountered. Asymptomatic radial artery occlusion was encountered in 1 case (3.7%).

Conclusions: Flow diverters can be successfully placed via the transradial approach with high technical success, low access site complications, and a low femoral crossover rate ⁶⁾.

Intra-arterial chemotherapy (IAC) has become one of the most important pillars in retinoblastoma (Rb) management. It allows for targeted delivery of chemotherapy by superselective catheterization of the ophthalmic artery, thus, reducing systemic toxicity. As in most neurovascular procedures, IAC has traditionally been performed through transfemoral access. However, recent publications have spurred the use of the trans-radial route for neuroendovascular procedures due to its lower complication rates and higher patient satisfaction. They presents the first case series in the literature on the technique, safety, and feasibility of IAC via the trans-radial route in the pediatric population.

Al Saiegh et al. retrospectively analyzed the prospectively maintained database and present the technique and initial experience from 5 consecutive pediatric patients aged between 3 and 15 years who underwent 10 trans-radial IAC treatments.

All IACs were performed successfully. Two patients had repeat IACs through the same wrist. There were no thromboembolic events or access site complications, such as hand ischemia or hematoma. All patients were discharged home the same day of the procedure.

This case series demonstrates the safety and feasibility of transradial IAC in pediatric patients with Rb. As more experience is gained with the transradial route for neurovascular procedures in adults, it may become the preferred route in some pediatric patients as well⁷.

Chen et al. reviewed a prospective institutional database for all patients who underwent a transradial

neurointerventional procedure between 2015 and 2019. Index procedures were defined as procedures performed via TRA after which there was a second TRA procedure attempted. Reasons for conversion to a transfemoral approach (TFA) for subsequent procedures were identified.

104 patients underwent 237 procedures (230 TRA, 7 TFA). 97 patients underwent \geq 2 TRA procedures, 20 patients >3, four patients >4, three patients >5, and two patients >6 TRA procedures. The success rate was 94.7% (126/133) with 52% (66/126) of successive procedures performed via the same radial access site (snuffbox vs antebrachial) while the alternate radial artery segment was used for access in 48% (60/126) of subsequent procedures. There were seven (5.3%) cases requiring crossover to TFA, six cases for radial artery occlusion (RAO) and one for radial artery narrowing.

Successive TRA is both technically feasible and safe for neuroendovascular procedures in up to six procedures. The low failure rate (5.3%) was primarily due to RAO. Thus, even without clinical consequences, strategies to minimize RAO should be optimized for patients to continue to benefit from TRA in future procedures⁸.

A study from Shchanitsyn et al., was aimed at comparative analysis of the transradial versus transfemoral approach used in carotid stenting. They retrospectively analysed the results of transradial and transfemoral stenting of carotid artery in a total of 168 patients. The operations had been performed in two centres over the period from 2012 to 2017. They evaluated the clinical and angiographic data, technical aspects of the operations, as well as the outcomes and complications. In particular, they compared such complications as stroke, transient ischemic attack, myocardial infarction and local complications of the approach. They carried out a univariate analysis of the risk for the development of complications depending on the method of the approach. Stenting of carotid arteries had been performed in 75 patients through the radial artery approach and in 93 patients via the femoral one. Comparing the two groups, the main clinical and angiographic data appeared to have no statistically significant differences. Various techniques of catheterization had been used depending upon anatomical peculiarities. The success of the procedure was achieved in 100% of cases, with the frequency of conversion amounting to 4% for the radial approach and to 1% for the femoral one (p=0.087). Amongst complications encountered, disabling stroke was revealed in two (1.2%) patients and minor stroke in four (2.4%). The groups did not differ by the incidence of neurological complications. Within 30 postoperative days neither lethal outcomes nor myocardial infarction were registered. Neither were there haemorrhagic events or other approach-related complications, however in the transradial-approach group, seven (9.3%) patients were found to have developed asymptomatic occlusions of the radial artery. The duration of the operation, the radiation load, and the length of hospital stay had no statistically significant differences depending on the approach used. Hence, the transradial approach is an effective and safe method in stenting of carotid arteries. In patients with high risk of haemorrhagic complications from the side of the vascular approach and with difficult anatomy of the aortic arch and its branches, hampering catheterization of the carotid artery via the femoral approach, the radial artery may be considered as an advantageous site of access ⁹⁾.

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