Institute of Experimental Morphology, Pathology and Anthropology with Museum
Bulgarian Anatomical Society

Acta morphologica et anthropologica, 24 (3-4)
Sofia ● 2017

Transradial Catheterization Failure due to High-Bifurcating Hypoplastic Radial Artery: Case Report

Iva N. Dimitrova[1]*, *Diana Trendafilova*[1], *Alexandar Iliev*[2], *Boycho Landzhov*[2]

[1] *Clinics of Cardiology, University Hospital St. Ekaterina, Medical University Sofia, Bulgaria*
[2] *Department of Anatomy, Histology and Embryology, Medical University Sofia, Bulgaria*

* Corresponding author: e-mail: dimytrova@yahoo.com

The transradial approach is an excellent alternative to the standard femoral approach for cardiac catheterization with success rates in over 90% of cases and has been widely used. Variations of the radial artery, however, could impede the cardiac catheterization and pose significant challenges to the interventional cardiologist. Herein, we report a failure of transradial heart catheterization due to high-bifurcating hypoplastic radial artery.

Key words: catheterization, hypoplastic radial artery, variations

Introduction

Nowadays, the transradial (TR) cardiac catheterization has been usually performed due to the lower incidence of complications in comparison with the transfemoral (TF) approach [11, 12]. The advantages of the TR approach are due to the fact that the radial artery is located just beneath the skin and is easy to access for hemostasis. In that way, the common complications of haematoma, pseudoaneurysm and arteriovenous fistulas of the femoral approach could be avoided. However, the TR approach could be associated with specific technical challenges and in comparison with the TF approach has relatively high incidence of catheterization failure [10, 11, 12]. TR catherization procedure failures could be due to different anatomical variations in radial artery anatomy and other structures of the upper limb [2-7, 9, 13, 14].

Herein, we describe a case of TR catheterization failure due to high-bifurcating hypoplastic radial artery in a 64-year-old female with clinical and electrocardiography signs of unstable angina pectoris and chest pain.

Case report

A 64-year-old female presented in the Emergency room of our hospital with clinical and electrocardiography signs of unstable angina pectoris and chest pain. A coronary angiogram was planned. Allen's test was performed and TR approach was chosen. The radial artery was successfully accessed with a 6F radial sheath. A 5F Tiger catheter was introduced through a 0.035 guide wire, but the wire could not pass at the level of the proximal brachial region. There was difficulty in catheter advancement, accompanied with pain. The wire was removed and a retrograde contrast injection was given to visualize the obstruction. We found a slender hypoplastic radial artery with high origin from the axillary artery combined with a spasm. We could not pass even with a 4F Tiger catheter. Thereafter, we used an alternative TF access with successful outcome (**Fig. 1**).

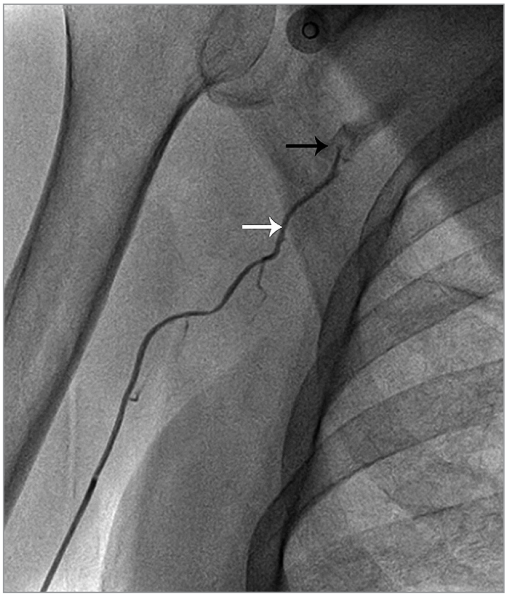

Fig. 1. High-bifurcating hypoplastic radial artery (white arrow) from the axillary artery (black arrow)

Discussion

In 1989, Dr. Lucien Campeau performed the first TR percutaneous diagnostic coronary angiography [1]. After that, in 1993, Dr. Ferdinand Kiemeneij used the TR approach for percutaneous coronary intervention (PCI) [8]. According to literature data, the TR approach has lower vascular complications, lesser hospital stay and healthcare costs in comparison with the TF approach. Moreover, if complications occur, they do not need surgery and usually are treated nonoperatively. The other advantage of the TR approach is the double blood supply to the hand, which prevents hand ischaemia after radial artery thrombosis or spasm [10-12].

Failure of TR approach is between 1-5%. Most commonly, this is due to inability for radial puncture, artery spasm and anatomical abnormalities. Variations of the artery of the arm were between 4-18.5% [10-13]. However, most of them do not impede TR heart catheterization. In rare cases, variations with smaller vascular diameters and especially these of high radial take off associated with a remnant radial artery or a slender radial artery can have such diameter of the radial artery that provokes difficulties in catheter advancement even with a 4F Tiger catheter and can thus lead to failure of TR heart catheterization. Trying to pass in such a remnant artery is painful and commonly associated with spasm and risk of artery perforation.

Conclusion

Interventional cardiologists should be familiar and expect different upper limbs arterial anatomical variations and have a plan to overcome them. Knowledge of such variations will be helpful at their learning curve, and thus in avoiding potential complications. In the case described in the present study, an alternative TF approach is preferable.

References

1. **Campeau, L.** Percutaneous radial artery approach for coronary angiography. – *Cathet. Cardiovasc. Diagn.*, **16**(1), 1989, 3-7.
2. **Dandov, A., A. Iliev, A. Mitev.** A case of an unusual anastomosis between the ulnar and radial arteries. – *Folia Med. (Plovdiv)*, **57**(Suppl.2), 2015, 35.
3. **Georgiev, G. P.** Significance of anatomical variations for clinical practice. – *Int. J. Anat. Var.*, **10**(3), 2017, 43-44.
4. **Georgiev, G. P., I. N. Dimitrova, L. Jelev, D. Marinova.** A case with aberrant origin of the brachial and antebrachial arteries and some remarks on the terminology of the upper limb variant arteries. – *J. Biomed. Clin. Res*., **2**(1), 2009, 172-173.
5. **Georgiev, G. P., I N. Dimitrova, L. Jelev.** A rare case of a brachial artery variation and its clinical significance. – *Health and Sci.*, **3**, 2011, 14-16. [In Bulgarian]
6. **Iliev, A., G. P. Georgiev, I. N. Dimitrova, B. Landzhov.** Extensor indicis brevis muscle: anatomical and clinical considerations. – *Acta Morphol. Anthropol.*, **22**, 2015, 75-78.
7. **Iliev, A. A., L G. Mitrov, G. P. Georgiev.** A variation of the origin and course of the posterior circumflex humeral artery and the deep brachial artery. Clinical importance of the variation. – *J. Biomed. Clin. Res.*, **8**(2), 2015, 164-167.
8. **Kiemeneij, F., G. J. Laarman.** Percutaneous transradial artery approach for coronary stent implantation. – *Cathet. Cardiovasc. Diagn.*, **30**(2), 1993, 173-178.
9. **Kirkov, V., A. Iliev, D. Hinova-Palova.** Variations in branching pattern of the brachial artery. – *Praemedicus since 1925*, **33**, 2016, 41-44.
10. **Lo, T. S., J. Nolan, E. Fountzopoulos, M. Behan, R. Butler, S. L. Hetherington, K. Vijayalakshmi, R. Rajagopal, D. Fraser, A. Zaman, D. Hildick-Smith.** Radial artery anomaly and its influence on transradial coronary procedural outcome. – *Heart.*, **95**(5), 2009, 410-415.
11. **Norgaz, T., S. Gorgulu, S. Dagdelen.** Arterial anatomic variations and its influence on transradial coronary procedural outcome. – *J. Interv. Cardiol.*, **25**(4), 2012, 418-424.
12. **Ostojić, Z., J. Bulum, A. Ernst, M. Strozzi, K. Marić-Bešić.** Frequency of radial artery anatomic variations in patients undergoing transradial heart catheterization. – *Acta Clin. Croat.*, **54**(1), 2015, 65-72.
13. **Rodríguez-Niedenführ, M., T. Vázquez, L. Nearn, B. Ferreira, I. Parkin, J. R. Sañudo.** Variations of the arterial pattern in the upper limb revisited: a morphological and statistical study, with a review of the literature. – *J. Anat.*, **199**, 2001, 547-566.
14. **Stanchev, S., A. Iliev, G. P. Georgiev, L. Malinova, B. Landzhov.** A case of bilateral variations in the arterial branching in the upper limb and clinical implications. – *CP Case*, **1**(1), 2017, 006.