Am J Cardiovasc Dis 2025;15(5):319-323
www.AJCD.us /ISSN:2160-200X/AJCD0167092

Case Report

Facilitating wire advancement into the ascending aorta during right radial cardiac catheterization by instructing turning the head to the left in a tortuous subclavian artery. Second case report

Mohammad Reza Movahed[1,2]

[1]*University of Arizona Sarver Heart Center, Tucson, AZ, USA;* [2]*University of Arizona, Phoenix, AZ, USA*

Received June 27, 2025; Accepted August 31, 2025; Epub October 15, 2025; Published October 30, 2025

Abstract: Coronary angiography and cardiac catheterization using the right radial arterial access have lower complication rates but are associated with unique challenges that can lead to procedural failure. One of the major challenges can be the wire advancement into the ascending aorta with a tortuous subclavian artery, particularly in the case of arteria lusoria. The deep inspiratory maneuver can help navigate the guiding wire into the ascending aorta. However, in extreme tortuosity or the case of arteria lusoria, it can be very difficult to advance the wire in the ascending aorta. In this manuscript, the second successful case of guide wire advancement in the ascending aorta in a very tortuous subclavian artery is described by instructing the patient to move her head to the left. This maneuver will straighten the subclavian artery, thus facilitating wire advancement into the ascending aorta by reducing the tortuosity of the subclavian artery. This can save radial cardiac catheterization and prevent changing the access route. This report describes this easy-to-perform maneuver in a difficult case of severe subclavian tortuosity, enabling us to complete the right radial cardiac catheterization.

Keywords: Right radial artery access, radial artery cardiac catheterization, left heart catheterization, coronary angiography, invasive cardiac procedures, percutaneous coronary intervention, coronary artery disease, coronary revascularization

Introduction

Cardiac catheterization via the right radial artery is associated with lower complication rates but has unique challenges. One major challenge is failing to advance a guide wire into the ascending aorta due to subclavian artery tortuosity despite using respiratory maneuvers [1-7]. Inability to advance the guide wire into the ascending aorta can lead to failure of completing radial cardiac catheterization, thus forcing the operator to change the access route, leading to increased time spent, cost, and risk of new access complications to the patient. The use of hydrophilic wire can help to facilitate catheter advancement into the ascending aorta. However, hydrophile wires can lead to life-threatening perforations [7-11] and should be used only as a last resort. It is well known that right radial cardiac catheterization in difficult cases can lead to higher radiation exposure and contrast use [12-14]. Therefore, any simple maneuver that can facilitate wire and catheter advancement during right radial cardiac catheterization can also reduce radiation and contrast use, as another reason to use a simple maneuver to overcome a tortuous subclavian artery. We reported a first case report of a very difficult tortuous subclavian artery, preventing us from advancing the guide wire into the ascending aorta despite instructing the patient to take a deep breath. However, we could complete the right radial cardiac catheterization by instructing the patient to turn her head to the left, thus straightening the course of the subclavian artery into the ascending aorta [15]. In this manuscript, we describe the second successful case of guide wire advancement in the ascending aorta in a very tortuous subclavian artery by instructing the patient to move her head to the left.

https://doi.org/10.62347/IJPT6510

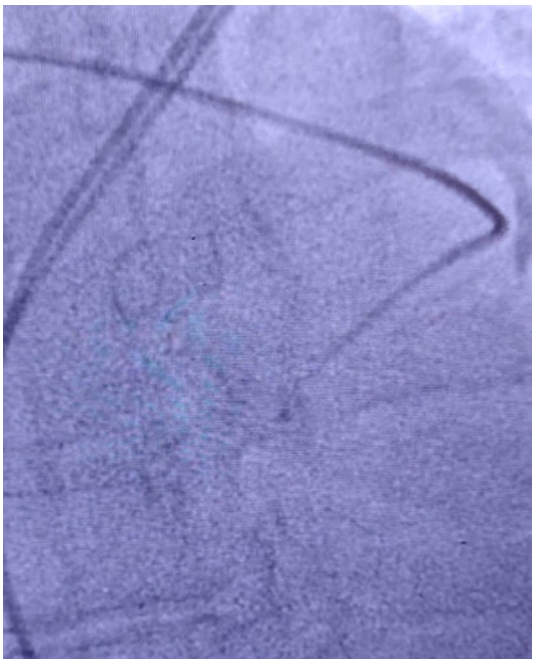

Figure 1. With the head of the patient in a straight position, the wire is in the descending aorta with the inability to be advanced into the ascending aorta.

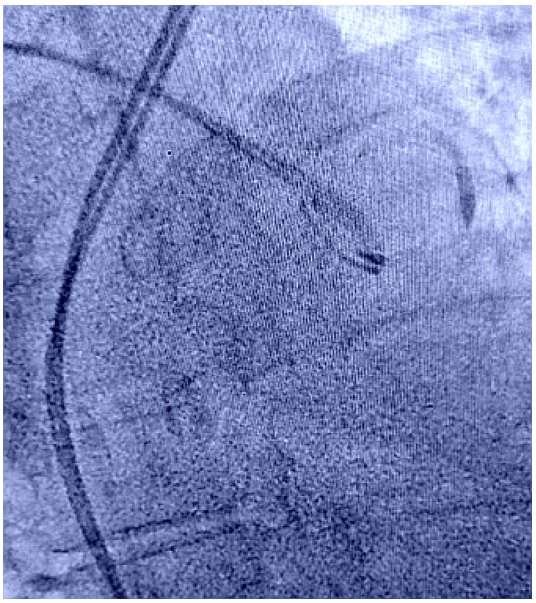

Figure 2. Turning head to left reorient wire toward ascending aorta.

Case report

The patient was a 70-year-old female with a history of obesity and long-standing hypertension presenting with increasing shortness of breath. Her myocardial perfusion study revealed a moderate-sized reversible anterior wall defect. The patient was referred to cardiac catheterization for further evaluation. She had normal creatinine, a basic metabolic panel, and hematocrit. Her vitals were stable with baseline hypertension and systolic blood pressure of 156/87. The heart rate was around 70 beats/minute. The right radial arterial access was obtained under ultrasound guidance without any difficulty. A 6-French slender sheath was advanced into the right radial artery. She received a cocktail of 5000 units of heparin, 100 micrograms of nitroglycerin, and 200 micrograms of verapamil into the radial sheath. Next, a 5-French Tiger catheter was advanced into the aorta using a 0.014-inch wire. However, the wire could not be advanced into the descending aorta despite performing respiratory maneuvers due to tortuosity (**Figures 1**, **2**). Finally, the patient was instructed to turn her head to the left, which led to immediate wire advancement into the ascending aorta (**Figures 3**, **4**) followed by the Tiger catheter. Coronary angiography could be completed without much difficulty, showing no significant coronary disease but very tortuous coronaries (**Figure 5**), which is consistent with her long-standing hypertension and very tortuous subclavian artery. The patient tolerated the procedure and was discharged the next day.

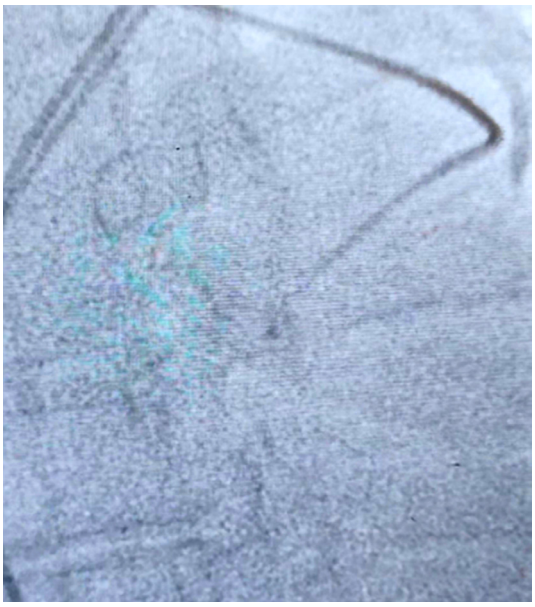

Figure 3. The guide wire is now successfully advanced into the ascending aorta after turning the head to the left.

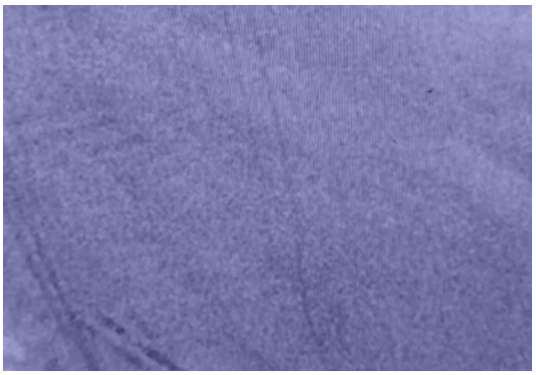

Figure 4. Successful wire advancement in the aortic root.

Discussion

Left heart cardiac catheterization is an indispensable invasive procedure for cardiac workup and treatment of patients with atherosclerotic heart disease, including acute coronary syndrome such as myocardial infarction or unstable angina. Other indications include coronary angiography for severe stable angina, resistance to medical therapy, cardiomyopathy of unknown origin, before valve surgeries, or cardiac workup for myocardial or pericardial disease. Radial arterial access site is now the preferred route for cardiac catheterization with proven reduction in major complications. One major challenge is failing to advance a guide wire into the ascending aorta due to subclavian artery tortuosity. Numerous respiratory maneuvers are published to facilitate wire and balloon delivery during coronary angiography or intervention. The deep inspiratory maneuver is useful for radial catheterization to advance the guide wire into the aorta and stent advancement in the native coronaries [1-3]. Expiratory maneuver (reverse Movahed Maneuver) is useful for balloon or stent delivery in tortuous vein grafts [4, 5]. In our case, respiratory maneuvers alone could not advance the guide wire into the ascending aorta. However, instructing the patient to turn her head to the left saved the day with the successful completion of right radial left heart catheterization. Turning the head to the left will straighten the subclavian artery connection into the aortic arch. Once the patient has turned the head to the left, the guide wire should be cautiously advanced toward the ascending aorta in an anterior-posterior X-ray projection with the guidance of a guide catheter (usually right Judkins or Amplatz catheters). Once the guide wire is in the ascending aorta, the guide catheter can then be advanced into the aortic sinus in order to complete coronary angiography. Failure to complete the right radial cardiac catheterization will cost a substantial amount of time, cost, and utilization of a second access, usually the femoral arterial route, which is associated with much higher major complications [16-18]. Therefore, every effort should be made to complete the procedure if possible. To our knowledge, this is the second case report describing the details of using this maneuver in a tortuous right subclavian artery. Based on these cases, we recommend utilizing this maneuver during right radial cardiac catheterization in difficult cases of the tortuous subclavian artery in order to facilitate wire and catheter advancement into the ascending aorta.

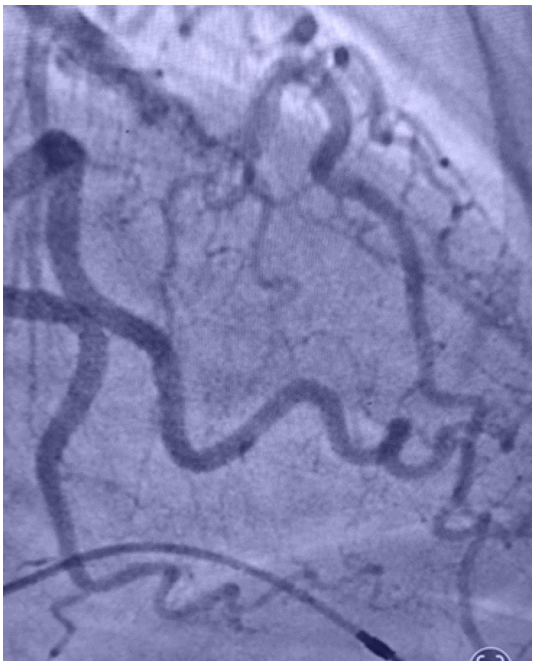

Figure 5. Tortuous left anterior descending and circumflex arteries.

There are not many published manuscripts describing any details about the head position for facilitating wire advancement into the ascending aorta. Casazza [7] described a successful case of wire advancement into the ascending aorta using expiration after inspiratory maneuvers failed the wire advancement. The left head-turning maneuver was not per-

formed in that case. Patel et al. [7] published detailed descriptions of anatomical challenges occurring during left heart catheterization, such as tortuosity, loops, stenosis, and congenital aberrancy, such as arteria lusoria. Numerous techniques and solutions were described to overcome those challenges, including the use of hydrophilic wire, balloon tracking techniques, and respiratory maneuvers. Again, they did not mention the left-head-turning maneuver in their publication. Turning the head to the left straightens the subclavian artery and leads to a more direct route of the subclavian artery into the descending aorta. The degree of success in using the left turn maneuver is not known. The presence of arteria lusoria introduces a similar challenge as a tortuous subclavian artery during right radial cardiac catheterization. We believe that the left-head turn technique can facilitate ascending aorta access. Future case reports can inform us if the left-hand turn maneuver can be helpful in patients with arteria lusoria. Using a hydrophilic wire can facilitate guidewire advancement into the ascending aorta, but it is associated with a higher risk for life-threatening perforations [8-11]. It is very important to educate cardiologists who perform cardiac catheterization and intervention via the right radial artery about this important maneuver.

Conclusions

This case elaborates an easy-to-perform maneuver that can save right radial cardiac catheterization by instructing the patient to turn the head to the left, thus straightening the aorta, leading to ease of wire advancement.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. Mohammad Reza Movahed, University of Arizona Sarver Heart Center, 1501 North Campbell Avenue, Tucson, AZ 85724, USA. Tel: 949-400-0091; E-mail: Rmova@aol.com

References

[1] Attaran RR, Butman S and Movahed MR. Going around the bend: deep inspiration facilitates difficult stent delivery in the native coronary arteries. Tex Heart Inst J 2011; 38: 270-4.

[2] Movahed MR. Inspiration maneuver can reduce risk of pericardiacophrenic perforation and balloon-assisted tracking can easily overcome tortuosity and spasm during challenging transradial catheterization. Cardiovasc Revasc Med 2022; 45: 82-83.

[3] Vakhshoori M and Movahed MR. Useful respiratory maneuvers aiding left heart cardiac catheterization and intervention. A comprehensive review. Crit Pathw Cardiol 2023; 1; 22: 135-140.

[4] Movahed MR. Reverse Movahed Maneuver: Maximal expiration maneuver during saphenous vein graft intervention for facilitated balloon and stent delivery in tortuous vein grafts - a novel technique. Int J Angiol 2016; 25: e66-e69.

[5] Movahed MR. Facilitating stent advancement by using the reverse movahed's maneuver (maximal expiration) during tortuous vein graft intervention. JACC Cardiovasc Interv 2020; 13: 139-140.

[6] Casazza R. "Blowout" technique: deep expiration for wire navigation into the ascending aorta with severe subclavian tortuosity from the right radial approach. Cath Lab Digest 2018; 26.

[7] Patel T, Shah S, Pancholy S, Deora S, Prajapati K, Coppola J and Gilchrist IC. Working through challenges of subclavian, innominate, and aortic arch regions during transradial approach. Catheter Cardiovasc Interv 2014; 84: 224-35.

[8] Tomassini F, Gagnor A and Varbella F. Successful use of an extra-long hydrophilic-coated sheath in enlarged aorta to overcome extreme tortuosity of right subclavian artery via transradial approach during coronary angiography. J Invasive Cardiol 2011; 23: E56-7.

[9] Arsanjani R, Echeverri J and Movahed MR. Successful coil embolization of pericardiacophrenic artery perforation occurring during transradial cardiac catheterization via right radial artery. J Invasive Cardiol 2012; 24: 671-4.

[10] Guo J and Song J. A hydrophilic-wire induced vascular perforation causing mediastinal hematoma during transradial coronary intervention. J Invasive Cardiol 2019; 31: E96.

[11] Movahed MR. Vascular perforation occurring during transradial cardiac catheterization is more common than thought and could be fatal. J Invasive Cardiol 2019; 31: E256

[12] Plourde G, Pancholy SB, Nolan J, Jolly S, Rao SV, Amhed I, Bangalore S, Patel T, Dahm JB and Bertrand OF. Radiation exposure in relation to the arterial access site used for diagnostic coronary angiography and percutaneous coronary intervention: a systematic review and meta-analysis. Lancet 2015; 386: 2192-203.

[13] Jahic A, Mujanovic E, Bajric M, Mirsic D and Hasukic I. Comparative analysis of transradial

and transfemoral arterial approach when performing diagnostic coronary angiography. Med Arch 2023; 77: 112-117.
[14] Case BC, Yerasi C, Forrestal BJ, Chezar-Azerrad C, Khan JM, Khalid N, Shlofmitz E, Chen Y, Musallam A, Waksman R and Hashim H. Right transradial coronary angiography in the setting of tortuous brachiocephalic/thoracic aorta ("elephant head"): impact on fluoroscopy time and contrast use. Catheter Cardiovasc Interv 2022; 99: 418-423.
[15] Movahed MR. Saving right radial cardiac catheterization with tortuous subclavian artery using head left turning maneuver for facilitating wire advancement into the ascending aorta. Cardiovasc Revasc Med 2024; 4: 100045.
[16] Pandie S, Mehta SR, Cantor WJ, Cheema AN, Gao P, Madan M, Niemela K, Rao SV, Schwalm JD, Valentin V, Velianou JL and Jolly SS. Radial versus femoral access for coronary angiography/intervention in women with acute coronary syndromes: insights from the RIVAL trial (radial Vs femorAL access for coronary intervention). JACC Cardiovasc Interv 2015; 8: 505-12.
[17] Nardin M, Verdoia M, Barbieri L, Schaffer A, Suryapranata H and De Luca G. Radial vs femoral approach in acute coronary syndromes: a meta- analysis of randomized trials. Curr Vasc Pharmacol 2017; 16: 79-92.
[18] Malik AH, Yandrapalli S, Shetty SS, Zaid S, Athar A, Aronow WS, Timmermans RJ, Ahmad H, Cooper HA, Naidu SS and Panza JA. Radial vs. femoral access for percutaneous coronary artery intervention in patients with ST-elevation myocardial infarction. Cardiovasc Revasc Med 2021; 28: 57-64.