Arteriovenous fistula: rare complication of radial artery access

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DESCRIPTION

A 74-year-old Caucasian man with a medical history of hypertension, hyperlipidaemia and type 2 diabetes mellitus presented with unstable angina and subsequently underwent coronary angiography through the right radial artery. He had significant stenosis in the mid-left anterior descending artery, which was treated with a 3.0×28 mm Xience Alpine drug-eluting stent. The next day, he complained of numbness in the wrist area and on the exam was noted to have a palpable thrill in the area of his transradial access site. There was no circulatory compromise to the hand, and Allen’s test remained normal. Upper extremity arterial duplex ultrasound revealed an arteriovenous (AV) fistula between the distal radial artery and the radial vein, as well as between the radial artery and the cephalic vein (figures 1 and 2). No pseudoaneurysm was noted. We consulted vascular surgery, which elected to follow conservatively without any intervention. Subsequent follow-up at 6 and 12 months showed resolution of the AV fistula with no complications.

The radial artery and the femoral artery are the most commonly used access vessels for cardiac catheterisation. The transradial approach has been preferred over transfemoral access due to numerous complications occurring in the latter. Complications of the femoral approach include access site haemorrhage, retroperitoneal haemorrhage, pseudoaneurysm formation and rare AV fistulas. The formation of an AV fistula can precipitate high-output heart failure, steal syndrome and lower extremity limb ischaemia. Due to the decreased risk of bleeding, early ambulation and discharge, and low procedural cost, the transradial approach is being widely favoured for both diagnostic and interventional cardiac catheterisations. Also, I am a 75-year-old retired man who is very active physically. One day, during the summer of 2019, I had severe chest pain in the centre of my chest while I was sitting and watching my favourite show on the TV. I did not bother much about it, but it slowly got worse over the next hour and by evening, it was the worst pain of my life. At that time, I decided to go to the emergency room (ER) and get myself checked up. I know that there was some blockage in my heart as I got a CT scan a few months ago, but I never realised that things can get so much worse. On my way to the hospital, I was covered in sweat completely and started throwing up. At that time, I was scared to death. The doctors at the ER got me in, did everything quickly and told me that I was having a heart attack. I could not be more afraid to hear that. My cardiologist took me to the operating room and put in a stent in my heart, but the next day, I started having pain in my right hand, specifically in my wrist. I was feeling little numbness as well, so I immediately informed the heart doctor about this and they told me that I might have developed a complication of the procedure. They did an ultrasound of my hand and said that there was a connection between two blood vessels which was not there usually. They told me that it will resolve on its own and asked me to watch for any swelling or pain in my hand. Ten months later, I am doing great and my hand feels fine. I am no longer having a ‘swooshing’ feeling in my hand anymore. I am really grateful to the doctors for taking such good care of me.
due to the enhanced comfort and reduced postprocedure bed rest, patients prefer the radial approach. The common procedural complications with transradial access include radial artery occlusion, non-occlusive radial artery injury and radial artery spasm. In rare circumstances, the formation of an AV fistula can be precipitated. AV fistula incidence is reported to be 0.04%. Its rarity is attributed to the fact that only small veins are present in the vicinity of the radial artery. Palpable thrill, persistent pain and swelling in the forearm following transradial access should raise suspicion, and the diagnosis is usually confirmed with duplex ultrasound. The Doppler spectrum of the veins can reveal arterialised blood flow, which is usually not seen (figure 2). The treatment depends on the size and location of the fistula. As in our case, spontaneous closure of the fistula is observed in majority of the cases. In rare instances, surgical management is required, which includes partial resection, ligation, excision and/or repair. The complications arising from the AV fistula include enlarging size leading to high-output cardiac failure or neurovascular compromise of the extremity. The best way to prevent such complications is by performing a real-time arterial ultrasound during radial artery cannulation.

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**REFERENCES**