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Trans-radial approach for coronary angiography in an adult postoperative patient with tetralogy of Fallot with complex anatomy

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CASE REPORT

Trans-radial approach for coronary angiography in an adult postoperative patient with tetralogy of Fallot with complex anatomy

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SUMMARY

A 42-year-old, postoperative patient with tetralogy of Fallot (TOF) with right-sided aortic arch, presented with heart failure secondary to left ventricular dysfunction, severe valvular regurgitation and residual ventricular septal defect (VSD). After initial stabilisation, he underwent successful coronary angiography through a trans-radial approach followed by aortic valve replacement, pulmonary valve and VSD repair, and was discharged home in stable condition. This case report highlights the trans-radial approach as a feasible option for coronary angiography in postoperative patients with TOF with right-sided aortic arch.

BACKGROUND

The complex anatomy of congenital heart disease challenges interventional cardiologists to get access to coronaries through a percutaneous route. In patients with tetralogy of Fallot (TOF), the possibility of the presence of right-sided aortic arch offers difficulties in adopting a trans-radial approach. The problem is further aggravated when the patient is postoperative, due to the possibility of distorted anatomy as a result of surgery. That is why left heart catheterisation in patients with TOF is always performed through a trans-femoral rather than a trans-radial approach; it is considered easier and safer.

These days, increasingly more coronary angiographies are performed through a trans-radial approach as it presents less chances of bleeding, early mobilisation of the patient and cuts out the need for the patient to lie flat for hours, as is required for a trans-femoral approach. We performed successful coronary angiography using a trans-radial approach in a 42-year-old patient with TOF having right-sided aortic arch, who had undergone total corrective surgery at the age of 15 years. This case report will set a trend towards adopting a trans-radial approach for left heart catheterisation, which is gaining currency in postoperative adult patients with TOF as a result of novel and effective management strategies in this segment of the population.

CASE PRESENTATION

A 42-year-old Asian man presented with symptoms of heart failure and he was New York Heart Association (NYHA) III-IV. He is a known case of TOF, who underwent total corrective surgery at the age of 15 years. His echocardiography and cardiac MR showed moderate left ventricular (LV) systolic dysfunction, severe aortic regurgitation with dilated aortic root (figures 1 and 2), moderate-to-severe pulmonary regurgitation, residual ventricular septal defect (VSD) and right-sided aortic arch (figure 3). After initial stabilisation, he was planned for aortic valve replacement, and VSD and pulmonary valve repair. Keeping in view his age, coronary angiography was planned to rule out underlying coronary artery disease.

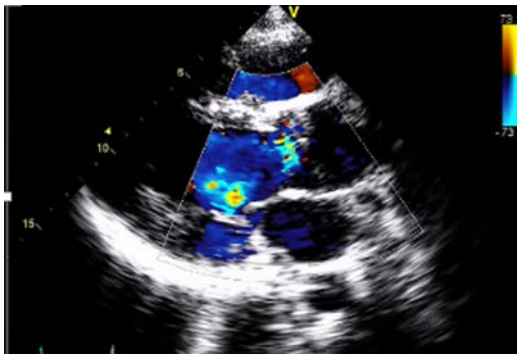

Figure 1 Colour Doppler echocardiography showing aortic regurgitation.

INVESTIGATIONS

- Echocardiography was performed, which showed moderately reduced LV systolic function, normal right ventricular systolic function, severe aortic

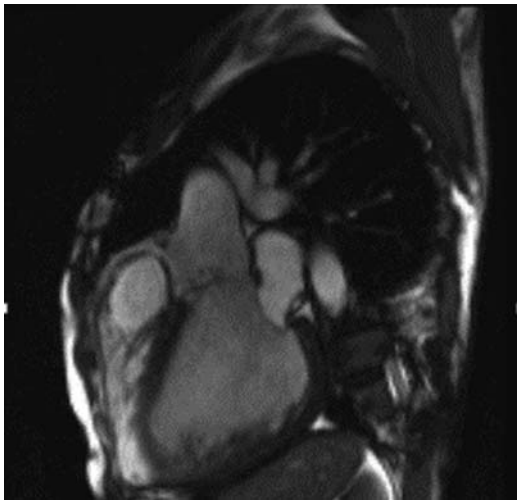

Figure 2 Cardiac MRI showing aortic regurgitation.

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Figure 3 Cardiac MR showing right-sided aortic arch.

regurgitation, moderate-to-severe pulmonary regurgitation, residual ventricular septal defect and dilated aortic arch.

- Cardiac MRI showed a severely dilated left ventricle with moderately reduced systolic function, severe aortic regurgitation, mildly dilated RV with preserved systolic function, severe pulmonary regurgitation-based, tricommissural aortic valve with dilated aortic root and residual VSD.

TREATMENT

The patient's coronary angiography was successfully performed through a trans-radial approach.

Procedure note: Access was taken through a right radial approach after taking measures to avoid sepsis. A Tiger 5 Fr diagnostic catheter was advanced through the right radial artery. Right-sided aortic arch position was confirmed with contrast injection through the catheter (figure 4) with clock-wise rotation and forward movement. The catheter was moved into the aortic sinus and right coronary artery (RCA) was engaged without difficulty. An accessory left anterior descending (LAD) was noticed arising from the RCA. Next, left coronary angiography was performed with the same catheter. Coronary angiogram showed minor plaquing and accessory LAD (figures 5 and 6). We did not find any difficulty engaging coronaries in the presence of right-sided aortic arch. The sheath was removed and haemostasis was secured with a TR band.

Subsequently, the patient underwent aortic valve replacement with bioprosthetic valve and VSD repair with Dacron patch, and he was discharged home in stable condition.

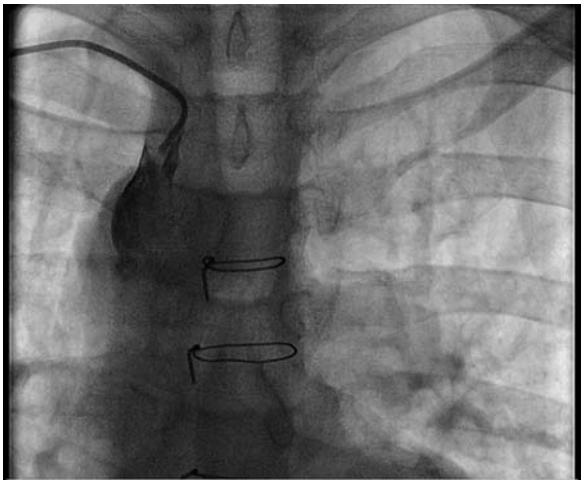

Figure 4 Coronary angiogram showing aorta; the catheter is seen approaching from the right subclavian artery.

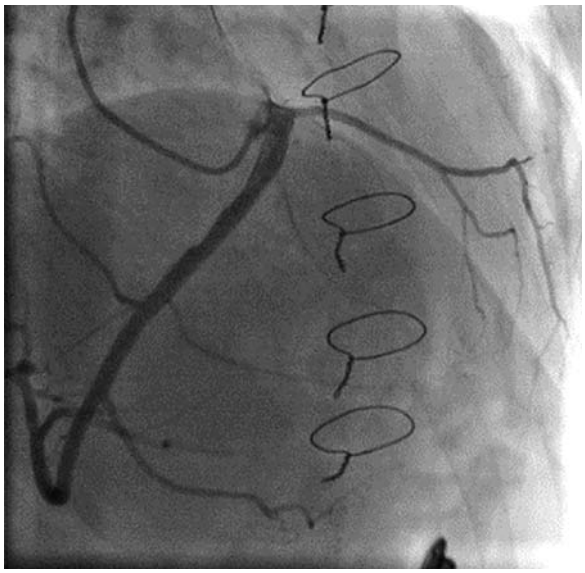

Figure 5 Coronary angiogram showing accessory left anterior descending originating from right coronary artery.

OUTCOME AND FOLLOW-UP

The patient was discharged home in stable condition with follow-up visits scheduled. He is currently leading a normal life and is free of symptoms.

DISCUSSION

TOF is one of the commonest congenital cyanotic heart diseases after the age of 1 month, with a prevalence of 3 of 10 000 live births, and constitutes 7–10% of all congenital heart diseases

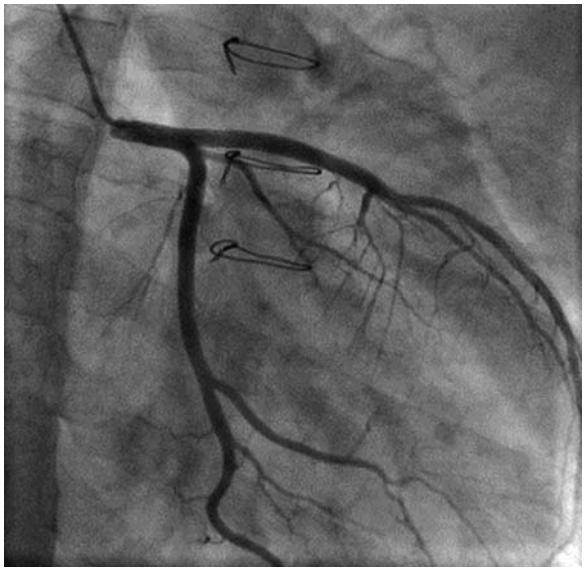

Figure 6 Coronary angiogram showing left main coronary, left anterior descending and left circumflex.

worldwide.[1] It is characterised by four major defects: (1) VSD; (2) over-riding of aorta; (3) pulmonary infundibular stenosis and (4) right ventricular hypertrophy as a result of abnormal movement of outlet septum.[1] Other than the aforementioned characteristics of the disease, there are many anomalies associated with it, such as right-sided aortic arch in 25% of cases, LAD artery originating from the RCA in 5% of cases, and branch pulmonary artery anomalies, major aortopulmonary collaterals, foramen ovale and atrial septal defect.[2]

Currently, the treatment of choice is total correction at an early age.[3] Owing to a better understanding of the disease and its therapeutic advancement, increasingly more patients with TOF grow to adulthood; it is estimated that there is an increase of 5% per year in adult patients with TOF.[4] The result is that the interventionist has to face complications of the disease process on the one hand, and the distorted anatomy of the underlying surgical intervention on the other.[5 6] As of the increased number of patients with TOF in their adulthood and the nature of most of the complications requiring surgical intervention, more patients with TOF require coronary angiographies these days and probably also will in the days to come. Owing to the aforementioned complexities, coronary angiography in such patients is being performed through a trans-femoral approach.

The concern with trans radial approach in patients with TOF is the difficulty to engage coronaries in the presence of right-sided aortic arch and dilated aortic root, but however, TRA is being adopted these days in a large number of procedure,[7 8] due to the fact that this approach has so many advantages, such as low rate of bleeding, shorter rest time, patient comfort, early mobilisation and early discharge from the hospital.[9–12] This approach is even more valuable in patients with TOF because most of these patient have LV dysfunction and it is very difficult for them to lie flat for hours for the sake of removal of the femoral sheath, in the cases where a trans-femoral approach is adopted.

Coronary angiography through radial approach in our patient was a challenge because he had right-sided aortic arch, dilated aortic root, severe aortic regurgitation and postoperative status. However, we have demonstrated in our case that trans radial approach is feasible and can easily be adopted in such patients, and in the setting of right-sided aortic arch, dilated aortic root and severe aortic regurgitation. To the best of our knowledge and through the literature search, no such case has been reported in which a trans-radial approach has been adopted in postoperative patient with TOF with right-sided aortic arch.

Learning points

- Trans-radial approach for left heart catheterisation in postoperative patients with tetralogy of Fallot is feasible and probably a better alternative as compared to a trans-femoral approach.
- Trans-radial approach through right radial artery can be used in patients with right sided aortic arch for coronary angiogram.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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