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CASE REPORT

Multi-vessel percutaneous coronary intervention in a patient with a type B aortic dissection-transradial or transfemoral?

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Abstract

Patients with chronic aortic dissections are at high risk of catheter-induced complications. We report a 41-year-old patient with a type B aortic dissection (Stanford) who underwent successful three-vessel percutaneous coronary intervention *via* the right radial artery approach following a non-ST elevation myocardial infarction. The patient remained asymptomatic at 6 mo follow-up. Trans-radial approach for coronary interventions can be used safely in patients with Stanford type B aortic dissection without increasing the risk of procedure- related complications in this high-risk group of patients.

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Key words: Aortic dissection; Type B; Percutaneous coronary intervention; Transfemoral

Core tip: The case highlights the use of a transradial approach to carry out multivessel percutaneous coronary intervention (PCI) in a patient with a chronic aortic dissection. There is a paucity of literature on this subject. This case discusses the possible mechanisms of dissection propagation with a transfemoral approach and highlights the need for training in both approaches. Decision making in choosing arterial access for PCI in patients with aortic dissection.

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INTRODUCTION

A 41-year-old male patient was admitted with cardiac chest pain and elevated troponin. His 12 lead electrocardiogram showed widespread T wave inversion. A diagnosis of non-ST elevation myocardial infarction (NSTEMI) was made. He was known to have a chronic Stanford type B aortic dissection, extending in the descending aorta from beyond the left subclavian artery down to the abdominal aorta, and was under regular medical surveillance.

CASE REPORT

His cardiovascular risk factors included hypertension, hypercholesterolemia and smoking. He had been given standard NSTEMI treatment with dual antiplatelets (aspirin 300 mg and clopidogrel 300 mg) and low-molecular weight heparin (weight adjusted) at admission. While an inpatient, he had further cardiac chest pains and therefore, was transferred to the catheter-lab for cardiac catheterisation. Prior to

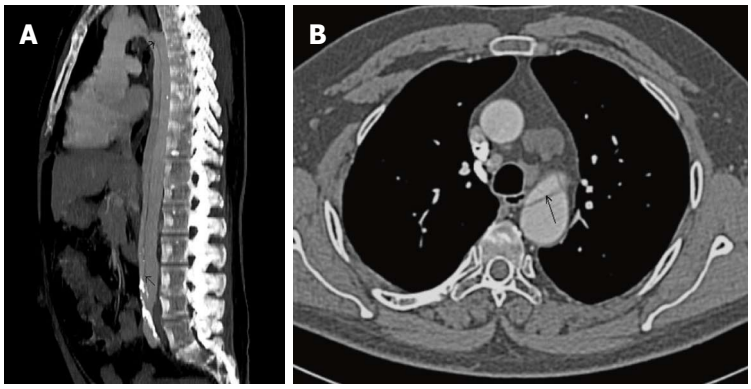

Figure 1 Computed tomography aorta. A: Sagittal view; B: Transverse view. Computed tomography aorta showing the chronic aortic dissection extending from the upper descending aorta down to the abdominal aorta. Arrows indicate dissection flap entry and exit points (A) and flap (B).

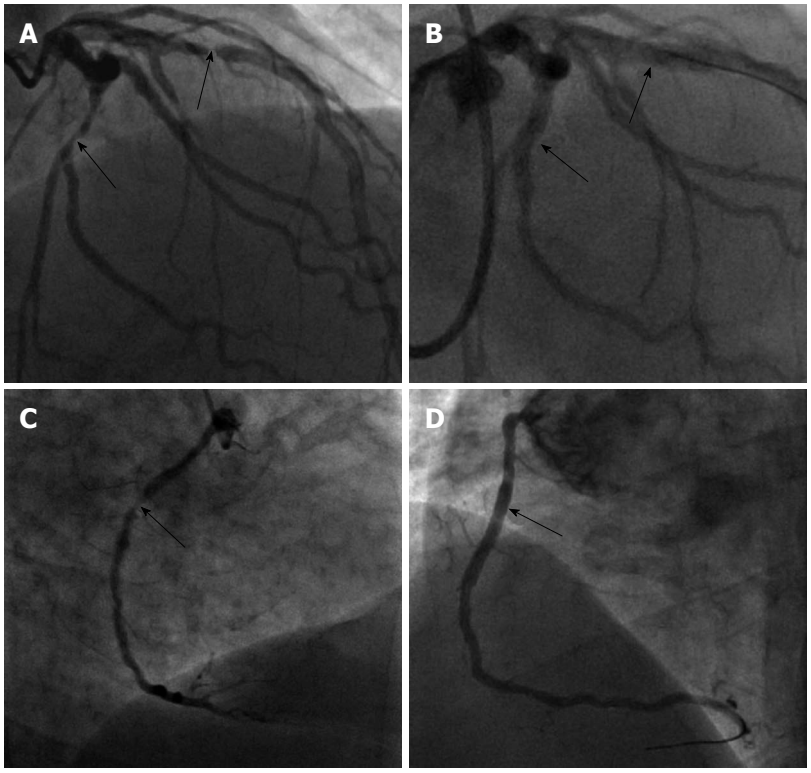

Figure 2 Coronary angiogram image. A: Lesions in left anterior descending (LAD), left circumflex (LCx). Coronary angiogram image showing severe lesions in LAD and LCx arteries (arrows); B: Percutaneous coronary intervention to LAD and LCx. Post-percutaneous coronary intervention (PCI) images showing successful PCI to lesions in LAD and LCx (arrows); C: Lesion in right coronary artery (RCA). Coronary angiogram image showing tight lesion in RCA (arrow); D: PCI to RCA. Successful PCI to RCA with a DES (arrow).

the procedure, he received further loading with clopidogrel 300 mg. During the procedure, he received weight adjusted unfractionated heparin intravenously. The decision to use standard acute coronary syndrome (ACS) peri-procedural therapy was made in view of the fact that the patient had been stable from his chronic aortic dissection and that his recent electronic computer X-ray tomography technique (CT) of the aorta showed no extension of his dissection (Figure 1). Informed consent was obtained prior to the percutaneous coronary intervention.

The coronary diagnostic procedure was performed *via* the right radial artery approach. Five French JR4® and JL 3.5® diagnostic catheters were used for the right and left coronary systems respectively. This confirmed a normal left main stem. The left anterior descending (LAD), left circumflex (LCx) and right coronary artery (RCA) had severe mid-vessel lesions (Figure 2A and C). Due to the complexity of the case, it was decided to treat all three lesions at the same procedure.

A Medtronic Launcher EBU 5.0 (6F)® (Medtronic) guide catheter was used to cannulate the left system. Two 0.014" BMW® guidewires (Abbott Vascular) were advanced to the distal LAD and LCx. The lesion in the LAD was directly stented using a 4.0 mm × 15 mm Resolute Integrity® drug eluting stent (DES) (Medtronic). The LCx lesion was pre-dilated using a 2 mm × 15 mm Maverick Balloon® (Boston Scientific), followed by a 2.75 mm × 22 mm Resolute Integrity® DES.

An Amplatz (AL2) guide catheter was used to cannulate the RCA. A 0.014" BMW® guidewire was advanced to the distal RCA. The lesion was pre-dilated with a 2.0 mm × 15 mm Maverick Balloon® followed by a 3.0 mm × 22 mm Resolute Integrity® DES. Excellent final angiographic results were obtained (Figure 2B and D) A Terumo TR band® (Terumo) was deployed to the radial access site at the end of procedure. There were no peri or post procedure complications. A total of 300 mL contrast (Visipaque®) and 7000 units heparin were given. His

repeat blood tests including haemoglobin, urea, creatinine and electrolytes were normal post-procedure. The patient made an uneventful recovery and was discharged a few days later on dual antiplatelets (aspirin 75 mg and clopidogrel 75 mg daily) and standard secondary prevention. He was instructed to continue on dual antiplatelets for 1 year and aspirin for lifelong thereafter.

DISCUSSION

Aortic dissection can be classified according to the location of the dissection and the relevance to patient management. The commonly used Stanford classification distinguishes aortic dissections by whether the ascending aorta is involved (type A) or not (type B)[1]. The incidence of aortic dissection in the general population is approximately 2.6-3.5 per 100000 person-years[2,3]. In a study by Islamoğlu *et al*[4], 11 of 76 patients with aortic dissection (acute and chronic) ie 14.5% had concomitant coronary artery disease. However, none of the chronic type B dissection patients who underwent coronary angiography had coronary artery disease. CT angiography allows the fast and reliable detection of aortic dissections and delineation of the dissection flap anatomy.

Since the introduction of trans-radial coronary angioplasty[5], procedural success rates have evolved remarkably and complex coronary artery lesions can be treated with minimal complications. Our patient had a chronic Stanford type B aortic dissection. A transfemoral approach would carry a high risk of complicating the existing dissection. Hildick-Smith *et al*[6] published a large case series looking at transradial coronary angiography in patients with contraindications to a femoral approach. Of 500 patients in that series, 10 patients had aortic dissection and had a transradial approach. However, there is no series looking solely at patients with aortic dissection and the best approach for PCI. Furthermore, there is a paucity of literature discussing the possible mechanisms of catheter-related complications in relation to aortic dissections in cases similar to ours. Mechanisms would include entry of the catheter tip into the false lumen. Using a femoral approach, this could happen at the exit site of the existing dissection. Continued advancement of the catheter would then risk propagation of the dissection into the ascending aorta as well as rupture of the vessel. Additional risks would include catheter entry into the false lumen *via* puncturing the wall between the true and false lumens. In our patient, to avoid these potential complications, we safely used the right trans-radial approach for three-vessel PCI without any procedural complications. This would appear to be the ideal approach in patients with Stanford type B aortic dissections as it avoids the descending aorta and thus, the potential to worsen an existing dissection. However, a radial approach is not without risk of aortic dissections. Indeed, there are case reports of iatrogenic aortic dissections due to aggressive catheter manipulation during PCI *via* a radial approach[7]. Furthermore, in patients with aberrant right subclavian artery (aretria lusoria), PCI *via* a right radial approach can be extremely difficult and there are reports of iatrogenic aortic dissections during such procedures[8].

This case highlights the importance of choosing the right access approach in patients with a complicated background like ours. It also highlights the importance of training interventionalists in both the transradial and tranfemoral approaches as each has its own merits and is sometimes the only feasible approach in certain patient groups.

In conclusion, trans-radial approach for coronary interventions can be used safely in patients with Stanford type B aortic dissection without increasing the risk of procedure-related complications in this high-risk group of patients.

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