Approach to the Patient with Combined Coarctation of Aorta and Wolf-Parkinson-White Syndrome

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Abstract

At the present time the treatment of choice for postductal coarctation of aorta is percutaneous angioplasty and stenting. One crucial step for successful stenting of coarctation is accurate positioning of the stent across the lesion, which is difficult due to high pressure blood flow at the site of the coarct. To solve this problem, rapid pacing has been used to decrease cardiac output and blood pressure for a few seconds and prevent excessive motion of the stent during deployment. However, if coarctation is combined with pre-excitation syndrome, rapid atrial/ventricular pacing could cause life-threatening tachyarrhythmias. In this paper, we report a 28-year-old woman with combined coarctation of aorta and Wolf-Parkinson-White syndrome who underwent radio frequency catheter ablation of the accessory pathway and then stenting angioplasty of the coarctation was performed without any complication (*Iranian Heart Journal 2009; 10 (3):53-55*).

Key words: coarctation of aorta ■ Wolf-Parkinson-White syndrome ■ angioplasty

• oarctation of the aorta accounts for →approximately 6 to 8 % of all congenital heart defects.¹ Typically, it consists of a discrete narrowing of the descending thoracic aorta distal to the left subclavian artery. However, coarctation has a wide spectrum of clinical presentations in terms of severity, anatomy, and physiology. Anatomic severity can vary from mild coarctation to complete interruption of the aorta. If coarctation is not treated, it could be complicated with stroke, premature coronary artery disease, heart failure, and high mortality before 50 years of age (75% mortality by 46 years of age). At the present time, balloon angioplasty and/or stenting is the treatment of choice for postductal coarctation of aorta.²⁻⁴

of the challenges during One stent in coarctation is accurate deployment positioning of the stent across the lesion, which is often difficult due to high pressure blood flow in the aorta. This step is crucial for success because incorrect positioning could result either in embolization of the device or significant residual stenosis. To solve the problem, rapid right ventricular pacing has been used to decrease cardiac output temporarily so the stent could be positioned correctly at the target site. For this reason, pacing must be delivered at a rate of 180-240 bpm.⁵ However, this step could be challenging in the presence of associated anomalies such as Wolf-Parkinson-White syndrome (WPW).

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Case report

A 28 year-old woman presented with unexplained and persistent hypertension. Physical examination revealed 60 mmHg pressure difference between upper and lower extremities (left hand blood pressure: 160/90; left leg blood pressure: 100/60). Physical examination of other organs and lab data were normal. The patient underwent further evaluation using electrocardiography and transthoracic echocardiography which showed a combination of WPW syndrome and discrete post-ductal coarctation of aorta with 57 mmHg pressure gradient. The aortic valve also was bicuspid with no stenosis or regurgitation and the size of the aortic root and ascending aorta were within normal limits. There were no other abnormalities in the cardiovascular system.

These findings were confirmed by CTangiography and the patient scheduled for percutaneous angioplasty and stenting of the aortic coarctation. However, in view of preexcitation in her ECG and possible arrhythmia during rapid ventricular pacing, she first underwent electrophysiological study which revealed right posteroseptal accessory atrioventricular pathway. Despite the absence of palpitation or other symptoms related to pre-excitation, the patient underwent radiofrequency ablation of the accessory pathway with successful results and on the same day, she was transferred to the catheterization lab for balloon angioplasty. Angiography showed a discrete coarctation of the aorta after the left subclavian artery with a coarctation index of 0.30 and about 65 mmHg pressure gradient across the lesion. After completion of diagnostic study, a transvenous temporary pacemaker lead was inserted via the femoral vein to the right ventricle and the patient was paced to a rate of 220 bpm. This test was performed before stent deployment to make sure that she can tolerate rapid pacing during the procedure. As we expected, there was no sign of pre-excitation or progression to VT/VF even at the paced rate of 200-220 bpm. Thus the procedure continued with

passage of 0.035 inch stiff wire and a long 12F sheath across the lesion. Then a NUMED CP 8x34 stent mounted on a BIB18x4.5 balloon was delivered to the site of the coarct and positioned carefully. Afterwards, rapid pacing was initiated at the rate of 200bpm and at the same time the balloon was inflated and stent deployed correctly on the aortic wall. No complication was noted during the procedure and post-deployment pressure measurements showed < 5mmhg pressure gradient across the lesion. The patient was sent to the CCU for overnight observation and discharged after 48 hours on beta-blockers and aspirin.



Fig. 1. A, Twelve-lead ECG before ablation shows ventricular preexcitation compatible with right posteroseptal accessory pathway. B, Twelve-lead ECG after catheter ablation shows absence of pre-excitation and narrow QRS. C, Aortography before angioplasty shows a discrete coarctation of aorta after the left subclavian artery. D, Aortography shows successful deployment of stent graft at the site of coarctation.

Discussion

Combination of aortic coarctation and preexcitation is not common but is occasionally encountered. Management of these cases warrants special care. Despite the overall safety of rapid pacing during stent deployment of coarct patients, when coarctation is present in a patient with WPW syndrome, the situation is different. To the best of our knowledge, this report is the first of its kind, indicating a safe approach for management of the patient with combined coarctation of the aorta and WPW. In this occasional combination, pacing at such a rapid rate could possibly result in malignant ventricular tachyarrhythmias such as ventricular tachycardia ventricular or fibrillation which could culminate in rapid collapse and even cardiac arrest. If this occurs during stent deployment in a coarctation patient, there would be no chance of accurate positioning and deployment of the stent and possible embolization of the stent will further complicate the case, even if successful directcurrent cardioversion could terminate the malignant arrhythmia. To prevent this grave complication during the procedure, it seems prudent to treat the pre-excitation first and then proceed to stenting. Due to safety and high success rate of radiofrequency ablation of accessory pathways, this procedure seems to be a necessary step before angioplasty in this group of patients.

Conclusions

At the present time, stenting of aortic coarctation is the preferred treatment for these patients. Acrucial step in aortic stenting is rapid right ventricular pacing to help deploy the stent accurately. However rapid pacing in patients with associated pre-excitation is obviously contraindicated. So, before proceeding to angioplasty, these patients must first undergo ablation of their accessory pathway even if they do not have symptoms related to that.

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