

Emergency (“Bailout”) balloon aortic valvuloplasty following diagnostic cardiac catheterisation in a patient with severe valvular aortic stenosis and severe coronary artery disease.

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Citation

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Abstract

Balloon aortic valvuloplasty is usually a palliative procedure, performed on an elective basis, undertaken in elderly or frail patients deemed unsuitable for surgical aortic valve replacement. It has previously been shown to improve symptoms, though not prolong survival. We report the case of a patient with severe aortic stenosis (diagnosed on echocardiography) who was also found to have severe coronary artery disease at the time of diagnostic cardiac catheterisation. He experienced profound acute haemodynamic deterioration immediately following the procedure. This did not improve after urgent percutaneous coronary revascularisation and intra-aortic balloon pump insertion. He did however improve after successful emergency balloon aortic valvuloplasty. Our literature search leads us to believe this is the first such case of successful emergency aortic valvuloplasty following routine cardiac catheterisation in a patient with both severe aortic stenosis and severe coronary artery disease.

INTRODUCTION

Calcific aortic stenosis remains the most prevalent form of valvular heart disease in the western world and is the most common indication for valve replacement surgery¹. Once a patient develops symptoms, the prognosis without surgery is poor, with an expected life expectancy of less than three years². The most widely performed treatment, and that with the best evidence base, remains surgical aortic valve replacement (AVR). Percutaneous treatment options include balloon aortic valvuloplasty (BAV) and, more recently, transcatheter aortic valve implantation (TAVI). BAV fell out of favour after studies in the 1980s and 1990s suggested no difference in actual survival between BAV and medically managed patients³. We report a rare case of unplanned emergency (“bailout”) BAV that was necessary to reverse acute haemodynamic compromise in a patient with severe aortic stenosis and coronary artery disease undergoing diagnostic cardiac catheterisation.

CASE REPORT

Our patient is a 79 year old man who presented in 2008 with exertion related chest pain. He had an impressive ejection systolic murmur on cardiac auscultation. Transthoracic

echocardiography (TTE) revealed severe calcific aortic stenosis, with a peak pressure gradient of 130mmHg, mean gradient 67mmHg and a calculated aortic valve area of just 0.44cm². He was therefore referred for diagnostic coronary angiography prior to referral for urgent surgical AVR.

At cardiac catheterisation, he was found to have occlusions of both the dominant right coronary and circumflex coronary arteries as well as severe stenosis in the left anterior descending (LAD) coronary artery. Immediately following the completion of the procedure, he developed haemodynamic embarrassment with marked ST segment depression on resting electrocardiography (ECG). This did not settle with initial medical therapy and the decision was made to return to the cath lab for urgent revascularisation. Two Driver bare metal stents (Medtronic, Santa Rosa, California) were inserted into the proximal LAD coronary artery, extending back into the distal left main stem artery, with an excellent angiographic result.

Unfortunately the haemodynamic compromise did not resolve, even after an intra-aortic balloon pump (IABP) was inserted. Arterial blood gases at this time revealed a partial pressure of oxygen (PO₂) of just 5.3kPa. As the left coronary

tree had been treated by revascularisation and an IABP was in situ, it was judged that the on-going instability was most likely related to the critical aortic stenosis. The local cardiothoracic centre was contacted and, following discussion with a cardiac surgeon, a decision was made to attempt emergency balloon aortic valvuloplasty (BAV).

The valve was crossed with a 260cm 0.035” Amplatz ES guide wire (Cook Medical, Bloomington, Indiana) and an active screw-in temporary pacing wire positioned at the right ventricular apex via the right femoral vein. Once rapid ventricular pacing (220bpm) was commenced, a 23mm BALT Cristal semi-compliant balloon (BALT Extrusion, Montmorency, France) was inflated and the catheter pull-back gradient across the valve fell to 30mmHg. Grade 2 aortic regurgitation was present on the post-BAV aortogram. However, the haemodynamic situation and arterial blood gases improved dramatically following BAV. The patient was subsequently transferred uneventfully to our nearest cardiothoracic centre, where he subsequently underwent bypass graft surgery and bioprosthetic AVR without complication and has made a good recovery.

DISCUSSION

After its first description in 1986 by Professor Cribier and colleagues⁴, BAV gained widespread popularity across the globe. Although a good short term haemodynamic and clinical improvement was observed⁵, in the long-term high restenosis rates⁶ and poor overall survival³ were also noted. Some authors did also, however, note that BAV may be an appropriate palliative option in those unwilling or unable to undergo surgery⁷.

BAV has previously been employed as an emergency measure to rescue patients presenting in cardiogenic shock secondary to critical aortic stenosis⁸. There is one previous article – a case series of 3 patients – of unplanned emergency BAV to reverse acute haemodynamic deterioration in patients with known severe aortic stenosis who were undergoing diagnostic cardiac catheterisation⁹.

The difference in our patient was the presence of concomitant severe coronary artery disease. Cardiac catheterisation can induce haemodynamic deterioration in patients with severe coronary artery disease, especially if a left main stem stenosis is present. If severe left ventricular outflow tract obstruction (LVOTO) – in this case valvar

aortic stenosis – is also present, the deterioration would be even more marked and unless both problems are treated restoration of normal cardiac function would not be expected.

Although some feel that BAV may be re-emerging into the clinical arena¹⁰, it remains rare for a non-surgical centre to offer this service. Our case highlights an unusual benefit of having a BAV programme on site, since our patient would almost certainly not have survived transfer to the surgical centre without emergency BAV. The case re-emphasises the fact that BAV can occasionally act as an emergency measure to bridge a patient to surgical valve replacement as well as reminding us of the potential dangers of diagnostic cardiac catheterisation in patients with significant aortic stenosis.

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