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**CASE REPORT**
*Coronary heart disease*

# Treatment of severe aortic stenosis and left ventricular outflow tract mass with transcutaneous aortic valve implantation: a case report

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**Background** Percutaneous implantation of aortic valve for severe aortic stenosis (AS) in the presence of pedunculated mobile left ventricular outflow tract (LVOT) mass not reported before. In this case report, we address the feasibility of this procedure.

**Case summary** An 80-year-old patient who presented with presyncope, transthoracic echocardiogram (TTE), and transoesophageal echocardiography (TOE) revealed severe calcific AS and LVOT mass measuring 2.1*1.5 cm. The patient was turned down for surgery. It was decided that transcatheter aortic valve implantation (TAVI) be performed because the valve compresses the mass against the proximal part of the interventricular septum. The mass peduncle was 1.4 cm, and it was 4 mm away from the annulus. This meant the valve was needed to be deployed 18 mm below the annulus to cover the mass completely. Gentle manipulation and direct valve deployment without preballoon dilation to decrease the possibility of fragment embolization were necessary. Self-expandable core valve deployed as low as possible, after initial deployment, the distance of LVOT covered by the valve measured by TOE 1.66 cm, the whole mass was covered, then the valve was fully deployed. The patient was extubated in the catheterization room; there was no clinical evidence of embolization. The patient was discharged home after 2 days. A follow-up TTE after 6 months showed a well-functioning valve and the LVOT mass then disappeared.

**Discussion** Pedunculated LVOT mass should be resected surgically. In high-risk surgical patients, direct TAVI to compress the mass is feasible in experienced canters. The safety issues need more research and more cases to judge. Transoesophageal echocardiography during the procedure is mandatory to guide the valve position.

**Keywords** LVOT • Mass • TAVI • Case report

## Learning points

- How to use the transoesophageal echocardiography in guiding transcatheter aortic valve implantation (TAVI) in presence of left ventricular outflow tract (LVOT) mass? The distance from the AV annulus to the end of the mass should be covered with the valve.
- Pedunculated LVOT mass should be resected surgically. In high-risk surgical patients, direct TAVI to compress the mass is feasible and safe in experienced centres. Transoesophageal echocardiography during the procedure is mandatory to guide the valve position.
- The mass should be within 18 mm from the AV annulus to be covered by the valve. Only self-expandable valves can be used in this scenario to allow low implantation to include the mass.

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## Introduction

Mobile masses in the left ventricular outflow tract (LVOT) with embolic potential should be surgically resected. Pagel *et al.*[1] reported a case of a highly mobile papillary fibroelastoma in the LVOT proximal to a calcified stenotic aortic valve. In contrast to this case, the mass was surgically removed during surgical aortic valve replacement. Isolated LVOT myxoma is rarer than an LVOT papillary fibroelastoma. Coats *et al.*[2] reported surgical resection of papillary fibroelastoma arising from the LVOT; the lesion was small and resembled a 'sea anemone' with a gelatinous membrane and multiple papillary projections. Benign cardiac myxomas constitute 88% of cardiac tumour cases; left ventricular myxomas account for 2.5% of cases.[3] Complications of LVOT mass are mainly caused by embolization, obstruction to LVOT, arrhythmias, and conduction disturbances.[4] In this case report, we discussed other techniques for the removal of mass that caused LVOT obstruction in patients at high risk of surgery. Here, we successfully treat severe aortic stenosis (AS) and the LVOT mass with transcatheter aortic valve implantation (TAVI). Leaving the pedunculated LVOT mass for conservative management had an inferior outcome compared with those who underwent surgery.[5]

## Timeline

| | |
|---|---|
| Presentation | An 80-year-old patient presented with syncopal attack associated with fall down. |
| One year ago | He had history of multiple presyncope attacks in the last year. |
| Time of admission | Admitted to our cardiac centre for investigation for syncope. |
| Transthoracic echocardiogram (TTE) and transoesophageal echocardiography | Revealed severe calcific aortic stenosis (AS) and left ventricular outflow tract (LVOT) mass measured 2.1*1.5 cm. |
| Heart team meeting | Turned down from surgery due to his age and associated pulmonary problems. |
| Decision | Direct transcatheter aortic valve implantation (TAVI) to treat AS and to compress the mass against interventricular septum. |
| Third day of admission | TAVI done successfully, the patient extubated in the catheterization room, no clinical evidence of embolization anywhere. |
| Two days later | The patient discharged home. |
| After 6 months | Follow-up TTE showed well-functioning valve and the LVOT mass disappeared, no presyncope attacks. |

## Case presentation

An 80-year-old patient presented with presyncope attacks during the last year. A week ago, he had a syncopal attack and fell down. The patient was referred to the cardiac centre to investigate the cause of syncope. On examination, an ejection systolic murmur grade V/VI with maximum intensity at the right parasternal area and propagated to the neck. His electrocardiogram revealed left ventricular hypertrophy with non-specific ST changes. Coronary angiography revealed non-obstructive lesions. Transthoracic echocardiogram (TTE) and transoesophageal echocardiography revealed severe calcific AS and LVOT mass measuring 2.1*1.5 cm. This mass was irregular, inhomogeneously speckled, with mobile fronds (*Figure 1*). The mean pressure gradient (PG) was 52 mmHg, LVOT diameter was 21 mm, and the aortic valve area calculated by continuity equation was 0.7 $cm^2$. The continuity equation is not accurate in the presence of two successive stenotic lesions. This PG was due to valvular AS because the LVOT had enough space beyond the mass. Also, the envelope of aortic valve Inflow was of fixed obstruction and not the late peaking dagger shape of dynamic obstruction. Because the thrombus possibility was very low, anticoagulation could not be started. The patient was turned down for surgery due to his age and associated pulmonary problems. We think to do alcoholic septal ablation aiming to reduce the size of the mass by reducing its blood supply then to do TAVI. However, it was decided to perform TAVI because the valve compresses the mass against the proximal part of the interventricular septum. We decided not to take a biopsy from the mass to avoid manipulation with a higher possibility of embolization. The mass peduncle was 1.4 cm and 4 mm away from the annulus. This meant that the valve needed to be deployed 18 mm below the annulus to cover the mass completely. Also, gentle manipulation and direct valve deployment without preballoon dilation to decrease the possibility of fragment embolization. Self-expandable 26 core valve expanded 60% deep in left ventricle, and then the valve pulled up to its original position to include the whole mass. The valve was intentionally implanted 16 mm below the annulus to cover the mass (*Figure 2*). We planned for second valve in valve in case of significant leak due to low implantation. Fortunately, the valve implanted and the mass covered with no leak. This technique cannot be done with balloon-expandable valves. The patient was extubated in the catheterization room, and there was no clinical evidence of embolization. The patient was discharged home after 2 days. A follow-up TTE after 6 months showed a well-functioning valve, and the LVOT mass disappeared (*Figure 3*).

## Discussion

The differential diagnosis of this mass either a thrombus, vegetation, or a tumour. Thrombophilia screen, autoimmune diseases, and hypereosinophilia screen were normal, making the possibility of thrombus very low, especially with normal left ventricular function. There was no fever or any clinical symptoms suggesting endocarditis and negative blood cultures, so the possibility of vegetation was unlikely. Tumour in the LVOT may be fibroelastoma, myxoma, or a rare malignant tumour. The most important feature of a cardiac myxoma is its narrow stalk; also, a myxoma is homogeneous and may have a hyperlucent central area, indicating haemorrhage and necrosis.[6]

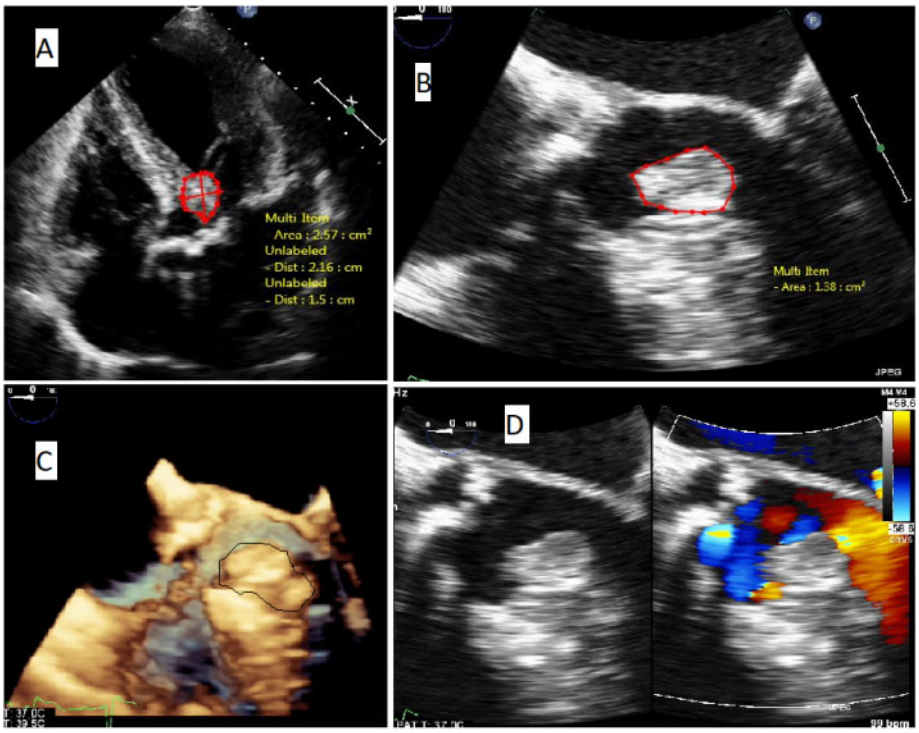


**Figure 1** (*A*) Transthoracic echocardiogram, apical five-chamber view showed the left ventricular outflow tract mass 2.1*1.5 cm, its area 2.57 $cm^2$. (*B*) Transoesophageal echocardiography, med-oesophageal view showed a different projection of the left ventricular outflow tract mass. (*C*) Three-dimensional image showed the left ventricular outflow tract mass circled with the black line. (*D*) Colour flow showed started mild acceleration at left ventricular outflow tract mass.

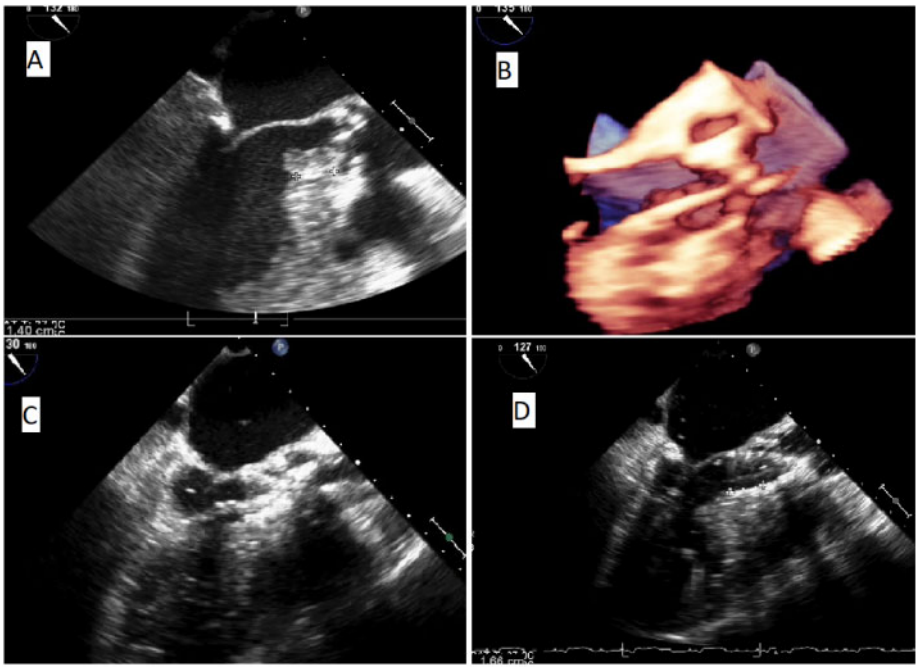


**Figure 2** (*A*) The peduncle of the mass is 1.4 cm; it is away from the left ventricular outflow tract 4 mm. (*B*) Live three-dimensional image showed the wire passing in front of the left ventricular outflow tract mass. (*C* and *D*) During valve deployment, the distance of the left ventricular outflow tract covered by the valve was 1.66 cm.

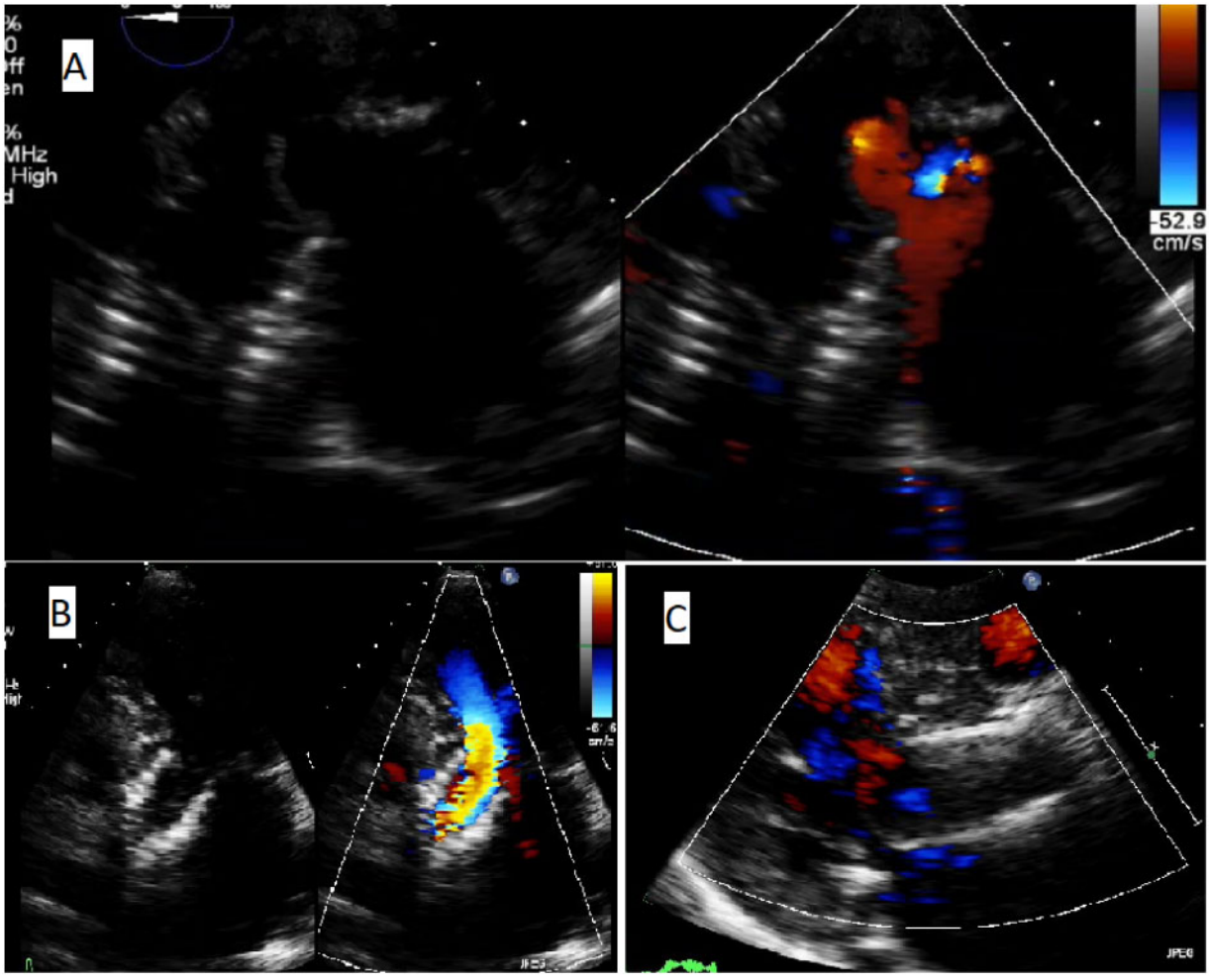


**Figure 3** (*A*) Transoesophageal echocardiography transgastric view after valve deployment, the mass disappeared. (*B* and *C*) Transthoracic echocardiogram after 6 months of follow-up, and a well-functioning valve with the disappearance of the mass.

Patients with an LVOT myxoma are usually asymptomatic. However, most clinical symptoms related to left ventricular myxoma are caused by embolization and LVOT obstruction.[7] The high pressure of the left ventricle during systole can increase the risk of systemic embolization, so a cardiac mass originating in LVOT should be removed immediately.[8] Finkelstein *et al.*[9] reported a case where severe valvular AS and subvalvular discrete subaortic stenosis were treated with TAVI. Unlike this case, there was no mobile mass and no fear of embolization. In this case report, the authors raise the possibility of treating LVOT masses with TAVI even in the absence of AS provided there was enough calcification to withhold the valve. This is out-of-label use and needs more research. The mass should be within 18 mm from the AV annulus to be covered by the valve. Self-expandable valves are better used in these cases to allow low implantation to include the mass. More research is required to support this approach. To the best of our knowledge, this is the first reported case of treating LVOT mass with TAVI. We want to emphasize that the main indication of TAVI in this case is the severe symptomatic AS in a high-risk surgical patient. The presence of the LVOT mass was a coincident finding and not the primary purpose for TAVI.

## Conclusion

Pedunculated LVOT mass should be resected surgically. In high-risk surgical patients, direct TAVI to compress the mass is feasible in experienced canters. The safety issues need more research and more cases to judge. Transoesophageal echocardiography during the procedure is mandatory to guide the valve position.

## Lead author biography

Dr Hesham A. Naeim, MD, FASE graduated from faculty of medicine, Al-Azhar University at December 1997. Granted MSc degree in cardiovascular diseases at December 2002. Granted MD degree in cardiovascular diseases and interventions 2006. Diplomate - Adult Comprehensive Echocardiography from National Board of Echocardiography, United States at June 2014. Resident and assistant lecturer of cardiology, in Al-Azhar University hospitals from June 1997 to February 2006. Cardiology consultant in MNH Saudi Arabia from January 2007 till April 2013. Adult cardiology consultant in Madina cardiac center Saudi Arabia from June 2013 till now. Dr Hesham is expert in Echocardiography in structural heart disease.

## Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

**Slide sets:** A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

**Consent:** The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

**Conflict of interest:** none declared.

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