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Title Page

Topic: Open Surgical Mitral valve replacement with a Transcatheter Edwards Sapien-XT valve

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Short Title

SMVR with Sapien valve

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Introduction

Extensive mitral annular calcification presents a formidable surgical challenge during mitral valve procedures. We present a case of a 68-year old female who was not suitable for standard mitral valve replacement (MVR) and underwent open surgical MVR with a "transcatheter aortic valve"- an Edwards Sapien XT valve (Edwards Lifesciences, Irvine, CA).

A 68-year old obese (110 kgs) woman presented with worsening exertional dyspnea for last 5 years. She had a background of chemotherapy and radiotherapy for Hodgkin's lymphoma 12 years before and was a type-2 diabetic. Transthoracic (TTE) and transoesophageal echocardiograms (TOE) showed a heavily calcified mitral valve (especially anterior mitral leaflet, AML) with extensive annular calcification with extension of calcification in the sub-valvular apparatus (SVA) and onto the left-ventricular (LV) wall, significant leaflet restriction (Mean gradient, MG= 20mm Hg) and moderate tricuspid valve (TV) regurgitation. Coronary angiogram showed mild coronary artery disease with extensive circumferential calcification of mitral annulus (doughnut

appearance). (**Fig.1**). Cardiac Computed tomography (CT) revealed Severe circumferential mitral annular calcification, particularly thick along the posterior leaflet attachment, measuring up to 1.6cm and LCX in close proximity to the heavily calcified posterior mitral annulus (**Fig.2**).

She was discussed in a combined multidisciplinary meeting and it was decided that she was not safe for MVR with standard prosthetic valve and techniques in view of the dense and extensive calcification of mitral annulus and subvalvular apparatus considering the risks of atrio-ventricular dehiscence and injury to LCX artery. She was also not suitable for percutaneous implantation of Edwards Sapien valve into mitral annulus in view of the heavily calcified anterior mitral leaflet which could cause left ventricular outflow tract (LVOT) obstruction from systolic anterior motion (SAM).

She underwent successful MVR using a 29mm Edwards Sapien-XT valve and TV repair with 32mm Physio-II ring (Edwards Lifesciences, Irvine, CA). Standard cardiopulmonary bypass (CPB) techniques using aorto-bicaval cannulation, antegrade aortic-root and retrograde cardioplegia, LA and RA approaches were used. A 30º thoracoscope was used for better visualization. There was a large calcified mass in AML which was excised to avoid LVOT obstruction (**Fig.3**). The heavily calcified mitral annulus with a markedly reduced valvular orifice area that was unable to accommodate a 19-mm valve sizer (Perimount; Edwards Lifesciences). But after the excision of the calcified mass in AML and careful annular debridement, the annulus could accommodate a 23-mm

Perimount sizer. The Sapien valve was deployed into the mitral annulus under direct vision and without using its Ascendra delivery sheath, with enough balloon inflation used to achieve adequate coaptation with the annulus (**Fig.3**). Post-bypass TOE showed the prosthetic Sapien valve implanted in mitral annulus functioning well with trivial regurgitation and mean gradient of 2mm Hg.

Patient had an uneventful postoperative recovery and was discharged on day 8 on a regimen of low-dose aspirin for anticoagulation.

She is doing well since then and her latest follow-up TTE (after one year of operation) has shown well-functioning aortic prosthetic valve in mitral position, with a mean gradient of 3mm Hg and trivial regurgitation.

Discussion

Extensive mitral annular calcification presents a formidable surgical challenge during mitral valve procedures. Survivors of Hodgkin disease and other thoracic malignancies treated with mantle radiotherapy may have Radiation induced heart disease (RIHD) which encompasses a range of deleterious effects on the heart, from subclinical histopathological findings to overt clinical disease[1,2].

Valvular disease appears to progress with time following irradiation and diagnosis often occurs more than a decade following irradiation and pathology of severely diseased valves demonstrate thickened, fibrotic leaflets[3]. Valvular calcification is a dominant

finding after mediastinal radiotherapy for Hodgkin's lymphoma. This occurs later in the development of valvular pathology.

Various approaches[4] are proposed for patients with extensive mitral annular calcification requiring mitral valve procedures. In our case, intra-annular insertion of a standard prosthetic valve was not safe due to the heavily calcified annulus and extension of calcification in SVA onto the LV wall, considering the risks of atrio-ventricular dehiscence and injury to LCX artery.

There are reports of percutaneous implantation of a transcatheter valve into a heavily calcified mitral annulus[5]. , but the risk of LVOT obstruction is very high if AML is heavily calcified, especially with current large sized devices.

Summary

Extensive mitral annular calcification presents a formidable surgical challenge during mitral valve procedures. Although experts recommend extensive decalcification with annular reconstruction, it may be impossible to implant standard prosthetic valve in some mitral valves and novel techniques using TAVR valves can be successful.

Disclosure

We have no financial or other interest in the product or distributor of the product.

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Figure Legends

Fig.1: Coronary angiogram image showing extensive circumferential calcification of mitral annulus (doughnut appearance, yellow arrow) and LCX artery running very close to the posterior annulus.

Fig.2: Cardiac CT images showing severe circumferential mitral annular calcification, particularly thick along the posterior leaflet attachment

Fig.3: Intraoperative image using a 30º thoracoscope, **Left:** showing a large calcified mass in AML; **Right:** showing the transcatheter Sapien valve implanted in mitral annulus

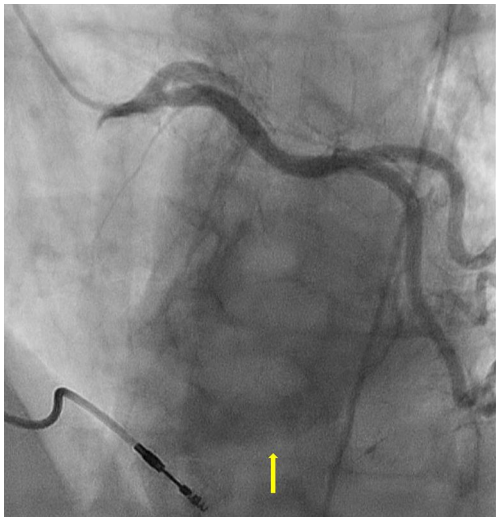

Fig. 1 Angio.jpg

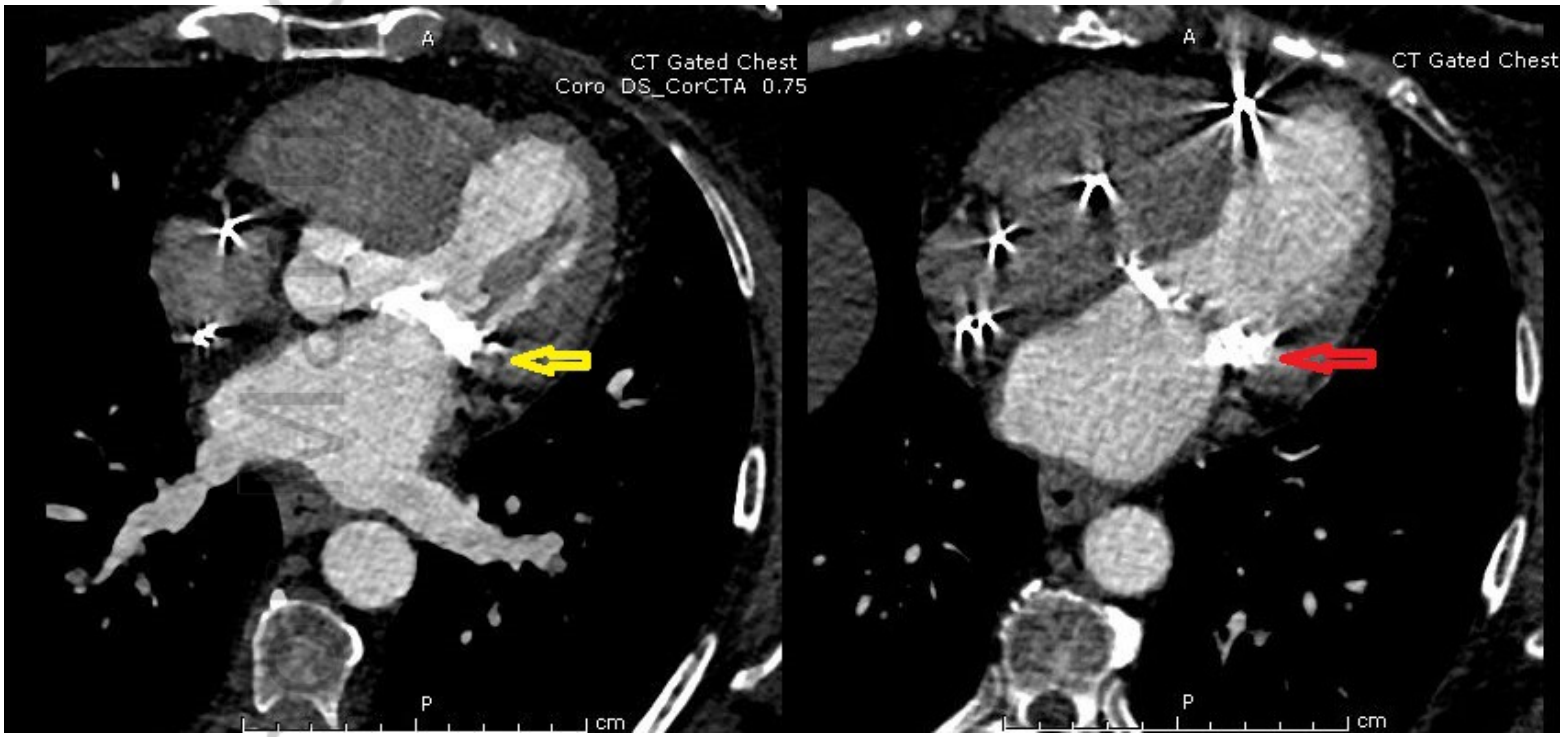

Fig. 2 CT Chest.jpg

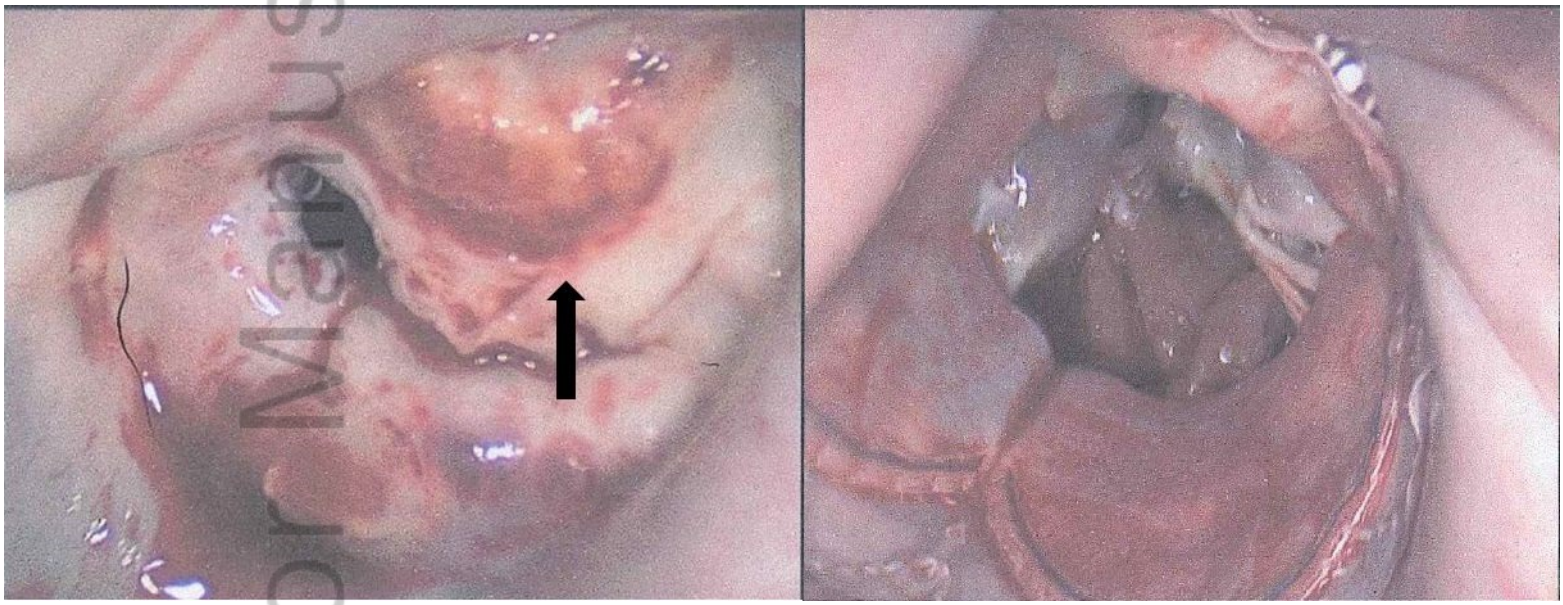

Fig. 3 Intraop Pic.jpg