Case report

Unusual intraoperative fracture of a 21mm Regent® St. Jude Medical (SJM) Valve

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A case of aortic valve replacement (AVR) with St. Jude Medical (SJM) Regent® valve no 21 ,that was fractured intraoperatively and replaced with a SJM Regent® valve no 19 ,is reported here.The fracture point was ring part of the valve that has not been reported yet.

INTRODUCTION

On October 3, 1977, the first St. Jude Medical (SJM) Valve was implanted by Dr. Demetre M Nicoloff. This prosthesis represented a significant advance in clinically available mechanical valve prostheses. In vitro and in vivo data indicated excellent hemodynamics, resistance to wear, and flow patterns predictive of a low incidence of valve related events (VRE)[1,2]. The St. Jude Medical (SJM) mechanical heart valve was the first bileaflet valve with leaflets and orifice all fabricated from pyrolytic carbon[3]. During this time three models of the SJM valve have been utilized in the aortic position, The aortic valve modifications include a change in the sewing ring from the original design renamed the SJM HP (in 1992) where the bulk of the sewing ring was reduced. By using the same size of Regent® (SJM) valve compared to previous versions of these valves a larger effective orifice area could be implanted. latest modification, the Regent® valve, involved a change of the valve housing in which a half millimeter was removed in order to allow implantation of an even larger device, approximately 1½ sizes larger than the original design, resulting in excellent hemodynamics[4] as claimed by the company the superiorities of this generation of SJM valves are:

1 Single digit in vivo pressure gradients even in valve sizes as small as 19mm.
2 Significantly larger effective orifice areas (EOA).
3 Excellent patient-prosthesis match even in small sizes[5].

An unreported complication in using these valves we encountered intraoperatively while using this new generation of St. Jude Medical (SJM) Valve is reported here.

Case report

A 63 years old male,with the complaint of dyspnea on exertion functional class II and the findings listed below was reffered by cardiologist for aortic valve replacement (AVR) and coronary artery bypass graft(CABG).

Angiography: Left anterior descending artery (LAD):cut,Right coronary artery (RCA):cut

Echocardiography: Thick aortic valve, mild aortic regurgitation(AI), moderate aortic stenosis (AS), aortic valve annulus: 20-21mm,

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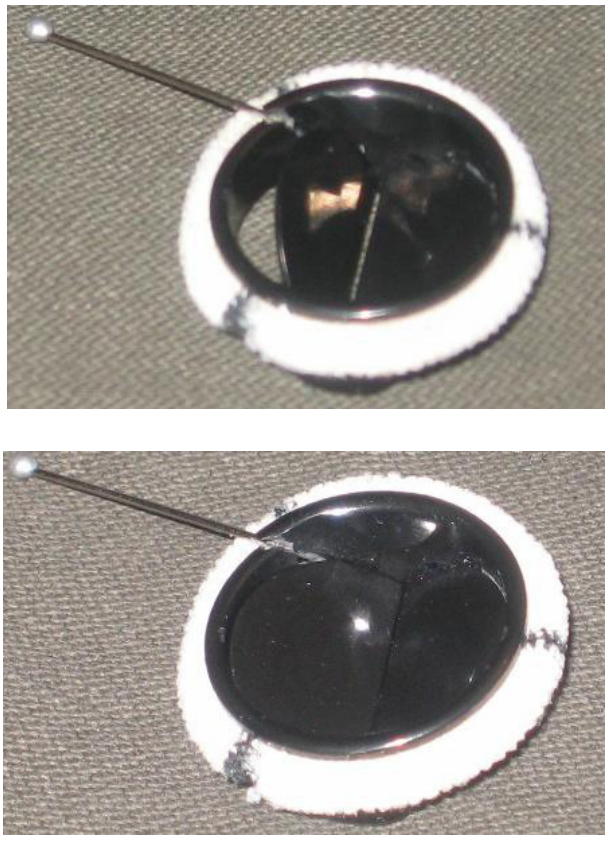
aortic valve area:1.4 cm2, peak and mean pressure gradients of aortic valve: 33 &17 mmHg.

Trivial mitral regurgitaion(MR), apical layered clot, LV enlargement, ejection fraction:35%.

Patient was operated. CABG was done with 2 grafts: Left internal thoracic artery (LIMA) on LAD, and saphenous vein graft (SVG) on PDA. Also AVR was done with a 21mm St. Jude Medical (SJM) Regent® valve. Aortic annulus was calcified, and interrupted Ethibond sutures were used for implantation and fixation of valve.Technique of implantation was as recommended by St. jude company. After closure of aortotomy, a sudden clicky sound from inside the aortic root made us aware that, something must be wrong and so, we opened the aortotomy and we found that the valve is broken from ring part (Figure1). We removed the valve and implanted another valve, but this time a 19 mm St. Jude Medical (SJM) Regent® valve was inserted. The rest of operation was as routine and uneventful.



Figs 1. Showing the fractured valve (top) and fracture site (bottom).

Discussion

Examples of very rare events reported in literature with these valves are: The leaflet fracture of a 19 mm SJM (HP) valve during valve insertion to the calcified small aortic annulus[6], disruption of the silver and non-silver coated sewing cuff of these valves during aortic valve replacement[7], and acute leaflet arrest[8]. Regarding the event we encountered with this new generation of St. Jude Medical (SJM) Valve, excessive pressure imposed on valve after closing aortotomy and forceful implantation of the valve, could have been the reason for this complication. We could not find any report of early ring fracture (leaflets remaining intact) in literature, so we think that this event has been reported for the first time in literature.

The ring thickness of small sized SJM valves are less than other bileaflet valves in the same size. In addition, the SJM valve does not have an orifice stiffening ring like other bileaflet valves. So, direct pressure to the ring from anuulus, and indirect pressure after closing aortotomy may cause valve destruction during insertion or immediately after, when a small additional force is imposed on the valve. The abnormal pressure applied to the direction from one hinge guard to the other can deform the ring resulting in ring fracture. On the other hand, the pressure directed perpendicularly may introduce leaflet escape and cause leaflet destruction[6].

Mechanical bileaflet valves with enhanced inner diameter may offer superior hemodynamic properties in patients with a small aortic annulus[9] and Regent® St. Jude Medical (SJM) Valve is one of the best choices for this challenge in cardiac surgery.

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