

Transcatheter Aortic Valve Implantation (TAVI) – Procedure Associated Complications

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Introduction

The advent of Transcatheter Aortic Valve Implantation (TAVI) has influenced the management of patients with severe aortic stenosis with high or prohibitive risk for standard surgical management. Procedure associated risks with TAVI are substantially different from those related to surgical aortic valve replacement. TAVI associated risks and include vascular injury, stroke, cardiac injury including coronary artery obstruction, cardiac perforation, and heart block that may require permanent pacing. Moreover, paravalvular leak and valve misplacement may complicate TAVI procedures. Understanding of TAVI associated procedural risks may contribute to improved recognition and management and could result in avoidance of such complications.

Vascular Injury

Dissection or perforation of the iliac or femoral arteries can occur during traumatic sheath insertion. Dissection of the descending or the ascending aorta may occur due to sheath or catheter trauma or may complicate aortic balloon valvuloplasty.

Stroke

Periprocedural stroke most frequently results from atheroembolism from the ascending aorta or the aortic arch. Other potential causes of stroke during TAVI procedures may include calcific embolism from the aortic valve (during balloon valvuloplasty), air embolism from left ventricular catheters or cannulation, thromboembolism from catheters, and prolonged hypotension during rapid pacing procedures.

Cardiac Perforation

During a transfemoral retrograde approach, wire or catheter-induced LV perforation can cause cardiac tamponade. Use of a stiff wire with an appropriately shaped curve and a standard J-curved wire may be the best method to avoid perforation of the left ventricle. Rupture of the aortic annulus is a rare complication of aortic balloon valvuloplasty often caused by inappropriate sizing. Rare cases of annular or root rupture with subsequent hemodynamic collapse have been reported during TAVI.

Coronary Artery Obstruction

Displacing of an unusually bulky, calcified native leaflet over a coronary ostium may result in coronary obstruction. Other reasons for coronary ostium obstruction may be the placement of an obstructive portion of the valve or the sealing cuff directly over a coronary ostium.

Heart Block

Conduction disorders such as atrioventricular block are known complications of surgical aortic valve replacement. Similar complication may also occur with TAVI. Atrioventricular block may be the consequence of the pressure applied on the conducting tissues located in close spatial relationship to the implanted valve (subendocardially in the left ventricular outflow tract and interventricular septum).

Paravalvular Leak

Moderately severe or severe paravalvular leaks are likely to

be hemodynamically significant. The initial sign is typically an unexpectedly low aortic diastolic pressure. Rising ventricular filling pressure might lead to adverse hemodynamic consequences including myocardial ischemia, ventricular dysfunction, and cardiogenic shock. It has been demonstrated that moderately severe or severe paravalvular leaks adversely affect long term outcomes.

Valve Misplacement

Valve misplacement may result in a valve extending excessively into the ventricle or the aorta. This complication might be associated with valve embolisation, mitral insufficiency, arrhythmias or aortic injury. Prosthesis embolization immediately during or after deployment is generally the result of a severe error in positioning or ejection of the device by an effective ventricular contraction during deployment (inappropriate rapid pacing).

Conclusion

When aortic stenosis becomes symptomatic, short and intermediate term prognosis is dismal. Transcatheter Aortic Valve Implantation (TAVI) has influenced the management of patients with severe aortic stenosis with high risk for standard surgical management. Improved understanding of these potential complications and risks may improve the procedural safety. This may extend the potential applications of TAVI procedures.

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