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RESEARCH ARTICLE

CORONARY ARTERY ABNORMALITIES IN PATIENTS UNDERGOING TRANSCUTANEOUS AORTIC VALVE REPLACEMENT (TAVI)

*Laith Obaidat, Sakher Sharaa, Ola M Alwaqfi, Yazan Bani Hamad, Moath Marashdeh

Queen Alia Heart Institute, Jordan

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*Corresponding author:
Laith Obaidat

ABSTRACT

Introduction: Transcatheter aortic valve implantation (TAVI) is being increasingly done nowadays in lower risk patients, and these patients will commonly have major coronary abnormalities needing intervention around the time of TAVI. **Objectives:** to identify the prevalence of coronary artery abnormalities in patients undergoing TAVI and management options. **Methods:** this is a retrospective study of patients who underwent TAVI from Jan. 2016 till May 2021 at Queen Alia Military heart institute in Jordan. Demographic data were reviewed including age, co-morbidities, gender, signs and symptoms, echo findings, results of computed tomography or angiography before and during the procedure and complications after the procedure. **Results:** thirty four patients were included, age 50-91 years (average 77.5 years). All patients were symptomatic before TAVI. 7 patient had diabetes, 15 patients had hypertension, three patients had previous coronary artery disease, two patients had chronic kidney disease, three patients had previous malignancy, two patients had atrial fibrillation and one patient had previous pacemaker implanted 9 patient had impaired LV function. all patients had severe aortic stenosis and in six patients there was associated moderate to severe aortic regurgitation. In 10 patients there were significant coronary artery lesions. all patients were stented. the average number of stents was 1.6 Stents per patient. All stents were drug eluting stents (DES). there was associated mild disease in four patients. three patients had previous CABG; two of them were stented. six patients died after the procedure. complications including SVG occlusion which was stented. Pericardial effusion in three patients and in one patient there was tamponade needing drainage. one patient had complete heart block for whom a permanent pacemaker was inserted. femoral artery dissection happened in three patients and all were stented. one patient had 2:1 AV block and one patient had coronary CCU psychosis. **Conclusion:** major coronary abnormalities happen in one thirds of TAVI and these must be addressed during or before TAVI. The timing and best management option should be addressed

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INTRODUCTION

Risk factors for aortic stenosis (AS) have been shown to be similar to that of atherosclerosis (1). Therefore, patients undergoing TAVI simultaneously have associated coronary abnormalities. The prevalence of significant CAD ranges from 25% to 50% in patients with severe AS (2-4). This association between the two conditions is thought to be related to clinical and genetic risk factors shared by both diseases including age, smoking, hypertension and hyperlipidemia (5). Previous reports from the surgical era showed that the prevalence of coronary artery disease in patients with severe aortic stenosis requiring concomitant coronary artery bypass grafting (CABG)

has increased with age. in the 61 to 70 years age range, 40% of patients undergoing aortic valve replacement (AVR) required coronary artery bypass graft whereas patients over the age of 80 years, 65% had concomitant CABG (6,7). the presence of significant coronary artery disease will increase the operative short term mortality in patients undergoing surgical aortic valve replacement (6)

METHODS

This is a retrospective study of patients who underwent TAVI from 2016 till May 2021 at Queen Alia Military heart institute in Jordan.

Demographic data were reviewed including age, comorbidities, gender, signs and symptoms, echo findings, results of CTA or angiography before and during the procedure and complications after the procedure

RESULTS

Thirty four patients were included, age 50-91 years (average 77.5 years). All patients were symptomatic before TAVI. seven patient had diabetes, fifteen patients had hypertension, three patients had previous coronary artery disease, two patients had chronic kidney disease, three patients had previous malignancy, two patients had atrial fibrillation and one patient had previous pacemaker implanted. Nine patients had impaired LV function. all patients had severe aortic stenosis and in six patients there was associated moderate to severe aortic regurgitation all procedures were done under conscious sedation via right and left femoral arterial access. sometimes radial access was used also aortic CT scan was done in all patients before the procedure to assess the annulus size. Coronary catheterization was done in all patients either few months before or during the procedure the aortic valve used had the average size of 28 millimetres (range between 23 and 34 mm). In 10 patients there were significant coronary artery lesions. all patients were stented. the average number of stents was 1.6 Stents per patient. All stents were drug eluting stents (DES). There was associated mild disease in four patients. three patients had previous CABG; two of them were stented. Six patients died after the procedure. complications include SVG occlusion which was stented. Pericardial effusion in three patients and in one patient there was tamponade needing drainage. one patient had complete heart block for whom a permanent pacemaker was inserted. femoral artery dissection happened in three patients and all were stented. one patient had 2:1 AV block and one patient had coronary CCU psychosis.

DISCUSSION

During TAVI procedure, there is a risk of causing coronary ischemia and hemodynamic instability in patients with significant atherosclerosis especially during rapid pacing and inflation of aortic balloon. Although thousands of TAVI cases have been done around the world and there were significant associated coronary artery disease in these cases, there was no consensus on the best management option for these cases regarding the timing and best treatment modality. The most widely adopted approach is to perform percutaneous coronary intervention (PCI) before implantation of the valve. Fifty to seventy percent of this recommendation is based on small, non-randomized, retrospective studies which showed that untackled coronary artery diseased patients have poorer 10-year survival rates than those undergoing revascularization or not requiring coronary artery bypass grafting (CABG) (8,9). The 2017 European guidelines recommend myocardial revascularization in the presence of valvular heart disease as a class one recommendation in the presence of >70% stenosis and class 2a for stenosis between 50 and 70% (10). Significant numbers of patients undergoing TAVR also have prior history of myocardial infarction (MI) (12% to 51%) and prior percutaneous (16% to 34%) or surgical revascularization (14% to 48%) (11). In our study 29% of patients had significant coronary stenosis of 50% or more and all of them were stented as this is our policy. In other studies the reported PCI rate is

much less common (11-13%)(11,12). Some advocate to do coronary intervention before TAVI. the advantage of this approach is that you minimize the risk of contrast nephropathy and risk of myocardial under perfusion and hemodynamic instability during the rapid pacing and aortic balloon inflation. the disadvantages of this procedure is that patients will be on dual anti-plated treatment after PCI and this will cause an increase risk of bleeding on subsequent TAVI and the other risk is the safety of doing coronary intervention in the presence of severe aortic stenosis (13-15). Others advocate to do coronary intervention and TAVI at the same time. The advantages of this approach is that you treat both lesions at the same time thus decreasing the potential risk of arterial injury, bleeding and reducing the risk of causing coronary ischemia and hemodynamic instability while performing TAVI. The disadvantages from this approach is there the increased exposure to contrast to large amount of contrast and increasing the procedural timing (16,17). The third approach is doing TAVI first and then doing coronary intervention at a later date. in this approach there is a concern of access issues, the valve struts could interfere with cannulation of coronaries and catheter manipulation can potentially dislodge the valve (18,19). The ideal interval remains undefined and again should be individualized on the basis of the specific clinical situation. Dual antiplatelet therapy in patients with DES is not an issue in case of transfemoral TAVR. However, it has implications for patients being randomized to the surgical aortic valve replacement (SAVR) arm in future studies or non-transfemoral TAVR where patients are placed in the studies after DES has already been implanted.

CONCLUSION

Major coronary abnormalities happen in one thirds of TAVI and these must be addressed during or before TAVI. The timing and best management option should be addressed

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