Case Report
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New approach to one-stop hybrid valve/PCI operation

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Abstract: Ambition to perform more esthetic and less traumatic operations leads the surgeons to less painfulness, less blood loss and probability of infection and finally to their patients fast recovery and early returning to physical activity. Also, minimally invasive operations have been promoted by hybrid procedures. We would like to present you our new approach in a future of which we deeply believe.

Keywords: hybrid valve/PCI, minimally invasive valve operation, bioprosthetic mitral valve, LAD stenting, single-stage hybrid operation

Introduction

For a long period two different pathologies- valve and coronary artery diseases met in one patient were treated via sternotomy incision. But it is fact that complex heart operations through this approach possess high mortality. Newly introduced minimally invasive technologies allow to avoid sternotomy incision. When compared with a standard median sternotomy potential benefits of minimally invasive valve surgery include less trauma, less pain and blood loss, less infection and antibiotic use and faster recovery time leading to improved outcomes [1-3]. But in the presence of concomitant coronary artery disease accomplishment of such incision requires stenting procedure before or after the valve operation. Unfortunately, this two-staged treatment option does not create a patient satisfaction because of two separate preparations for two different procedures performed in two different days and therefore utilizes a lot of resources of the hospital. Also, many questions remain unanswered about hybrid valve/PCI procedures, including the optimal order and timing for the procedures [4]. Some surgeons hypothesize that 1-stop approach is more convenient for the patient and more cost effective than a 2-stage approach [5]. But this method requires a high level of coordination between the cardiologist and cardiac surgeon and also demands the presence of a "hybrid" operating room [4]. Although, some groups have observed an increased incidence of acute kidney injury when both PCI and valve procedure are performed on the same day and recommended of creating a period of three weeks between the PCI and valve operation [6, 7]. Also some problems with hemorrhagic complications are emphasized by some authors. Despite this, some surgeons achieved very promising results with single stage valve/PCI procedures for aortic valve [5], as well as for mitral valve (8). The latter performed their procedures in such general manner: PCI to non-LAD lesion and subsequent minimally invasive mitral valve operation. They included both non-reoperative and reoperative patients. But unfortunately, there are only few reports of single-stage (one-stop) hybrid valve/PCI operations in the literature.

We would like to present our case of non-reoperative hybrid valve/PCI operation with the stenting of LAD and oppositely different order of procedures than usually used in such operations.

Figure 1. Hybrid operating room of Baku heart center.

Figure 2. Preparation of patient for hybrid valve/PCI procedure.

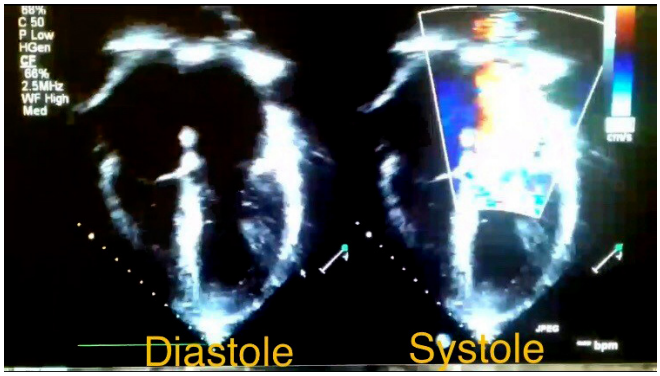

Figure 3. Transthoracic echocardiography before operation. IV degree mitral insufficiency is seen in systole.

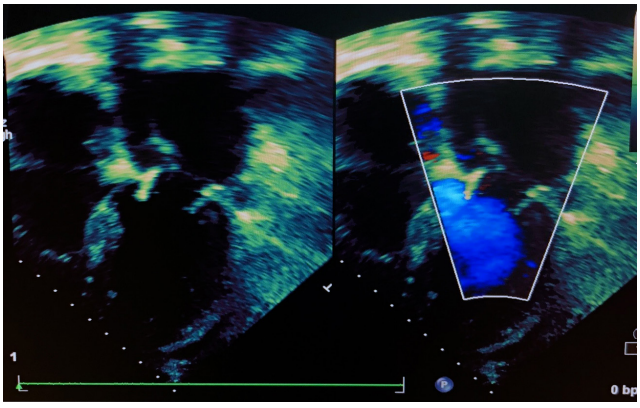

Figure 4. Transthoracic echocardiography after hybrid operation. Bioprosthetic valve is well functioning.

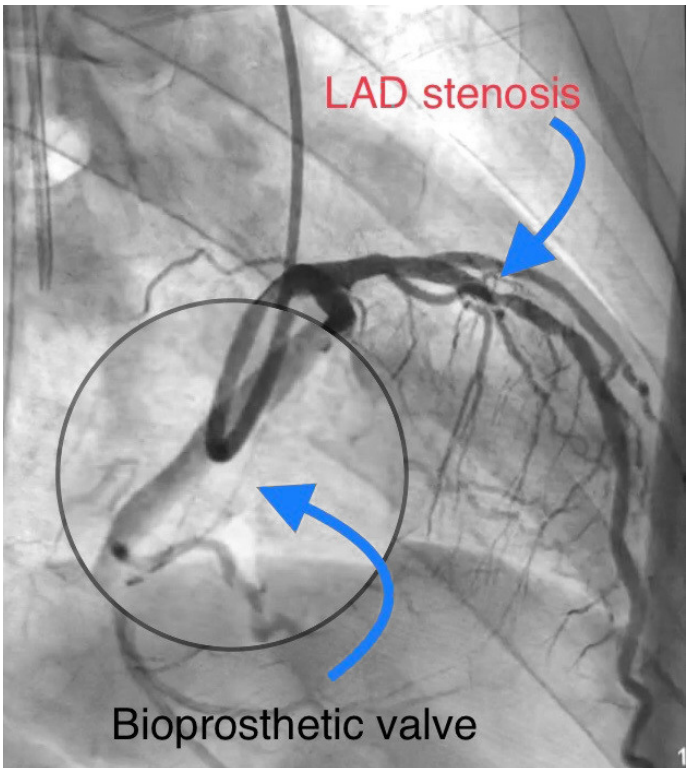

Figure 5. Coronary angiography. LAD stenosis before stenting. Already implanted bioprosthetic valve is also seen.

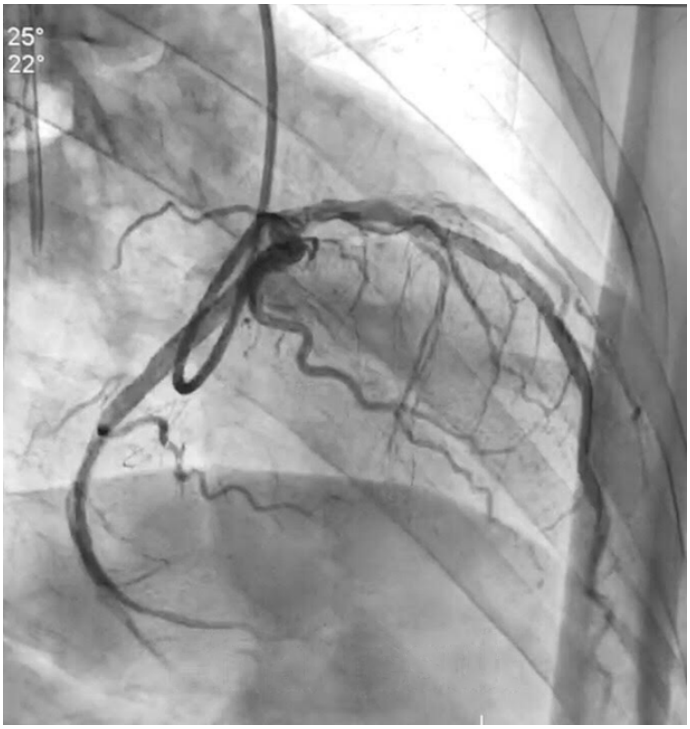

Figure 6. Coronary angiography. LAD after successful stenting.

Case Presentation

62-year-old male patient was admitted to our hospital complaining of shortness of breath and non-irradiating retrosternal pain during effort. These complains started abruptly since one week. Transthoracic echocardiography revealed mitral valve anterior leaflet prolapsus owing to chordal rupture- flail AML and IV degree of mitral insufficiency with preserved ejection fraction (Figure 3). Cardiac catheterization revealed mid-LAD stenosis of 80%. The patient's laboratory analysis and other investigations was unremarkable. Surgical consensus was one-stop hybrid procedure on hybrid room (Fig. 1).

Procedural technique: Patient was placed in the supine position and underwent intubation with a double-lumen endotracheal tube and a roll was placed underneath the right scapula (Fig. 2). A transesophageal echocardiogram probe was placed intraoperatively to evaluate the mitral valve and to assess the postoperative results. 3 cm incision was made in the right inguinal fold and femoral vessels are prepared. Then 10 cm skin incision was made in the IV intercostal space and anterior thoracotomy was done with right lung deflated. Pericardium was opened. After full heparinization right femoral vessels was cannulated. Aortic root cannula and superior venous cannula were placed via thoracotomy incision. Once on cardiopulmonary bypass a patient was cooled, ascending aorta was cross-clamped and the heart arrested. The mitral valve was accessed through the left atriotomy incision and found to be not amenable for repair. Mitral replacement with Hancock II bioprosthetic heart valve (Medtronic, Minneapolis, MN) was carried out in the standard fashion (Fig. 4). 3-0 polypropylene suture was used to close the left atrium. Cardiopulmonary bypass had been discontinued. After decannulation purse-string sutures were tied, only 1/2 of protamine administered and the femoral vessels were repaired. A single chest tube was placed to the pleural space. The thoracotomy incision was closed in the routine manner. Surgical team finished their part of operation and 2-nd part of hybrid procedure started. 300 mg clopidogrel was given via nasogastric tube. LAD was successfully stented via left femoral artery enter (Fig. 5, 6). The patient received clopidogrel 75 mg starting on postoperative day 1. Aortic cross clamp time was 45 min, cardio-pulmonary bypass time was 63 min. Total blood loss composed 450 ml. A patient extubated in 12 hours and discharged home on postoperative day 7.

Discussion

Our case of hybrid valve/PCI has two different points: at first we used oppositely different order than usually used in such procedures and second we used a stenting of LAD- the vessel which is believed to be more convenient to be bypassed by LIMA.

Generally, in single-stage valve/PCI procedures in non-re-operative patient klopidogrel is given before induction of anesthesia. Then, incision for valve operation (thoracotomy) is completed and PCI is performed (before 5000 unit of heparin is administered). Hereafter surgery of the valve is accomplished (before full dose of heparin is administered). We think that performing of procedure in such order is more laborious unless coronary artery stenosis is critical. Obviously, stenting of coronary arteries as first procedure is considered in order to avoid the problems associated with inadequate cardiac protection during the valvular part of operation. We think that in situations when coronary artery stenosis is less than 95% (so non-critical) valvular part could be performed first without compromising the heart muscle viability. This could allow to obviate any mechanical traction damage to the stent itself, especially in proximal and mid portion of right coronary artery. In our case the LAD stenosis was not more than 80%. We did not consider surgery to this lesion.

Conclusion

Usage of one-stop valve → PCI approach is possible in case of non-critical coronary artery stenosis (when there is no risk of reduction of quality of myocardial protection). We consider hybrid PCI → valve order in one-stop procedures in patients with critically stenotic coronary arteries and in staged hybrid procedures when patient with valvular disease comes with acute coronary syndrome. Undoubtedly, for wide use of our approach future randomized trials are required.

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