

OFF PUMP TOTAL ARTERIAL COMPLETE CORONARY REVASCULARIZATION IN PATIENT WITH PORCELAIN AORTA

Haitham Altaani¹, Safwan Alfwares², Saker Ma. Ayaa³,
Saker Alsharee⁴, Mahmoud Obeidate⁵

¹⁻⁵ Department of cardiac surgery, Queen Alia Heart institute, Royal Medical Services, Amman, Jordan

Address for Correspondence:

Haitham Altaani,

Department of cardiac surgery, Queen Alia Heart institute, Royal Medical Services, Amman, Jordan

E-Mail: hanfahad05@gmail.com

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Contribution

HA conceived idea, did literature review and final drafting. SA SM reviewed case report. MO helped in acquiring photographs. All authors contributed significantly to the submitted manuscript.

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ABSTRACT

The presence of calcification of the ascending aorta carries high risk of cerebrovascular thromboembolism. The risk increases in heavily calcified aorta called porcelain or unclampable aorta.¹ The incidence is about 14% of ascending aorta calcification in patients who undergo cardiac surgery. Similarly the incidence of porcelain or unclampable aorta is about 0.4% to 5.4%. A strong correlation between atheroembolism and atherosclerosis of the ascending aorta had been found at autopsy.^{1,2} Therefore difficulty is found in performing coronary revascularization in such patients.

Key Words: Diabetes, Angina, Stroke, Porcelain Aorta

INTRODUCTION

Risk of thromboembolism increases with calcification of aorta or peripheral arterial disease. The risk is even more if patient is having concomitant coronary artery disease because intervention in such patients is difficult with thromboembolism and other complications.

CASE REPORT

We report a 78 years old male who was referred to cardiac surgery department for coronary artery bypass grafting for three vessel disease and angina (III-IV). The patient was diabetic on oral hypoglycemic agents, hypertensive on treatment, heavy smoker, had clinical features of obstructive lung disease and pulmonary function test documented obstructive features. He had peripheral vascular disease, manifested as occluded both iliac arteries.

Coronary angiography showed triple vessel disease, left anterior descending artery had proximal critical stenosis, circumflex had 80% pre major obtuse marginal branch stenosis and right coronary artery had proximal total occlusion with good retrograde filling from left system. Trans thoracic 2D echo revealed ejection fraction of 45% without any valve pathology.

The procedure was performed using left internal mammary artery and left radial artery to do four grafts in off pump (aorta non touch technique). After he was anesthetized and prepared for surgery by scrubbing and towel, and

Figure 1: Exposure of the Calcified Aorta

midsternotomy incision was performed, the first finding was that the lungs were badly diseased and emphysematous, the left internal mammary artery was harvested in skeletonized method.

The pericardium was opened and suspended, we inspected and palpated aorta for aortic cannulation, it was found that the whole aorta was very thick due to heavy calcification. There was no site for cannulation of the aorta or even to apply cross clamp or partial clamp to do the proximal anastomosis, so we decided to do the procedure without using the cardiopulmonary bypass. (Figure 1)

We did not harvest right mammary artery because of the underlying obstructive lung disease, presence of diabetes and age of the patient in addition to osteoporotic sterna bone, these were factors that may affect his pulmonary function and may increase the risk of sternal dehiscence if the other mammary artery was harvested, so we decided to harvest the left radial artery.

After performing Allen test, radial artery was found to be non-dominant. The artery was harvested by open method, the wound closed in layers and drain was inserted. The patient was already heparinized, mammary artery (LIMA) was opened longitudinally in the ventral surface at the level of left atrial appendage. The proximal end of the radial artery was anastomized to LIMA in end to side manner. (Figure 2 and 3) Then radial artery was anastomized to first and the

Figure 2: Y Shape Anastomosis between Left Internal Mammary and Left Radial Artery**Figure3: Flow in Both Radial Artery and LIMA after Completion of Y Anastomosis**

second obtuse marginal arteries and posterior descending branch of the right coronary artery in sequential way. LIMA was anastomized to left anterior descending artery, the flow was checked at the end of each anastomosis to check filling of coronary. (Figure 4)

The procedure performed using the octopus stabilizer without using the cardiopulmonary bypass. The heart tolerated the procedure without any hemodynamic or rhythm disturbances. Protamine sulfate administered at the end of the procedure. His postoperative period was uneventful. He was extubated after 4 hours and discharged from the hospital after 5 days of operation. Seen in postoperative clinic after 3 week of operation without any complication.

DISCUSSION

The presence of calcification of the ascending aorta carries high risk of cerebrovascular thromboembolism, the risk of thromboembolism can occur during ascending aorta cannulation, application of cross clamp or partial cross clamp while doing proximal anastomosis. The risk increases if the aorta is heavily calcified which is called porcelaine or unclampable aorta.¹

The frequency of ascending aorta calcification in patients who undergo cardiac surgery have been reported to be between 14% and 29% in recent studies. The incidence of

Figure 4: The End of the Procedure Showing LIMA to LAD (in the right), Radial Artery to OM1, and to RCA (to the left)

porcelain or unclampable aorta is about 0.4% to 5.4% according to different series. A strong correlation between atheroembolism and atherosclerosis of the ascending aorta was documented at autopsy.^{1,2}

The diagnosis of atherosclerosis of ascending aorta can be made preoperatively during cardiac catheterization, computed tomography and TEE. It can be diagnosed intra operatively by epic aortic ultrasound, intra operative TEE or most commonly by gentle palpation of the aorta.

The use epi aortic ultrasound and intra operative TEE can minimize the risk of cerebral thromboembolism because it shows the areas free of calcification which can be suitable for cannulation. Many surgical options can be used for either cannulation or grafting of the coronaries and conduit used³⁻⁵ for cannulation, aortic cannula can be inserted in ascending aorta by using suitable site free of calcification. It can also be inserted very distally or axillary or femoral cannulation can be done which was difficult in our case because of peripheral vascular disease.³⁻⁶

Distal anastomosis can be performed using cardiopulmonary bypass on beating heart if arterial cannula is inserted, or in off pump manner if it is impossible to insert the cannula.^{5,6} Left internal mammary artery is the best conduit to be used for left anterior descending artery. If great saphenous vein is used as conduit for other coronaries it can be anastomosed proximally to axillary artery or to a descending aorta.^{6,7}

Some use only off pump LIMA to LAD as first step of hybrid procedure before going to next step of percutaneous intervention (PCI). Others use both mammaries with LIMA to LAD and right internal mammary artery (RIMA) to right coronary or to obtuse marginal artery. Sometimes RIMA to LIMA in Y configuration can be anastomosed, doing the procedure in off pump manner, which was difficult in our case because badly diseased lungs and osteoporotic sternal bone.^{6,7}

In our case we use the left radial artery and the left mammary artery which were anastomosed to each other in 'Y' configuration, the radial artery used for circumflex artery and right coronary artery grafting in sequential way, the

LIMA was used for LAD grafting.^{6,7} We did complete arterial revascularization by aorta non touch technique; the risk of cerebrovascular accident was minimized.

CONCLUSION

Different strategies to deal with heavily calcified aorta during coronary artery bypass grafting can be applied. Total revascularization in off pump (aorta non touch technique) manner using arterial conduits is good alternative.

REFERENCES

1. Sirin G, Sarkislali K, Konakci M, Demirsoy E. Extraanatomical coronary artery bypasses grafting in patients with severely atherosclerotic (Porcelain) aorta. *J Cardiothorac Surg* 2013;8:86.
2. Gaudino M, Glioca F, Alessandrini F, Luciani N, Cellini C, Pragliola C. The unclampable ascending aorta in coronary artery bypasses patients: a surgical challenge of increasing frequency. *Circulation* 2000;102:1497-502.
3. Grenon SM, Lachapelle K, Marcil M, Omeroglu A, Genest J, de Varennes B. Surgical strategies for severe calcifications of the aorta (porcelain aorta) in two patients with homozygous familial hypercholesterolemia. *Can J Cardiol* 2007;23:1159-61.
4. Yamaguchi A, Adachi H, Tanaka M, Ino T. Efficacy of intraoperative epi-aortic ultrasound scanning for preventing of stroke after coronary bypass surgery. *Ann Thorac Cardiovasc Surg* 2009;15:98-104.
5. Tabaei AS, Rostami A, Soheila A, Khamoushi AJ. Coronary artery bypasses graft in porcelain aorta. *Iran Cardiovas Res J* 2008;1:245-8.
6. Leyh RG, Bartels C, Nötzold A, Sievers HH. Management of porcelain aorta during coronary artery bypass grafting. *Ann Thorac Surg* 1999;67:986-8.
7. Adesanya TM, Kilic A. Dealing with a porcelain aorta during coronary artery bypass grafting. *Case Rep Surg* 2014;2014:582425.