Ascending Aortic Intraaortic Balloon Pump Insertion

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Abstract

Intraaortic balloon pumping (IABP) is a precious technique, used in the treatment of low cardiac output developed secondarily to depression of myocardial performance. Today IABP's success rate is high and it is a reliable technique if the decision is on time. In this study, we aimed to report our case under the light of the literature. Our patient developed perioperative low cardiac output syndrome during coronary artery bypass grafting and underwent intraaortic balloon pump insertion into ascending aorta whose both external iliac arteries were occluded.

TRANSTHORACIC INTRAARTIC BALLOON PUMP INSERTION IS AN EFFECTIVE METHOD TO PROVIDE AORTIC COUNTERPULSATION IN POSTCARDIOTOMY FAILURE PATIENTS IN WHOM OTHER METHODS OF BALLOON SUPPORT ARE NOT FEASIBLE.

INTRODUCTION

Intraaortic balloon pump (IABP) is being used in cardiac surgery in an increased ratio(1). Choice of a route of cannulation for intraaortic balloon counter pulsation during cardiopulmonary bypass is related to accessibility. In those patients in whom it is impossible to pass the IABP into the common femoral artery, ascending aortic cannulation is a rapid and direct method of insertion(2).

CASE PRESENTATION

Our case was a 69-year-old male. He was suffering from chest pain for 2 months. After the investigations related with this symptom the diagnosis of coronary artery disease was put and surgical approach was indicated. Therefore he was admitted to our clinic. Her coronary angiography revealed subsequent and long stenotic lesions in left anterior descending artery and 2nd obtuse marginal branch of circumflex artery. His transthoracic echocardiography showed mild tricuspid insufficiency and pulmonary arterial pressure was measured as 30 mmHg. Left ventricular ejection fraction was 40%. Blood pressure values were in the normal range. The patient had no significant changes in standard biochemical findings on admission. He was a smoker. The cholesterol and triglyceride levels were within the high range.

Co-existing diseases of our case were chronic obstructive lung disease, stenotic lesions of 70% in the left and 20% in the right renal arteries, as well as total occlusion of both external iliac arteries (Figures 1 and 2).
He was operated under endotracheal general anesthesia and in supine position. Following a median sternotomy, pericardium was opened longitudinally. After heparinization, extra-corporeal circulation was established between the venae cavae and the ascending aorta. A cross clamp was placed on aorta and by antegrade intermittent isothermic blood cardioplegia from aortic root, cardiac arrest was established. Hypothermia was moderate (28ºC).

Aortoconary bypass was established by using the proximal segment of the left and right great saphenous veins prepared as graft. During weaning from cardiopulmonary bypass (CPB) low cardiac output was developed. Therefore, CPB was reestablished and effort was made to repair hemodynamic parameters. Insertion of IABP through ascending aorta was then planned. We modified the technique of Burack to avoid an additional operation while removing the balloon. Accordingly, side-biting clamp was placed on ascending aorta and after aortotomy, an 8 mm Dacron tubular prosthetic vascular graft was anastomosed in an end-to-side manner. Through this graft, IABP was introduced down distal to left subclavian artery. To avoid displacement of catheter, we applied pressure on the left subclavian artery as recommended by Santini. By this technique, we prevented the catheter from being inserted into left subclavian artery. Afterwards, the position of the balloon was readjusted while controlling the descending aorta manually (Figure 3).

After achievement of restoration of hemodynamic parameters, the patient was weaned from CPB and sternotomy was closed by steel wire. IABP was extended out through lower edge of the sternal incision, thus attaching to the console (Figure 4). By this way, when the need for IABP ended, removal of the catheter by exploring the region where it protruded beneath the sternum and suturing the tip of the graft were carried out easily.

**DISCUSSION**

In a selected group of patients requiring intraaortic balloon counterpulsation, the use of the transthoracic IABP is a reasonable second choice. When intraoperative balloon pump support is needed for patients who cannot be weaned
from cardiopulmonary bypass and when the balloon catheter will not pass retrograde into the aorta from the femoral artery, the catheter must be inserted into the ascending aorta directly(4).

The technique of Burack et al for transthoracic intraaortic balloon pump insertion can be done in a rapid and atraumatic fashion(5). A short prosthetic graft is used, and intraaortic balloon pump removal does not require resternotomy. This technique is a safe alternative in postcardiotomy failure patients with inadequate peripheral arterial access.

In study of Santini et al; a simple technique is described to achieve correct transthoracic intraaortic balloon pump catheter insertion and positioning without the need for special equipment(6). We used it in our application.

In study of Meldrum-Hanna et al; eight patients are described in whom ascending aortic IABP cannulation was undertaken to enable weaning from cardiopulmonary bypass after cardiac surgical procedures. The following problems were encountered: graft infection, aberrant cannulation of the left subclavian artery, left coronary artery embolism, and inability to close the sternum due to mechanical tamponade(2). Moreover, besides the risk for impairment of mesenteric and renal arterial circulation, these patients must be closely followed for development of mediastinitis as a rare complication.

In conclusion; transaortic balloon catheter insertion is an effective method to provide aortic counterpulsation when the conventional retrograde femoral route cannot be used, usually due to severe aortoiliac disease(2). Although considerable morbidity and mortality are associated with ascending aortic cannulation, it is simple, fast, and effective, and should be considered for all patients requiring postoperative IABP support in whom peripheral vascular disease makes access difficult(2).

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