

Prevention of Possible Embolus Following Intra Aortic Balloon Counterpulsation (IABP) Insertion by Transesophageal Echocardiography (TEE)

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Abstract: Severe atherosclerosis of the descending aorta is directly related to atheroembolic events. Transesophageal echocardiography (TEE) is a sensitive technique for evaluating such atheroma plaques of the thoracic aorta which may predict the risk of emboli. We describe a patient with severe intraluminal aortic atherosclerotic plaques detected by TEE while positioning an Intraaortic Balloon Counterpulsation (IABP) during coronary artery by-pass grafting. IABP was re-positioned to prevent an emboli formation with the aid of TEE. TEE should be use to visualize descending aorta prior to IABP insertion.

Key words:Intraaortic balloon counterpulsation, atheroembolic events, severe atherosclerosis, transesophageal echocardiography, embolus, atherosclerotic plaques

INTRODUCTION

The use of Intraaortic Balloon Pump (IABP) has been well established and has been an effective treatment in perioperative support of surgical patients with severe left ventricular dysfunction. More recently, it works as a circulatory support during the high-risk coronary angioplasty procedures. It has been estimated that 2-12% of cardiac surgery patients require IABP support during perioperative period. Although most ischemic complications are owing to impairment of arterial inflow, severe atherosclerotic diseases of the descending thoracic aorta may produce embolization of atherosclerotic material that can cause toe ischemia and eventually require amputation. Embolus may also reach the renal and visceral arteries to produce ischemia of these organs. The presence of aortic atherosclerosis can be determined by echocardiography and if present, insertion through the axillary artery considered^[1].

Transesophageal Echocardiography (TEE) has provided an accurate window for the evaluation of diseases of the thoracic aorta. Experience with TEE has led to an increased recognition of atherosclerosis of the thoracic aorta as a source of cerebral and systemic embolism. Certain features of aortic plaque morphology detected by TEE may prove to have prognostic and therapeutic significance. The intraoperative assessment of thoracic aortic atherosclerosis by TEE may guide modifications in surgical techniques and aortic manipulations that reduce the incidence of perioperative neurologic complications^[2].

Here we describe a patient with poor ventricular

function and who presented an intramural aortic atherosclerotic debris detected by transesophageal echocardiography in the thoracic aorta during coronary by pass surgery following IABP positioning. TEE helped us to reposition of IABP and possibly prevent an emboli due to IABP operation.

Case report : A 78 year-old male patient without diabetes was admitted for elective coronary artery bypass grafting for unstable angina with angiographic evidence of severe coronary artery disease. Coronary artery catheterization revealed stenosis in all three coronary vessels, left ventricular Ejection Fraction (EF) of 30% with apical akinesis, and mild mitral regurgitation. Anesthesia was induced with standart protocol. Cardiopulmonary by-pass was achieved via aorta-atrial cannulation and the patient was cooled down to 32°C. Three vessel by-pass grafting was performed during ischemic arrest achieved with hypothermic blood cardioplegia. Since the weaning from cardiopulmonary by-pass despite inotropic support could not be possible, an IABP catheter was advanced via right femoral artery percutaneously. TEE was used to guide the position of the balloon catheter tip just distal to the left subclavian artery. We realised a marked irregular mass and disruption of the intimal surface of the thoracic aorta with overlying shaggy echogenic material on the intimal surface into the aortic lumen (Fig. 1). The ballon catheter was pulled back 3-4 cm from subclavian artery origin to a healthy area before operating IABP (Fig 2).

The patient was weaned from cardiopulmonary-by-pass and admitted to intensive care unit without any difficulty. The early and mid-term post-operative follow-

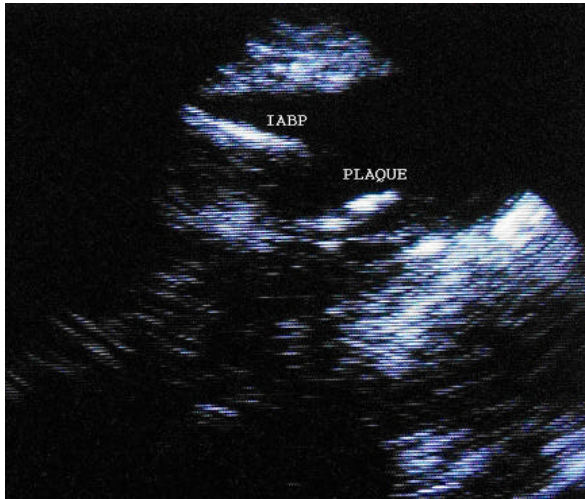


Fig. 1 : We realised a marked irregular mass and disruption of the intimal surface of the thoracic aorta

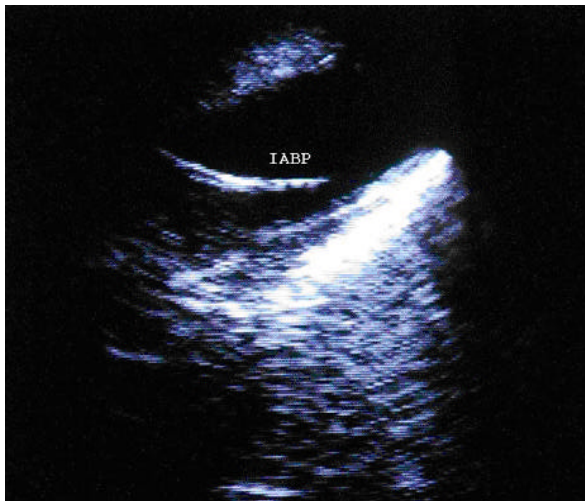


Fig. 2: The balloon catheter was pulled back 3-4 cm from subclavian artery origin to a healthy area

ups were uneventful and the patient discharged from the hospital.

DISCUSSION

The use of IABC is indicated in various conditions. It is mainly used to support the circulation peri-operatively (for weaning from by-pass after cardiac surgery), in patients with cardiogenic shock, and in those with ischaemic left ventricular failure or intractable angina. Its use is increasing in patients undergoing high-risk Percutaneous Coronary Intervention (PCI)^[3] and has been

demonstrated as having a role in cardiac patients undergoing non-cardiac surgery^[4]. It has proved to be very useful in stabilizing and supporting a failing heart. Its use, however, may lead to major complications, especially in patients with preexisting peripheral vascular disease. The application of TEE in the perioperative period helps not only detect IABP complication early but also verify of balloon catheter position quickly^[5].

Severe atherosclerosis of the descending aorta was directly related to atheroembolic events and most strongly associated with peripheral vascular disease and advanced age. Patients with atherosclerotic debris in the descending aorta and arch detected using TEE are at particularly high risk of embolus during cardiac surgery, whereas patients with a lesser degree of atherosclerosis are at lower risks. There have been several reports on the utility of TEE in predicting embolus in older patients undergoing cardiac surgery^[6,7]. Invasive aortic procedures, such as catheterization or IABP placement may dislodge or rupture an atheroma and result in stroke, transient ischemic attack, or peripheral embolization. TEE is a sensitive technique for evaluating such atheroma plaques. Also the role of epiaortic ultrasonography (imaging of the ascending aorta by direct application of a sterile sheathed transducer) in the intraoperative evaluation of aortic atherosclerosis and its value in guiding the modification of surgical techniques to reduce stroke has been studied^[8]. Because an epicardial probe can not be maintained in an imaging position throughout the operation, it is difficult to use this technique as a continuous monitor of cardiac performance. In contrast, TEE provides a noninvasive, continuous monitor of cardiac function that does not require entry into the sterile field or interruption of the surgical procedure.

Reported complication rates of the intra-aortic balloon pump vary between 12.9 and 29% and average approximately 20%. Life-threatening complications are rare. Leg ischemia is by far the most^[9] common complication (incidence 9–25 percent patients). Our unpublished data shows a correlation of 2.2 % between stroke and IABP use in 304 patients.

We realized atherosclerotic masses which could easily break off and cause an emboli just distal to the subclavian artery and pull back the tip of balloon catheter before counterpulsation. Thus we can recommend TEE in any case which IABP will be used.

When atherosclerotic aortic debris is detected, especially if the debris is mobile, substituting brachial for femoral catheterization and avoiding placement of an intraaortic balloon pump may reduce the risk of embolism.

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