'The importance of peripheral pulses following cardiac surgery'

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Abstract

The sudden disappearance of peripheral pulse tracing in the post cardiopulmonary bypass period can be an ominous sign of a catastrophic complication in cardiac surgery. It needs to be recognized at the earliest and immediate action should be taken to avoid serious outcome. Here we have described a case of Bentall's procedure in which the right radial arterial tracing disappeared about 60 minutes post-operatively due to aortic dissection, but was repaired successfully because of early detection. We conclude that following cardiac surgery, one must closely monitor the peripheral pulses. The decrease in amplitude or disappearance of peripheral pulse should be taken seriously. It should be investigated immediately and prompt treatment should be done to save life. ***(Ind J Thorac Cardiovasc Surg, 2008; 24: 18-21)***

Key words: Cardiopulmonary bypass, Cardiac surgery, Echocardiography.

Introduction

The sudden disappearance of peripheral pulse tracing in the post cardiopulmonary bypass period can be an ominous sign of a catastrophic complication in cardiac surgery. It can turn fatal. It should be recognized at earliest and immediate action should be taken to avoid a serious outcome.

Case report

A sixty-five year old woman, who was a known case of ascending aortic aneurysm with severe aortic regurgitation, was admitted in our hospital. She was hypertensive for the last 10 years. A chest radiogram showed mediastinal widening and normal lung field. The echocardiography showed dilated aortic root with dilated ascending aorta and thin walled aortic valve with ejection fraction of 35%. A duplex colour Doppler study showed normal flow in carotids, subclavian and vertebral arteries and coronary angiography showed normal coronaries. A contrast computerized radiography revealed aneurysm of ascending aorta, size 5.8 cm. there was no dissection of aorta. The Bentall's procedure was planned.

An informed consent was taken after explaining the risk of surgery. The patient was premedicated with tablets ranitidine 150 mg and Lorazepam 3 mg, one hour before surgery. An intravenous line was secured by cannulating the right cubital vein with 16 G canula under local anaesthesia. The right radial artery was canulated under local anaesthesia. After establishing routine monitoring (radial arterial pressure, ECG, peripheral saturation, bispetral index) patient was induced with Injections of 1 milligram midazolam, 150 milligram thiopentone, 300 microgram fentanyl, 50 milligram rocuronium and intubated with 7.5 millimeter Portex cuffed oral endotracheal tube. The right internal jugular was canulated with 7.5 Fr triple lumen catheter for administering drugs, fluids and monitoring central venous pressure. The left femoral artery was also canulated for invasive blood pressure measurement. Intraoperatively trans-esophageal echocardiography (TEE) confirmed preoperative finding of large aneurysm with severe aortic regurgitation without any dissection of aorta. After sternotomy, heparin 4 mg/kg was given to the patient to keep activated clotting time above 500

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seconds. Aortic and bicaval cannulation were done and cardiopulmonary bypass was initiated. The cold blood cardioplegia was given directly through coronary ostia after clamping the aorta. The patient's body temperature was brought down till 28^{0}C. The Bentall's procedure was carried out on arrested heart with size 23 Saint Jude Medical aortic-valved composite graft, Minnesota, USA. The aorta was transected, aortic valve was excised. Right and left coronary buttons were mobilized. The composite graft was implanted with interrupted suture and the coronary buttons were implanted into this graft. The distal end of graft anastomosed to the aorta. After that aortic cross clamp was removed. The total circulatory arrest was not required. After completing the procedure patient was rewarmed to 36 ^{0}C and came off from cardiopulmonary bypass (CPB) with inotropic support of Dopamine 5 µgm/kg/min. The total CPB time was 95 minutes and cross clamp time was 82 minutes. Repeat TEE showed normally functioning aortic valve without any evidence of dissection. Patient was shifted to the intensive care unit (ICU) for elective ventilation and monitoring. After about 1 hour, we noticed that the amplitude of right radial tracing gradually decreased and became totally absent, although we could aspirate blood. Soon the radial and brachial pulses became nonpulsatile on right side. A colour Doppler study showed low nonpulsatile flow in right subclavian and axillary arteries. The computed tomography (CT scan) revealed dissecting flap in arch of aorta distal to the site of anastomosis. It was at the origin of innominate artery, extending to both carotid origins, thus causing narrowing of true lumen with more severity on right side (Fig. 1). The dissection was seen in the mid aortic arch with dissecting flap extending into left common carotid and proximal innominate (Fig. 2). The false lumen of left common carotid was thrombosed to cause significant narrowing and thinning of the true lumen. The contrast opacification and caliber of left common carotid artery distal to narrowing was normal. The dissection was also extended into the origin of right subclavian artery causing mild to moderate narrowing. The contrast opacification of distal subclavian and axillary was reduced. The dissection into innominate was extended into right common carotid artery causing it's near complete narrowing however contrast opacification distal to the narrowing was normal by retrograde filling. The anastomotic site and ascending aorta were normal. The patient was immediately shifted to operation theatre and put on CPB. The common carotids were exposed at bifurcation on both sides. The sternum was opened. Side biting clamp was put on aortic graft and proximal limb of Y

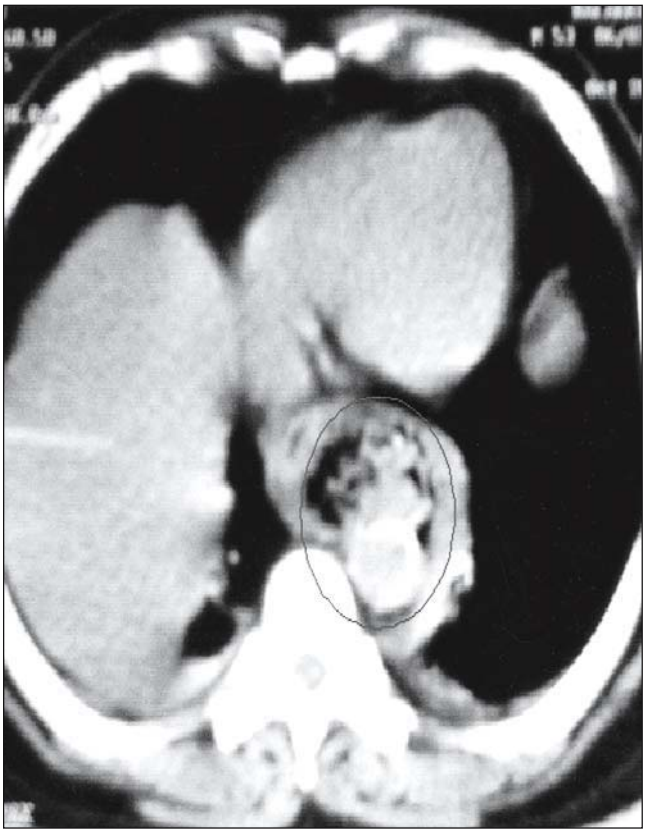

Fig. 1. The computed tomography scan reveals dissection and thrombus at the origin of innominate artery

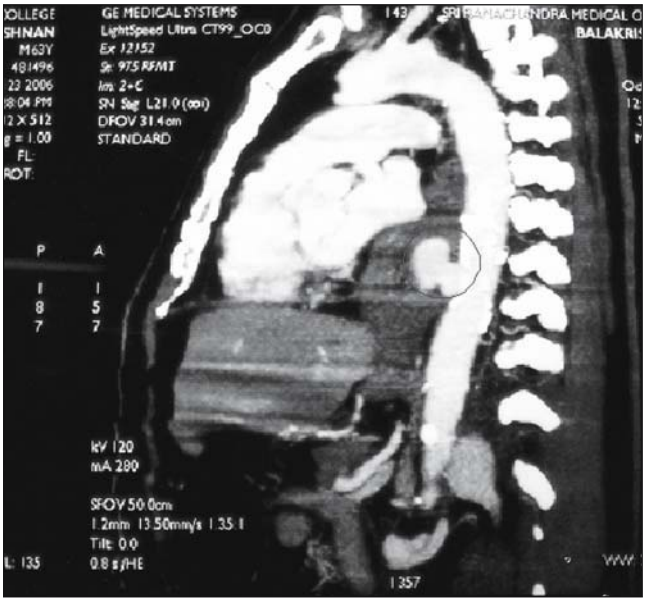

Fig. 2. The computed tomography image demonstrating dissection flap in arch of aorta.

graft was put on it. Both distal ends were put on common carotids on both sides through suprasternal notch in subcutaneous plane. Thus aorto-bicarotid bypass with gelatin impregnated knitted Dacron graft (16+8+8 millimeter), Gelsoft Plus, Vascutex limited, Renfrewshire, Scotland was done (Fig. 3). The patient was then shifted to the ICU. Next day she was weaned off from ventilator and trachea was extubated. Further hospital course of the patient was uneventful.

Discussion

The disappearance of unilateral peripheral artery pulsation can be caused by embolus[1], aortic dissection[2], broken rib[3], rarely embolization of biological glue after repair of aortic dissection[4], and subclavian artery compression by chest tube[5].

Iatrogenic acute aortic dissection is rare but potentially fatal complication of cardiac surgery. Its prevalence has been estimated between 0.16% and 0.35%[6]. The atherosclerotic disease of aorta, long standing hypertension, dilated aortic walls, cystic medial necrosis and collagen vascular disease may predispose to this complication[7].

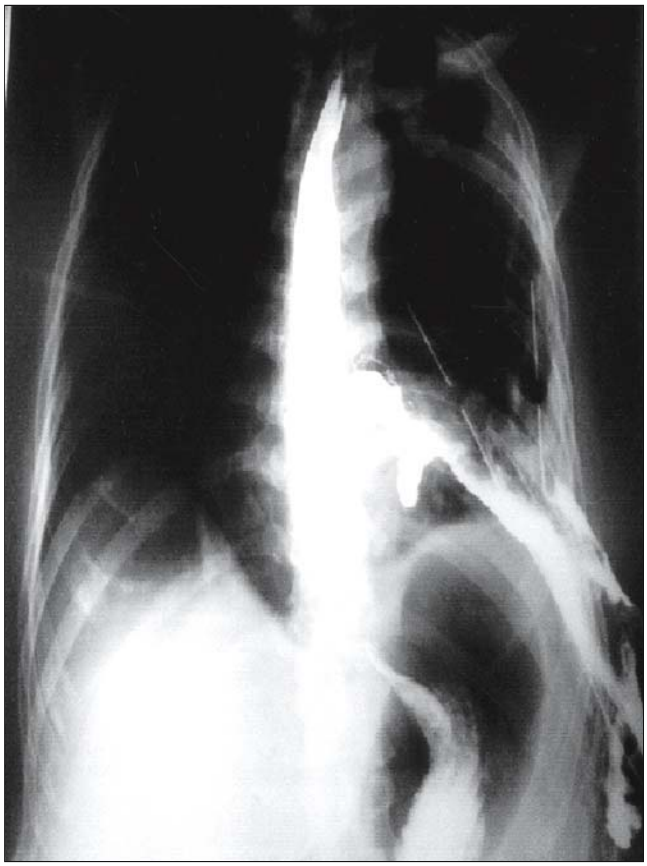

Fig. 3. The computed tomography image demonstrating aorto-bicarotid graft and aortic valved composite graft.

Aortic cannulation, aortic cross clamps, partial occlusion clamp, proximal anastomosis, retrograde dissection from femoral cannulation[2], and aortic dissection caused by percutaneous coronary angioplasty[8] are responsible for most of the dissections. In our case the aortic cross clamp site seemed to be responsible for the dissection.

The common causes of death due to aortic dissection are heart failure secondary to myocardial malperfusion, multi-organ failure secondary to reperfusion injury and visceral malperfusion and rupture of false lumen into pericardium with tamponade. The retrograde extension of dissecting flap leads to occlusion of the arch, spinal, visceral, or limb branches, resulting in malperfusion and end organ ischemia[9]. So any delay in repair could turn fatal.

Intraoperatively the TEE findings are helpful in diagnosing the dissection of aorta[10]. The CT scan is the standard screening tool to diagnose aortic dissection. It is more sensitive and easy to interpret than TEE and colour Doppler. In our case also CT scan could detect the dissection.

In conclusion, following cardiac surgery, we should always closely monitor vitals including checking of peripheral pulses at regular intervals. The sudden disappearance of peripheral pulse tracing after cardiac surgery should be taken seriously, as it could be due to a potentially serious complication of cardiac surgery as in our patient. The prompt diagnosis followed by timely repair is important for survival of the patient. By observing peripheral pulses, such a complication can be detected earliest and can be life save.

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