CARDIAC SURGERY

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INTRAOPERATIVE TYPE A AORTIC DISSECTION REPAIR (case report)

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Abstract: Iatrogenic aortic dissection (IAD) is a very rare but dangerous complication, which can occur during or after open cardiac surgery, complex percutaneous coronary intervention (PCI), thoracic endovascular aortic aneurysm repair (TEVAR) or transaortic valve replacement (TAVR). Accord-ing to literature, IAD is observed three times more fre-quently during off pump (OPCAB) than conventional coro-nary bypass grafting (CABG). It is also associated with a higher mortality and represents a huge challenge to all cardiovascular professionals including cardiac surgeons who encounter this clinical outcome. Here we present a case of intraoperative Stanford type A aortic dissection during off-pump coronary artery bypass.

KeyWords: Aortic dissection, iatrogenic aortic dissection, type A aortic dissection, Dissection of the thoracic aorta, Stanford classification

CASE STUDY

A 62-year-old hypertensive female underwent triple OPCAB, with saphenous vein grafts to the left anterior descending coronary artery (LAD), first marginal branch of the circumflex coronary artery (Cx) and to the right coronary artery (RCA). The aorta was normal in size and texture. With the use of a partial aortic clamp, we maintained the patient's systolic blood pressure at 90 mmHg during 3 proximal aortovenous anastomoses. Just few minutes after removing the partial clamp, a moderate bleeding from the proximal anastomosis site was observed and the aorta became discolored. Bleeding was stopped by few pledgeted stitches. After transferring the patient to the Intensive care unit (ICU), 4 hours after arrival, acute right leg ischemia was observed and there was suddenly no urine output, despite the diuretics drug therapy. Acute Stanford type A dissection was suspected and the patient was referred to CT-scan (Fig.1).

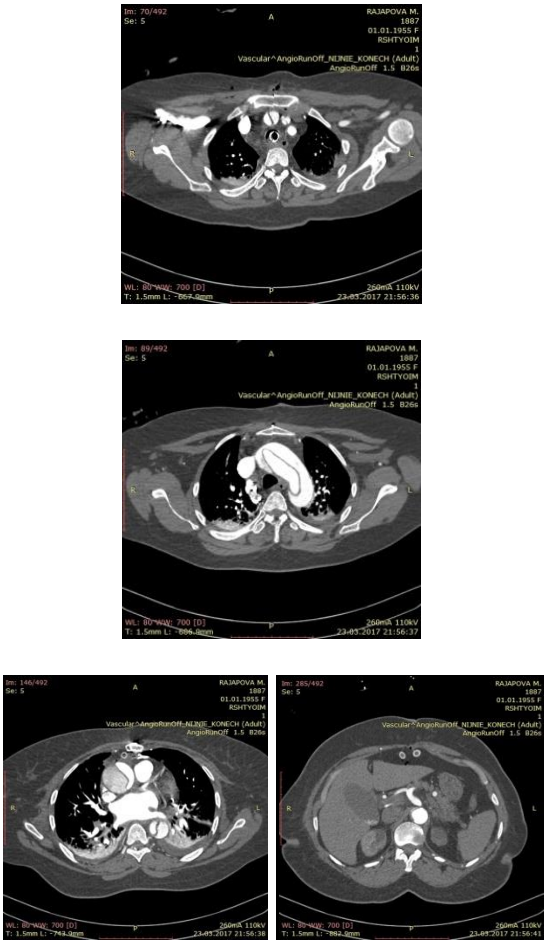

Fig. 1. CT-scan data of 62 y.o. female patient suggestive for type A aortic dissection

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The examination showed a dissection flap that involved the ascending aorta, aortic arch and descending thoracic aorta, with contrast medium filling the true and false lumen—findings that were diagnostic of type A aortic dissection. The patient was urgently transferred in the operating room. The right subclavian artery was canulated using an 8 mm Dacron tube graft and venous return was performed using a two stage canula in the right atrium. The patient's body temperature was cooled down to 18^0C and circulatory arrest with unispheric antegrade selective cerebral perfusion was commended. While opening the aorta, the dissection was localized at the proximal anastomosis of the venous graft to the right coronary artery (RCA) (Fig. 2).

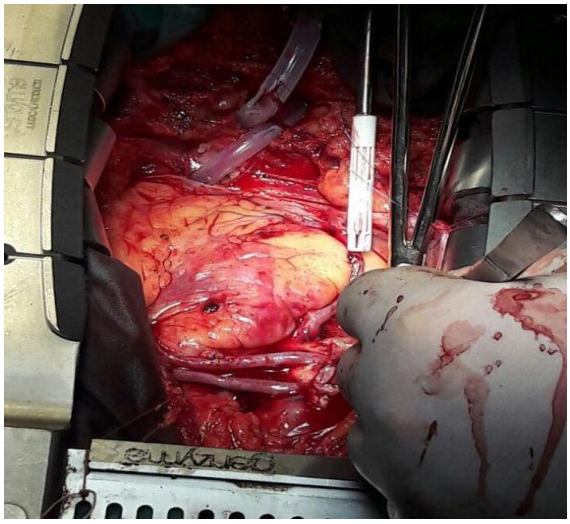

Fig. 2. Aortic dissection at the proximal anastomosis of the venous graft to the RCA

The dissected part of the ascending aorta including all three proximal anastomoses was excised, the surrounding dissected layers of aortic wall were reattached using the "sandwich" technique and first the distal anastomosis using an open anastomosis was performed, to avoid wrong lumen perfusion through the dissected right subclavian artery, the cardiopulmonary bypass was reestablished through the additional side graft of the prosthesis. After the proximal anastomosis using also the "sandwich" technique was finalized, all three venous grafts were then reattached to the Vascutek prosthesis (Fig. 3).

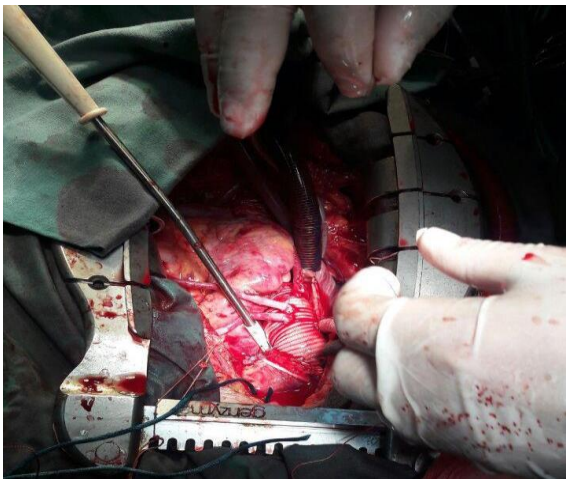

Fig. 3. Completed intraoperative view, ascending aorta is replaced, venous grafts are reattached to the prosthesis

In the postoperative period, the patient developed a coagulation disorder, with a total blood loss of 800 ml. On the third postoperartive day, the patient awoke normally with no signs of brain damage or other organ malperfusion. Unfortunately, on the 11-th postoperative day the patient developed acute respiratory failure and died on the same day.

DISCUSSION

Data Iatrogenic aortic dissection after cardiac surgery is a rare but devastating complication, with higher rate observed intraoperatively than postoperatively [2, 7, 10]. The frequency of aortic dissection is high in patients with severe atherosclerotic disease of the aorta, long-standing hypertension, thin, dilated aortic walls, cystic medial necrosis, and collagen vascular disease [2, 3]. Only immediate recognition and appropriate surgical repair can save the patient. The mortality rate is relatively high and fluctuates between 20% after intraoperative recognition and up to 50% if discovered postoperatively [9]. The risk factors which can lead to this life threatening complication are aortic cannulation, aortic cross-clamps, partial-occlusion clamps, proximal aortic anastomosis, and retrograde dissection from femoral cannulation most of the dissections [6]. Our patient had at least two risk factors: hypertension

and a thinned aorta, which we believe predisposed him to aortic dissection. Other risk factors for dissection include old age and known atherosclerotic disease [2]. Aortic dissection following cardiac surgery can develop intraoperatively, early postoperatively (30 min- 30 days) or late after initial surgery (more than 30 days from cardiac surgery) [11].

Another classification distinguishes late postoperative dissections into acute (patients required intervention within 2 weeks of symptoms) and chronic (late incidentalinding of dissection with no acute symptoms, candidates for elective surgery). Some authors speculated that the use of a partial-occlusion clamp on the pulsating, sometimes diseased aorta could increase the risk of iatrogenic aortic dissection during OPCAB [3, 4]. In 2001, there were publications describing experience with 2 instances of early postoperative aortic dissection and 1 of intraoperative dissection in OPCAB group, and only 1 intraoperative dissection in the on-pump CAB group [2]. According to some data it could be suspected that, in the absence of autopsies, some sudden deaths after OPCAB were also secondary to rupture of unrecognized early postoperative dissection and not to the terminal catastrophic events that are usually invoked [1]. Some authors also stated that the total number of iatrogenic aortic dissections is likely underestimated, and in reality postoperative aortic dissection underlies 3% to 5% of deaths after cardiac surgery [4]. Intraoperative aortic dissection is easily recognized due to the presence of a rapidly expanding hematoma. But sometimes it could be underestimated due to inexperienced team, like in our case. Early dissection after OPCAB is not always easily diagnosed. It may be missed in patients who experience no pain, and it may be confused with more common complications of coronary artery bypass surgery (for example, myocardial infarction, graft occlusion, left ventricular dysfunction,or arrhythmias), leading to crucial delay and possibly to sudden death from rupture of the aorta. Having high level of suspicion (suddenly discolored aorta and bleeding during previous surgery), could help not to lose the time. Among the most ominous signs and symptoms of early dissection after OPCAB are signs of malperfusion, more typical tearing chest and back pain or the sudden loss of peripheral pulses after OPCAB should readily suggest the correct diagnosis.

CT-scan with intravenous contrast is the most important diagnostic option for timely diagnosis of the early postoperative aortic dissection. On CT-scan you can find a typical flap in the ascending aorta that may extend to the aortic arch and the descending thoracic aorta, and contrast medium maybe found in the true and false lumina [8]. These findings are pathognomonic of type A or DeBakey type I acute aortic dissection and should prompt immediate surgical attention.

The dissection can be repaired in fashion similar to acute spontaneous aortic dissection, although with a much higher mortality rate. There are two pattern to repair of dissected aorta by local replacement of the dissected aortic segment with a patch graft or by replacement of the entire ascending aorta with a tube graft, followed by reimplantation of the veins in both cases [13].

Some dissections had specifically associated histologic findings, such as cystic medial necrosis; and inflammation signs and endothelial desquamation others had no specific associations other than aortic layers separated by hematoma [5]. Intraoperative or early postoperative dissection is more prevalent in OPCAB, probably due to a pulsatile pattern of arterial pressure during application of a side-biting clamp and performance of the proximal anastomoses.

Avoidance of cross-clamping or partial clamping the aorta and performing the total arterial revascularization may prevent this complication, but its efficacy is under the question in elderly insulin dependent diabetic patients. Therefore, some authors advice to maintain low systemic pressure (80 mmHg) controlled pharmacologically or by partial clamping the inferior vena cava, during proximal anastomoses formation [12,14].

CONCLUSIONS

Surgical Aortic dissection after cardiac surgery is a rare but extremely dangerous complication, accompanied by a high risk of death. It can be observed at any time, both intraoperatively and at various times after the operation. A

high level of alertness and the presence of characteristic symptoms of malperfusion can help in timely diagnosis. At the same time, the importance of computed tomography with intravenous contrast should not be underestimated. Timely surgical intervention consisting in replacement of the ascending aorta under the circulatory arrest and antegrade perfusion of the brain can save the patient's life.

Conflict of interests

There is no conflict of interests.

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