Negative results - Aortic and aneurysmal
Early complication after hybrid thoracic aortic aneurysm repair

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Abstract

This brief report describes an unusual hybrid approach complication of aortic arch disease. An acute stent kinking in the first postoperative day promoted ventricular fibrillation and death. Adequate oversizing was achieved and intraoperative angiogram showed no proximal or distal leaks. Unfavorable outcomes are highly under-reported and describing complications are a key instrument to improve this technique.

Keywords: Endovascular; Aortic aneurysm; Stent-graft; Hybrid

1. Background

Standard surgical treatment of aortic dissection and true aneurysm demands thoracotomy, cardiopulmonary bypass (CPB), deep hypothermia and a graft interposition. The recent introduction of endovascular approach may avoid these important risk factors, performing the procedure in a minimally invasive fashion. Besides that, some portions of the aorta, like the arch, are not suitable for standard endovascular approach due to arch branch origin. In such cases, reports suggest hybrid procedures in order to reduce surgical trauma, morbidity and mortality [1, 2].

Surgical and postoperative factors play a role in providing possible superior results when compared to standard intervention in selected cases: reduced blood loss, avoidance of CPB and cross clamp, lower renal failure incidence, lower stroke risk and hospital stay. Conventional and endovascular approaches are under investigation in many centers. EVAR and DREAM trials present some tendency in reducing procedure-related mortality, even in low-risk individuals, with the use of endovascular intervention [3, 4].

In this scenario, the alternative approach using standard and endovascular techniques are becoming a safe strategy in correctly selected patients, and able to promote significant death and complication reduction [3, 4]. Besides that, a new technique may create new complications, many potentially lethal [5]. A case of an unusual complication is described.

The following case report describes one of these new complications.

2. Case report

A 50-year-old male patient with hypertension, diabetes mellitus and hyperuricemia. The patient was admitted to the emergency unit with oppressive chest pain, with exertion being worst and with no spreading. The pain commenced two years previously and became worse in the last three months, associated with dyspnea, dizziness and both inferior limb paresthesia due to diabetes vascular microangiopathy. Three months ago he had a transient ischemic attack. Actual prescription: angiotensin converting enzyme, B-blocker, calcium channel antagonist, statin and acetylsalicylic acid.

Transesophageal echocardiography (TEE): severe atherosclerotic disease (atheroma > 3 mm with mobile and ulcerated plates), atherosclerotic ulcer (aortic arch), presence of intramural hematoma and pseudo-aneurysm at the left carotid artery. Carotid ultrasonographic examination: severe bilateral common proximal obstruction (70%) with the presence of poor collaterals. Computer tomography: aortic arch ectasia (38 mm), intimal irregularities (arch and descending) with diffuse ulcers (Fig. 1). Coronary angiogram showed no significant lesions.

The patient underwent a hybrid approach. In the operating room equipped with an angiographic C-arm system and TEE, a midline sternotomy was performed. Without CPB support, an extra-anatomical shunt was fashioned with a Dacron prosthesis linking the ascending aorta to both carotid arteries, using end-to-side anastomosis. Following this, proximal ligations of the carotid arteries were performed in order to avoid cerebral emboli during stent placement. In the same surgical procedure, a self-expandable nitinol stent-graft (Braile Biomedical) was correctly deployed in the aortic arch through the ascending aorta with radioscopic and TEE guidance occluding the brachiocephalic artery, left carotid and left subclavian arteries with a previously

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described technique [1]. A 20% oversize was used. Adequate proximal and distal landing zones were achieved; a final angiogram showed no leaks and correct placement.

On the first postoperative day, the patient presented acute stent kinking and distal migration leading to ventricular fibrillation and death (Fig. 2).

3. Discussion

The development of hybrid procedures allowed many patients that were considered not suitable for surgical procedure due to high operative risk to be treated, and have been shown to be feasible [6]. Avoidance of CPB and deep hypothermic circulatory arrest (DHCA) seems to be the main benefit. Besides that, a new technique brings different complications, not previously reported.

Byrne et al. [5] reported a recent series with 143 patients treated with hybrid approach, with a mortality rate of 0.7% and a low non-fatal complication rate, including 3 (2.1%) for bleeding, 1 (0.7%) wound infection, 2 (1.4%) transient ischemic attack, 1 (0.7%) non-fatal stroke, 2 (1.4%) post-operative myocardial infarction, and 6 (4.3%) late (>30-day) occlusions. Atrial fibrillation, paraplegia, thromboembolism, retroperitoneal hematoma and displacement of the prosthesis were also reported [5].

This expresses the urgent need to improve the technique and how to treat those patients in the postoperative period.

Abdominal aortic aneurysm series, imply these results to poor prosthesis design [7]. These findings could be possibly extrapolated to thoracic aneurysms. In this way, factors related to patient selection and the technique itself is being implicated. Accurate definition of these factors is not well established. Patient related factors, like age, ASA score and pre-operative prescription can predict outcome and hospital stay [8].

Szeto et al. [6] performed this operation under CPB but avoiding DHCA with a decrease in morbidity and mortality associated with conventional repair, with CPB and DHCA an obvious benefit. But a step further, the avoidance of CPB seems to bring even more benefit, even in terms of stroke. Besides the hybrid approach not being completely unharmful, the hospital mortality associated with conventional strategy using CPB and DHCA ranges up to 20%, with a stroke rate up to 12% [9], justifying the investment in this technique.

This report describes a lethal complication due to prosthesis kinking in the early postoperative period. After migration and kinking the prosthesis probably leads to an acute increase in afterload, ventricular distention and irreversible fibrillation. Besides an initial correct deployment, satisfactory proximal and distal landing zones and 20% oversize, the most probable cause was inadequate stent selection. Aortic diameter may vary up to 13.3% during cardiac cycle [10] and computed tomography images used to measure and select the prosthesis diameter could be obtained in an inadequate moment leading to wrong selection. Perhaps dynamic images should be used to measure aortic diameter and select the adequate stent oversize in order to avoid such a complication.

Endovascular and hybrid approach are becoming a new alternative in the treatment of aortic diseases, especially in patients with prohibitive risk to standard procedure. Improved results are still under investigation and ideal candidates are not well defined. Like others, this approach is not free of important complications, even requiring urgent conventional rescue procedures and special techniques.

Unfortunately, there is a slight tendency not to publish unfavorable outcomes and a lot of problems and pitfalls remain hidden. Reporting adverse results is an obligation of groups performing endovascular procedures. This position will certainly promote new knowledge and solutions in order to improve these emerging therapy results.

References


