Giant left coronary ostial aneurysm after modified Bentall procedure in a Marfan patient

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Abstract

We performed surgical repair of a giant left coronary ostial aneurysm after aortic root replacement using composite valve graft (modified Bentall procedure) in a patient with Marfan syndrome. Aneurysmal formation in the left main stem itself is very rare. In order to avoid mobilizing the coronary ostium from severe adhesions after previous surgery and to reduce the tension on the anastomosis, the left main trunk was reconstructed using an interposition Dacron graft. In aortic root surgeries in Marfan patients, the size of the side hole on the composite graft should be kept relatively small to fit the diameter of the native coronary arteries for prevention of coronary buttons from forming aneurysms at the level of the coronary button anastomosis. In addition, close observation to the coronary button anastomosis is indispensable in postoperative check-up.

Keywords: Aortic root; Aneurysm; Reoperation; Surgery complications

1. Introduction

Application of the modified Bentall procedure with the button technique has reduced complications at the anastomotic sites of the coronary arteries in aortic root surgeries using a composite valve graft. However, especially in Marfan patients, aneurysmal formations at coronary ostial anastomoses have not been eliminated in spite of technical improvements for reconstruction of the coronary arteries because of their connective tissue abnormality. Leaving too much native aortic tissue in a too large opening in the graft seems to be the main cause responsible for this type of aneurysm. The development of an aneurysm of the left main stem itself in the presence of a normal ostium is uncommon. We describe here a case of such a rare aneurysmal formation in a Marfan patient. The coronary ostial aneurysm could be potentially lethal when it grows to a large diameter, and a surgical repair should be done to prevent rupture of the aneurysm.

2. Case report

A 48-year-old male Marfan patient was referred to our institution. He underwent a modified Bentall procedure for aortic root aneurysm at 28 years of age. Anastomoses of the coronary arteries to the composite valve graft were performed using the button technique. He also received abdominal aortic replacement for abdominal aortic aneurysm at 31 years of age, and at 44 years of age, aortic dissection occurred in the distal ascending aorta requiring ascending aortic replacement. During a routine checking, a computed tomography (CT) revealed an oval aneurysm, 29 mm × 49 mm in diameter, at the left coronary ostium at the level of the coronary button anastomosis to the composite valve graft (Fig. 1).

After re-re-do median sternotomy, cardiopulmonary bypass (CPB) was established with an arterial cannula (21 Fr) in the right femoral artery, a venous drainage cannula (28 Fr) in the right femoral vein and the jugular vein (17 Fr) [1]. Under mild hypothermia (28 °C), the composite graft was clamped and cold crystalloid cardioplegia was given both antegrade and retrograde. The pulmonary trunk was divided vertically and composite was transected partially for good exposure of the left main stem. A giant left coronary ostial aneurysm was found behind the pulmonary trunk without sign of dissection.

The aneurysm was opened from the coronary anastomosis site to the bifurcation of main stem into the left anterior descending and circumflex artery. The left main trunk of the coronary artery was reconstructed using an interposition 10-mm Dacron graft [2] between the neo-coronary-ostium and the side hole on the aortic composite graft (Fig. 2). Then both the pulmonary trunk and the aortic composite grafts were re-anastomosed. Weaning from CPB was easy without any ischemic changes in electrocardiogram. Postoperative recovery was uneventful.

3. Discussion

The occurrence of coronary ostial pseudoaneurysms in patients with Marfan syndrome after aortic root replace-
ment using a composite valve graft has been virtually eliminated after the introduction of the coronary button technique [3]. Meanwhile, Meijboom et al. have demonstrated that, in a study with magnetic resonance imaging angiography, they found coronary ostial aneurysms in 17 patients of the 40 patients with Marfan’s syndrome who underwent surgery and concluded that coronary ostial aneurysms are not uncommon even when the button technique is used. Especially in patients <35 years old, coronary ostial aneurysms were more frequently seen in 56% of patients (15 of 27) [4]. However, the reason for coronary ostial aneurysms should be classified into pseudoaneurysm, aneurysm of the anastomosis site to the composite graft, and aneurysm of the left main trunk itself. The case we report is classified as the third reason and this is very rare. The reason for true aneurysms at this level seems to be caused by cystic medial necrosis related to Marfan syndrome. Milano et al. have demonstrated that anastomotic pseudoaneurysms after the modified Bentall procedure were observed only in patients with acute dissection and a coronary aneurysm was only identified in a patient with Marfan syndrome [5]. This indicates that connective tissue disorders appear to play a significant role in the development of these anastomotic problems. Therefore, in aortic root surgeries with Marfan patients, close observation to the coronary button anastomosis is indispensable in a post-operative check-up.

According to Kazui et al., in order to reduce the risk of aneurysm formation at the coronary button anastomosis, the size of the side hole on the aortic composite graft must be reduced to fit the diameter of the coronary artery ostium and avoid the redundant native aortic wall from developing aneurysmal changes in the late postoperative period [6]. In our case, the side hole was 10 mm in diameter and was not oversized according to the coronary ostium. This fact demonstrates the necessity of strict follow-up in Marfan patients is necessary despite adherence to principle size consideration.

We applied the graft interposing method, which is a modification of Cabrol’s technique [7], to reconstruct the left main trunk to avoid mobilizing the coronary ostium from severe adhesions after previous surgery and to reduce the tension on the anastomosis. This procedure will reduce the physical stress against the native wall of the coronary artery and, as a consequence, reduce the risk of aneurysm formation.

Because the majority of Marfan patients undergoing aortic root surgery are relatively young, valve-sparing aortic root replacement techniques [8, 9] are attractive. Recently, these techniques are becoming reasonable alternatives to the modified Bentall procedure for Marfan patients supported by good long-term results [10]. Even in valve-sparing operations, we should pay attention to the size of the side hole at the anastomotic site and be aware of potential aneurysmal formation at this level.

References


eComment: Stabilizing aortic tissue after aortic root surgery in Marfan syndrome

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We would like to congratulate Okamoto and colleagues for their interesting report [1]. Their case illustrates again how difficult it is to treat and manage patients with Marfan syndrome before and even after several aortic (root) surgeries.

Ostial aneurysm formation is a well-known complication after aortic root surgery in Marfan syndrome [2]. We agree that it is crucial to excise as much aortic root tissue as possible when re-implanting the coronary arteries in the Dacron graft. We use felt or pericardial patches to strengthen the suture-line around the ostium and to prevent future aneurysm formation at this area. Unfortunately, progressive aortic dilatation can sometimes not be prevented, and it is clear that aneurysm formation of the left trunk itself cannot be prevented by a small, reinforced button technique alone.

Interestingly, it has recently been shown that losartan, an angiotensin II type 1 receptor blocker, and widely used medication to treat arterial hypertension, has the potential to stabilize the aortic root tissue in Marfan syndrome [3, 4]. Matt and colleagues recently published from Johns Hopkins a small pediatric cohort study in which the use of angiotensin II type 1 receptor blocker therapy in patients with Marfan syndrome slowed the rate of progressive aortic root dilatation from 3.54±2.87 mm per year during previous medical therapy to 0.46±0.62 mm per year during angiotensin II type 1 receptor blocker therapy (P<0.001) [5].

These findings are incredibly encouraging for patients with Marfan syndrome, and we think that it might, therefore, be time to start patients with Marfan syndrome – before and after aortic root surgery – on losartan therapy. However, whether angiotensin II type 1 receptor blocker therapy is effective in preventing ostial and coronary dilatation after aortic root surgery in Marfan syndrome requires, of course, further studies.

References


eComment: Giant left coronary ostial aneurysm after modified Bentall procedure in a Marfan patient

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One of the typical problems in the long follow-up period after a classic Bentall operation is the formation of coronary ostial aneurysm. According to data of various authors the frequency of this complication achieves 8.5%. At the same time, messages on formation of coronary ostial aneurysm, when performing the modified Bentall technique, are really very rare. However, the inherent weakness of a connecting fabric in patients with Marfan syndrome, in a great degree, possibly promotes development of this complication. We congratulate the authors for such an interesting message [1].

In our centre, for the last period of time, three patients with Marfan syndrome underwent reoperation after the classic Bentall technique with the use of a synthetic conduit. In all three cases we eliminated coronary ostial aneurysm, thus managing to execute direct re-implantation of coronary ostial in the new conduit. In all cases the apertures in the conduit were done in exact conformity with the diameter of the coronary ostium. Besides that, since 1990, more than 80 patients with Marfan syndrome underwent implantation of xenopericardial conduit manufactured at the Bakoulev Center for Cardiovascular Surgery [2]. In the remote period of more than 15 years follow-up none of those patients was diagnosed coronary ostial aneurysm.

References
