Case report - Coronary

Surgical angioplasty and unroofing technique for intramural coronary anomaly

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Abstract

A malign intramural course of the left main coronary artery is a rare anatomical anomaly. Surgical repair is mandatory since the condition is associated with myocardial ischemic syndromes and sudden death. Unroofing the intramural part and reconstructing a neo-ostium is challenging if the neo-ostium is immediately adjacent to the intercoronary commissure as there is a risk of narrowing the newly created ostium. We report a case in which we performed a surgical angioplasty of the left main coronary artery in combination with unroofing of the intramural section and resuspension of the intercoronary commissure.

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1. Introduction

A monocoronary anomaly with a malign intramural course is a rare anatomical anomaly and is associated with myocardial ischemic syndromes and sudden death.

The most expedient operative technique is coronary bypass grafting [1], although this is associated with a high incidence of coronary bypass occlusion due to competitive flow from the native coronary artery [2]. Another technique is pulmonary translocation to relieve the potential extrinsic pulmonary artery pressure on the anomalous coronary artery [3]. Alternatively, the intramural portion of the coronary artery that passes between aorta and pulmonary trunk can be opened longitudinally from within the aorta (unroofing) [4, 5]. This permits reconstruction of the most proximal portion of the coronary artery so that the ostium now emerges from the corresponding sinus of Valsalva in a normal and unobstructed location.

We describe here a case in which the newly created left main coronary ostium would have been partially obliterated by the intercoronary commissure after its resuspension.

2. Case report

A 40-year-old male presented with episodes of palpitations, presyncopes and general weakness in combination with retrosternal pain, which was related to episodes of stress.

Transthoracic echocardiography was normal. Holter monitoring showed several supraventricular extrasystoles and multiple runs of supraventricular tachycardia. During electrophysiological examination, several runs of non-sustained ventricular tachycardia could be induced.

Coronarography revealed a monocoronary system from the right sinus of Valsalva. An additional computed tomography (CT) scan showed that the left main coronary artery had a common ostium with the right coronary artery and further followed an intramural course, passing posteriorly between the aorta and the pulmonary trunk. At the point of the intercoronary commissure between the right and left sinuses of Valsalva, the left main coronary artery left the aorta and bifurcated into the left anterior descending artery and circumflex artery (Fig. 1a,b).

A median sternotomy was performed, and a mildly hypothermic (32 °C) extracorporeal circulation was started. Intermittent warm blood cardioplegy was administrated, initially antegrade in the ascending aorta and then retrogradely in the coronary sinus. Venting was performed via the right superior pulmonary vein. The ascending aorta was dissected from the pulmonary artery trunk, and the intramural part of the left main coronary artery was visualized (Fig. 1c). The aorta was incised transversely, 1 cm above the commissures. The ostium of the monocoronary artery was found in the right sinus of Valsalva. The intramural part of the left main coronary artery was unroofed retrogradely, but its course disappeared behind the commissure between the right and left coronary cusps (Fig. 1d). The commissure was detached and the unroofing completed.

We then realized that the resuspension of the commissure would partially obliterate the new ostium (Fig. 1e,f).
Therefore, an anterior angioplasty of the left main coronary ostium was performed using an onlay patch of fresh autologous pericardium as previously described [6]. The aortotomy was prolonged over 1 cm in the roof of the left main coronary artery. A patch of 30 mm × 7 mm autologous pericardium was harvested. One-third of the patch was used to enlarge the main coronary artery using a running suture of polypropylene 8-0 (Prolene; Ethicon, San Angelo, TX, USA) (Fig. 2a), and the rest was used as an onlay patch on the adjacent aorta to create a funnel shape (Fig. 2b). The unroofed area was closed with a running polypropylene 5-0 suture (Prolene; locked stitches) in order to reinforce the aortic wall. The intercoronary commissure was resuspended using a transmural polypropylene 4-0 U-stitch (Prolene, Ethicon), reinforced with an autologous pericardium pledget (Fig. 2c). The rest of the aortotomy was closed with a running polypropylene 4-0 suture (Prolene).
The patient’s postoperative course was uneventful. He stayed overnight in the intensive care unit and left the hospital on postoperative day 4.

3. Discussion

Unroofing an intramural segment of the left main coronary is challenging if it ends immediately adjacent to or behind the intercoronary commissure, because of the potential risk of narrowing the newly created ostium. In addition, there is a danger of disrupting the commissure after its resuspension [7].

When the course of the intramural segment does not cross the commissure, its takedown can be avoided [7, 8]. Fine scissors are then used to incise the intramural course toward the point at which the artery leaves the aortic wall in the relevant Valsalva sinus [7]. A similar technique was reported in a patient with an anomalous left main coronary artery that arose from a separate orifice in the right sinus, adjacent to the intercoronary commissure [8].

In this case, we were confronted with the ending of the intramural section partially behind the intercoronary commissure. This needed to be taken down, but resuspension would have narrowed the neo-ostium. Therefore, an anterior angioplasty of the left main coronary artery was performed [6].

This technique has excellent long-term results, as we have previously described [6]. The onlay patch enlarges not only the neo-ostium of the left main coronary artery, but also a part of the aortotomy in order to obtain a funnel shape. A saphenous vein onlay patch is usually preferred to a pericardial one because of higher fibrinolytic activity. However, our patient had undergone a bilateral varicectomy and we only needed to enlarge the proximal part of the left main stem. For this reason, aspirin 160 mg was started postoperatively.

References