Repair of early left main stem stenosis after switch operation using an autologous innominate vein patch

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Abstract

We describe the repair of the postoperative left main stem stenosis of a 24-day old male patient who initially underwent arterial switch operation for dextro-transposition of the great arteries. The repair was facilitated by using an autologous left innominate vein patch, while there was a shortage of suitable repair material in this neonate. Postoperative echocardiogram prior to discharge confirmed a satisfactory flow through the left main stem and improved left ventricle function.

Keywords: Arterial switch operation • Postoperative complication • Coronary artery stenosis

INTRODUCTION

Coronary artery stenosis is a recognized complication of arterial switch operation (ASO), which may blight the outcome of the surgery. Currently, technical modifications of coronaries re-implantation have reduced the early mortality rate caused by the left ventricular failure to 4% [1, 2]. The obstruction of translocated coronary arteries remains the main cause of postoperative mortality [2]. Although the rate of reoperation for coronary artery stenosis following ASO is 0.5% [3], it is technically a very demanding redo procedure particularly in neonates.

CASE REPORT

A 9-day old male neonate (weight = 3.1 kg) presented with discordant ventriculoarterial connections. Anatomically, the pulmonary artery was positioned anterior to the aorta with an usual coronary pattern: the left main stem (LMS) and the right coronary artery originated from the pulmonary artery root separately. LMS bifurcated to left anterior descending and circumflex arteries. The patient underwent ASO with LeCompte manoeuvre following mobilization of both LMS and right coronary artery with implantation of mobilized coronary buttons to the aortic root. Two weeks following surgery after discharge the patient was admitted as an emergency with severe left ventricle dysfunction. The patient underwent an urgent cardiac catheterization, which demonstrated the tethering and stenosis of LMS sparing the bifurcation. Although a subsequent transluminal balloon coronary angioplasty temporarily relieved the stenosis, the recurrence of LV dysfunction and ECG changes warranted the second cardiac catheterization. The latter confirmed the restenosis of LMS (Figs 1 and 2A) for which the patient underwent an emergency redo sternotomy accompanied by cut-down of the right thigh. The saphenous vein was found to be too small to be used as the patch material, and therefore, attention was brought to the left innominate vein (LIV). The LIV was fully mobilized and momentarily occluded by clips to avoid wrinkles secondary to occlusion. Then, a square section from the anterior wall of LIV was taken and this was replaced with a patch of autologous pericardium maintaining the vessel patency (Fig. 2B). Following dissection of adhesions and aorto-right atrial cannulation accompanied by left atrial vent, the patient was placed on cardiopulmonary bypass and cooled to 25°C. The pulmonary artery was transected and pulled away by stay stitches to fully expose the aorta.

Figure 1: Left main stem stenosis (arrow).
the cross clamp on the ascending aorta and administration of cardioplegia, a 5-mm vertical incision was made on the aorta in relation to the left coronary button. A small coronary probe was passed through the incision into the LMS beyond the stenosis (Fig. 2C). The vertical incision was then extended on the course of the probe. The LIV patch was sewn into place using continuous 8-0 suture material while the edges of incision were kept open by stay stitches. Following completion of the coronary repair (Fig. 2D), the cross clamp was removed after a total of 64 min. The patient was uneventfully weaned off cardiopulmonary bypass with satisfactory flow through the coronaries confirmed by the perioperative echocardiogram. His postoperative course was largely unremarkable and the patient was discharged after 9 days. During the follow-up, he demonstrated a remarkable progress, and an echocardiogram performed at the 3 years of age revealed satisfactory coronary flow and good left ventricle function. There were no upper limb complications or neurological symptoms at follow-up.

**DISCUSSION**

Patch arterioplasty has been shown as an effective measurement to repair the LMS stenosis following ASO [4]. The use of autologous saphenous vein and LIV also has previously been reported in children; however, to our knowledge, this has not been adequately explored in neonates following ASO. Many neonates undergoing ASO have a weight of less than 5 kg with an unsuitable saphenous vein for patch repair. Non-vascular materials such as autologous pericardial patch are also not desirable considering the age of these patients.

In neonates, reconstruction of LIV is of paramount importance. Although major damage of LIV with permanent division has been shown to be tolerable in adults [5], a prudent approach is required in neonates to avoid LIV injury leading to ligation and division of this vessel as collateral veins have not developed yet. Surgeons must be aware of probable neurological and upper limb complications.

**CONCLUSIONS**

Our experience demonstrated that repair of coronary arteries with an autologous LIV patch is a reliable option in neonates where there is a paucity of repair materials. Large series are required to examine the long-term outcomes of the abovementioned technique, including complications such as aneurysm or restenosis.

**Conflict of interest:** none declared.

**REFERENCES**


