Resection of atherosclerotic aneurysm at origin of aberrant right subclavian artery

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Abstract

In two patients (75- and 88-years-old), with the aid of cardiopulmonary bypass and using a transaortic approach, a rare calcified aneurysm at the origin of an aberrant right subclavian artery was closed with a prosthetic patch. The aneurysm was partially resected and the remainder closed over the patch. This technique obviates the need for hazardous clamping of the aorta around the base of the calcified aneurysm and allows secure closure of the origin of the aneurysm. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

In left aortic arch with aberrant right subclavian artery (RSA) the latter vessel arises as the last branch of the aortic arch and courses from the descending aorta to the right arm, passing behind the esophagus. It is the most common congenital anomaly of the aortic arch and in large autopsy series has been reported to occur in 0.7% of the population [1]. At a young age an aberrant RSA is rarely symptomatic because the trachea and esophagus are not encircled by vascular structures. Symptoms may be present, however, when the right and left carotid arteries have a common origin from the aortic arch or when they are in juxtaposition, so that the esophagus and trachea are hemmed in, posteriorly and to the left by the aberrant RSA and anteriorly by the carotid fork [2]. In adult life, approximately 5% of patients with aberrant RSA have been reported to become symptomatic due to the development of atherosclerotic rigidity, tortuosity, or, occasionally, aneurysmal dilatation of the aberrant vessel [3]. An aneurysm at the origin of an aberrant RSA is extremely rare, with only seven cases reported thus far [4–9]. We report our repair technique of this rare entity that may necessitate a specific surgical technique.

2. Methods and results

Two patients, 75- and 88-years-old, were referred with complaints of severe dysphagia. The youngest patient had
also weight loss. In both patients, the chest roentgenogram demonstrated a superior mediastinal mass located posteriorly. Barium esophagography confirmed the presumed diagnosis of vascular ring; it showed a wedge-shaped impression on the dorsal aspect of the esophagus at the level of the aortic arch. Aortography demonstrated an aber-

Fig. 2. (A) Transaortic repair of atherosclerotic aneurysm (A) at origin of aberrant right subclavian artery (RSA), that arises as last branch off the aortic arch, distal to the left subclavian artery (LSA). The aortic incision starts at the level of the left common carotid artery and extends just distal to the aneurysm (dashed line). (B) The origin of the aberrant right subclavian artery is closed with a prosthetic patch. The proximal part of the dilated right subclavian artery is resected. The upper segment of the aneurysm is resected. (C) The aortotomy is closed, the remaining aneurysmal wall is closed, and the right subclavian artery is anastomosed to the ascending aorta with use of an interposition graft.
Several other approaches have been described to revascularize the distal RSA, but use of a short interposition graft may be necessary [8]. Preferable when it can be performed without tension [12], the ascending aorta or right common carotid artery. In children, division at thoracotomy allows mobilization of the vessel, division at its origin from the aortic arch and extending just distal to the anomalous origin of the RSA (Fig. 2A). The maximum diameters at the origin of the aneurysms, which were both calcified, were 2.8 and 3.6 cm, respectively. In both patients the origin of the aneurysm was closed with a Dacron prosthetic patch (Hemashield Woven Double Velour grafts, Medadox Medicals, Inc., Oakland, NJ) that was sewed in with a continuous 4-0 polypropylene suture (Prolene; Ethicon, Inc., Somerville, NJ) (Fig. 2B). The RSA was transected at its origin from the aortic arch. Cardiopulmonary bypass was resumed. The upper part of the aneurysm was resected and the remaining aneurysmal wall was closed with a continuous 4-0 Prolene suture (Fig. 2C). Inflow into the right arm was restored by interposing an 8 mm Dacron graft between the RSA and the right side of the distal ascending aorta.

In both patients the postoperative course was uneventful. The pulse and blood pressure were equal in both brachial arteries. In both patients, at 4.2- and 1.7-year follow-up, the dysphagia had disappeared. The youngest patient had gained 5 kg of weight.

3. Discussion

The initial treatment for symptomatic aberrant RSA consisted of ligation of the vessel. However, this procedure leaves the right arm dependent on collateral circulation, which may not be sufficient. We prefer to re-establish blood flow into the distal RSA in both children and adults to avoid the development of ischemia, subclavian steal, and growth disturbances in the right arm [10]. Because the aberrant RSA originates from the posteromedial side of the distal aortic arch [11], a surgical approach through a right thoracotomy allows mobilization of the vessel, division at its origin without leaving a long stump, and connection to the ascending aorta or right common carotid artery. In children, direct anastomosis of the RSA to the ascending aorta is preferable when it can be performed without tension [12], but use of a short interposition graft may be necessary [8]. Several other approaches have been described to revascularize the right arm, including a left thoracotomy with or without a cervical approach, an extrathoracic approach, or a median sternotomy [8]. Potential disadvantages of these techniques include difficult exposure of the posteromedial side of the aortic arch and the right lateral side of the ascending aorta and hence less optimal control of hemorrhage, the need to position the patient twice for two incisions, and an increased frequency of residual symptoms because of leaving a relatively long stump of the aberrant RSA.

In the presence of a large aneurysm at the origin of the aberrant RSA, we believe that the aneurysm should be resected. The surgical approach in the seven patients with an aneurysm at the origin of an aberrant RSA thus far consisted of a left thoracotomy (three patients), a right thoracotomy (one patient), and a median sternotomy (three patients) [4–9]. In our experience an approach of the aneurysm through a median sternotomy with the aid of cardiopulmonary bypass and circulatory arrest offers excellent exposure of the orifice of the aneurysm. In addition, such approach obviates the need for difficult and hazardous clamping of the aorta around the base of the often calcified aneurysm, which procedure may also damage the left recurrent laryngeal nerve because it courses close to the origin of the aberrant RSA. In contrast with others [9] we prefer to resect the aneurysm because retention of the aneurysm may result in residual compression of the esophagus. Extension of the incision into the right supraclavicular region adequately exposes the distal RSA and facilitates restoration of its circulation by insertion of an interposition graft that can be anastomosed to the ascending aorta or, alternatively, the right common carotid artery.

References

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