Clinics in Surgery

Surgical Technique
Published: 17 Dec, 2019

Minimal Access Transposition of Arteria Lusoria through an Upper Mini-Sternotomy

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Abstract

We describe an operative technique of less invasive transposition of an aberrant right subclavian artery on the right common carotid artery through a partial upper mini-sternotomy. This approach offers direct control of the entire course of the artery, as division of the artery is possible directly at the level of it offspring and therewith, the full length of the artery is available for mobilization and transposition without a use of synthetic interposition graft.

Keywords: Aberrant right subclavian artery, Arteria lusoria; RCCA; TEE

Introduction

Aberrant right subclavian artery (*arteria lusoria, AL*) is a rare anomaly of the offspring (Figure 1a) from the proximal descending aorta and the course (Figure 1b) of the artery behind the esophagus, compressing it and causing dysphagia lusoria. A plethora of surgical approaches have been described like full median sternotomy [1], left and right thoracotomy [2,3], supraclavicular cervical incision [4] and combined surgical and interventional approach [5], but there is no consensus on the most favorable method. We present a minimal access approach for translocation of the AL to the Right Common Carotid Artery (RCCA) through partial upper mini-sternotomy.

Surgical Technique

Neurologic monitoring consisted of cerebral near-infrared spectroscopy and bilateral monitoring of radial artery pressure. A Transoesophageal Echocardiography (TEE) probe was placed to assist with identification of the oesophagus. After an 8 cm skin incision, an inverted "T" upper mini-sternotomy was performed down to both fourth intercostal spaces. The left brachiocephalic vein was dissected free and pulled caudally with an elastic loop. Both CCAs were circumferentially dissected free for a length of 8 cm. A dissection plane was developed between the trachea and the right parietal pleura. The right vagus nerve was exposed between the trachea and the oesophagus. The TEE probe was pulled back and the dissection plane was further extended behind the oesophagus to expose the AL (Figure 1c). Another dissection plane was developed between the trachea and the left CCA and extended dorsally along the medial aspect of the left parietal pleura. The left recurrent laryngeal nerve and the thoracic duct were identified. Further dorsally, the origin of the AL from the descending aorta was dissected free (Figure 1d) and after administration of heparin, the AL was clamped on the right side of the trachea, and divided on the left side of the trachea at the level of its offspring with vascular stapler (Endo GIA™ 30 mm, Medtronic, Minnesota, USA). The AL was pulled behind the esophagus and delivered on the right side of the trachea in the anterior mediastinum. After securing adequate right hemispheric cerebral perfusion with test occlusion of the RCCA, the AL was anastomosed on the RCCA (Figure 1e) taking care not to twist or kink both arteries. After completion of the procedure, both radial pressure tracings were identical.

Discussion

An ideal treatment of dysphagia lusoria should relieve the dysphagia and restore the blood flow to the right axillary artery. A division and transposition of the AL upon the right common carotid artery is the recommended operation for this condition. Several different approaches have been described. The left thoracotomy offers an ideal exposure to the origin of the vessel, but makes the transposition very difficult, and the necessity of a second incision may not be avoidable [6]. The right thoracotomy approach gives a good exposure to the distal part of the AL and the RCCA; however, makes it very challenging to reach the origin of the AL. Leaving a long stump has been

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Received Date: *26 Nov 2019*
Accepted Date: *13 Dec 2019*
Published Date: *17 Dec 2019*

Citation:
Risteski P, Radwan M, Mitrev Z, Walther T. Minimal Access Transposition of Arteria Lusoria through an Upper Mini-Sternotomy. Clin Surg. 2019; 4: 2681.

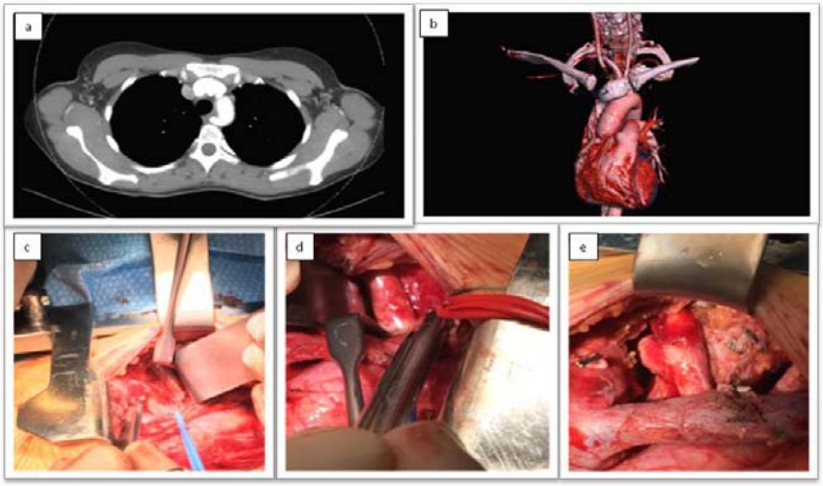

Figure 1: Treatment of dysphagia lusoria. a) Axial plane showing the offspring of the AL from the descending aorta. b) 3D Reconstruction of the course of the AL. c) Exposure of the distal extent of the AL. d) Exposure of the offspring of the AL from the descending aorta. e) Transposition of the AL on the right CCA.

repeatedly reported to be the main reason for residual dysphagia [1,4,6,7]. Cervical or supraclavicular approach seems to be the least preferred strategy. Working in a "tunnel" and having to perform deep anastomosis have been associated with significant hemorrhagic complications requiring conversion to median sternotomy [8]. Staged surgical (carotid-subclavian transposition) and interventional (catheter occlusion of the AL or aortic stenting) procedures carry risk of residual compression, device migration and infection of the aortic stent. The approach described in this report offers direct control of the offspring and the distal extent of the AL. Digital control of all anatomic structures was possible. The remaining stump was only 2 mm in height and the full length of the artery was available for mobilization and transposition without a use of synthetic interposition graft. The ascending aorta is readily available for transposition in order to avoid mismatch if the right CCA is of small diameter, or when the cerebral circulation is jeopardized during the temporary occlusion of the CCA. There is no need for a second incision, and the anastomosis is not performed in a deep tunnel but few centimeters below the skin level.

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