pulmonary veins draining separate lobes of the right lung as it traveled superiorly. Unlike the majority of right-sided vertical veins that insert into the superior caval vein, this vein took an atypical turn and inserted into the innominate vein. This abnormality may have contributed in part to the etiology of the obstruction. Although this vein travels in the opposite direction, it shares anatomical features with that of classical Scimitar syndrome, a rare form of partial anomalous pulmonary venous connection.[2] Commonly, the lower and middle lobe of the right lung drain inferiorly to the inferior vena cava and in 21% of cases involves the entire right lung.[2] This presentation similarly collects the near entirety of the right lung as it traveled a serpentine pattern prior to inserting aberrantly into the innominate vein. Vertical veins crossing the midline is a previously described entity,[3] but this remains a rare form of this disease.

This case reinforces the benefit of 3-dimensional cardiac computed tomographic reconstruction techniques in understanding the anatomy of complex congenital heart lesions, such as this rare form of TAPVC. The combination of the 2-dimensional source imaging from the cCTA and the 3-dimensional virtually dissected images allowed our surgical team to visualize this rare disease process and devise a comprehensive plan prior to repair. The imaging studies were essential to planning this surgery and the knowledge provided by the scan demonstrated preoperatively where ligation point of the vertical vein should be and highlighted the spatial orientation of the disease relative to other important structures. The use of cCTA in this patient preoperatively contributed significantly to the positive surgical outcome for this patient.

Authors' Statement

Permission was obtained from the patient's family to publish this case report.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

David M. Leone https://orcid.org/0000-0002-4296-4081
Jeremy M. Steele https://orcid.org/0000-0003-3121-3036

Supplemental Material

Supplemental material for this article is available online.

References

1. Allen HD, Shaddy RE, Penny DJ, Feltes TF, Cetta F, Moss AJ. Moss and Adams' heart disease in infants, children, and adolescents: including the fetus and young adult; 2016.
2. Vida VL, Padalino MA, Boccuzzo G, et al. Scimitar syndrome: a European congenital heart surgeons association (ECHSA) multicentric study. *Circulation*. 2010;122(12):1159-1166.
3. Gathman GE, Nadas AS. Total anomalous pulmonary venous connection: clinical and physiologic observations of 75 pediatric patients. *Circulation*. 1970;42(1):143-154. doi:10.1161/01.cir.42.1.143. PMID: 5425587.

Repair of Aberrant Right Subclavian Artery Causing Dysphagia Lusoria via Partial Median Sternotomy

Kevin R. An, MD[1], Mimi X. Deng, MD[1], Lindsay R. Freud, MD[2], and Osami Honjo, MD, PhD[1]

[1] Division of Cardiovascular Surgery, Labatt Family Heart Centre, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada
[2] Division of Cardiology, Labatt Family Heart Centre, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada

DOI: 10.1177/21501351221137826

Abstract

While unusual, aberrant right subclavian artery (ARSCA) can occasionally be a source of significant dysphagia in children. We present a case of a 13-year-old female who reported a three-year history of dysphagia to solid foods and was found to have ARSCA on a barium swallow study and computed tomography scan of the chest. We reimplanted the ARSCA into the right carotid artery in end-to-side fashion using a partial median sternotomy approach. At six months follow-up, her symptoms had completely resolved, and her postoperative echocardiogram showed an unobstructed reimplanted ARSCA.

Meeting presentation: AATS 102nd Annual Meeting; May 14, 2022; Boston, MA.

Introduction

Aberrant right subclavian artery (ARSCA) is a congenital anomaly with a prevalence of 1.2% to 2.2% in the general population.[1] ARSCA usually does not cause symptoms as it does not form a complete vascular ring. However, in selected cases, the artery can cause

Submitted July 10, 2022; Accepted October 4, 2022.

Corresponding Author:
Osami Honjo, Division of Cardiovascular Surgery, Labatt Family Heart Center, The Hospital for Sick Children 555 University Avenue Toronto, Ontario, Canada M5G1X8.
Email: osami.honjo@sickkids.ca

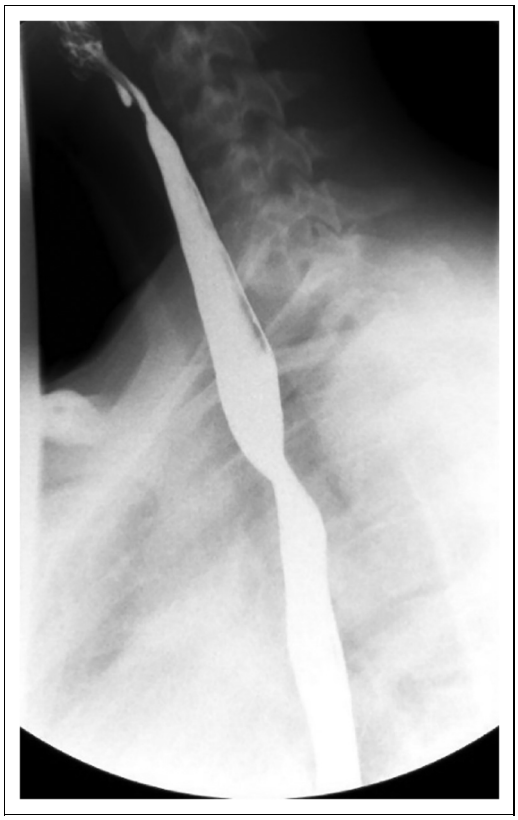

Figure 1. Barium swallow study demonstrating a mid-thoracic esophageal compression.

posterior esophageal compression due to limited space between the esophagus and spine.

Clinical Summary

A 13-year-old female presented with a three-year history of dysphagia to solid foods. She occasionally regurgitated or vomited solid foods that she could not swallow. She had a history of velopharyngeal insufficiency with a posterior pharyngeal flap. A barium swallow study noted a mid-thoracic esophageal compression concerning for aberrant right subclavian artery (Figure 1). Computed tomography scan of the chest confirmed an ARSCA arising from the left aortic arch as the fourth branch coursing posteriorly behind the esophagus without a Kommerell diverticulum (Figure 2A and B). The proximal part of the ARSCA was more dilated than usual, which could have caused her symptoms. The challenges of this case involved the decision to pursue operative or medical management as well as the choice of surgical approach. Written informed consent for publication was obtained from the patient.

Surgical Technique

A partial upper median sternotomy to the third intercostal space, without a J- or T-shaped sternal incision, was performed to reimplant the ARSCA to the right carotid artery. In children, a J- or T-shaped sternal incision is not necessary due to the flexibility of the sternum, and a central sternal split of the manubrium and upper sternal body is adequate for exposure. The dissection was continued along the posterior aspect of the aortic arch, until the ARSCA was identified and encircled at its base with a vessel loop. Identifying the artery's path right of the esophagus was more challenging due to its posterior position. By dissecting along the superior border of the innominate vein and along with the right lateral border of the trachea and esophagus, the distal extent of the right subclavian artery was identified and encircled. With proximal and distal control obtained, the ARSCA was clamped and divided at its proximal extent. The aortic arch was oversewn, and the artery was brought anterior to the esophagus and trachea by dissecting the soft tissue surrounding it. After the administration of heparin, a partial clamp was placed on the right carotid artery. The right subclavian artery was beveled and anastomosed to the right carotid artery in end-to-side fashion (Figure 3). After de-airing maneuvers were performed, a strong ARSCA pulse was felt. The chest was closed in routine fashion with one chest tube in-situ. The patient tolerated the surgery well and was discharged on postoperative day two. At six months follow-up, her symptoms of dysphagia had resolved and her postoperative echocardiogram showed an unobstructed reimplanted ARSCA.

Comment

First reported by Bayford in 1794 and repaired by Gross in 1946, ARSCA is a common congenital anomaly that usually does not cause symptoms.[2] When symptoms of dysphagia occur, it is termed "dysphagia lusoria." Symptoms in children are usually due to the vessel appearing taut across the posterior esophagus, causing compressive symptoms, while symptoms in adults are more often due to age-related atherosclerotic changes or aneurysmal dilation, termed Kommerell diverticulum. In symptomatic children without a Kommerell diverticulum dietary modification with soft foods or smaller bites may be attempted if symptoms are mild, although this is controversial.[3] In our case, upon discussion at multidisciplinary case rounds, given the severity of symptoms and lack of another cause, the decision was to proceed with the operation.

There are a number of different surgical approaches to ARSCA. Previous reports have described supraclavicular, right or left thoracotomy, and median sternotomy approaches.[2,4–6] We chose a partial median sternotomy approach due to the belief it would provide the optimal exposure for accessing both the base of the right subclavian and the right carotid artery for end-to-side anastomosis. It is important to ensure that the vascular stump is not left too long and there is no persisting ligamentum arteriosum or dysphagia symptoms that may not resolve.[6] Long-term outcomes of repair in children are good with one study reporting no long-term need for reoperation in 56 patients undergoing repair.[7] Our case demonstrates isolated ARSCA as the cause of significant dysphagia in a child with complete resolution of her symptoms by relocation and reimplantation of her ARSCA.

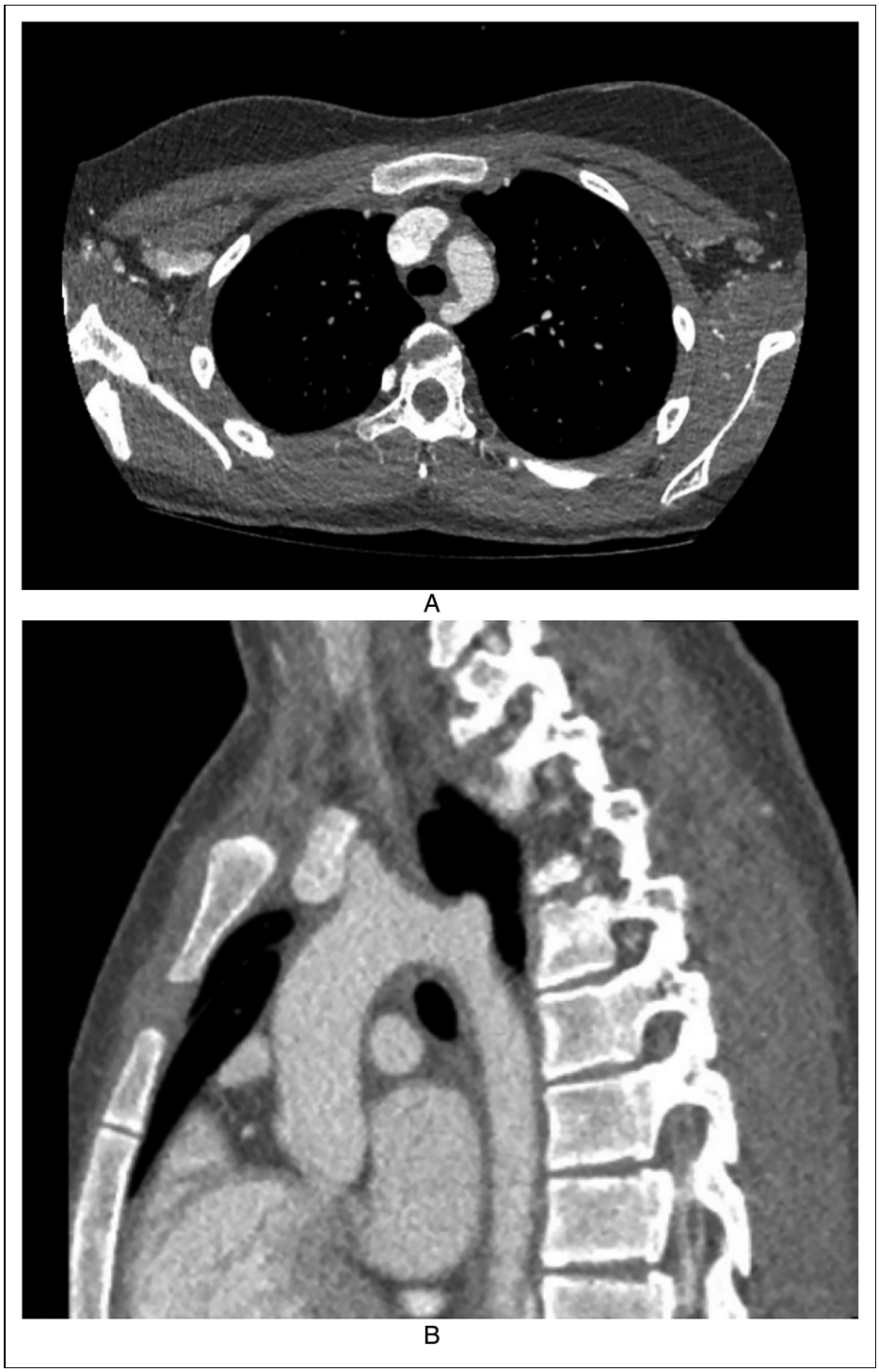

Figure 2. A and B, Computed tomography scan of the chest in axial (left) and sagittal (right) views demonstrating the right subclavian artery emerging from the left aortic arch coursing posteriorly behind the esophagus without a Kommerell diverticulum (left).

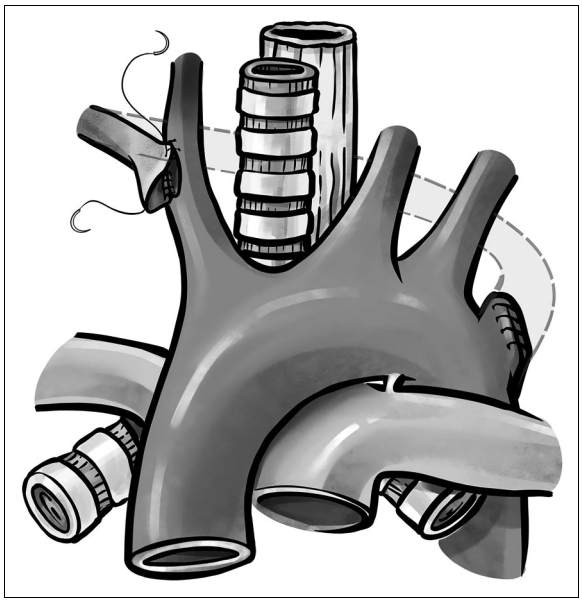

Figure 3. Operative diagram showing the reimplantation of the aberrant right subclavian artery into the right carotid artery.

Authors' Statement

Written patient informed consent obtained.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Kevin R. An https://orcid.org/0000-0002-9184-4510

References

1. Natsis K, Didagelos M, Gkiouliava A, Lazaridis N, Vyzas V, Piagkou M. The aberrant right subclavian artery: cadaveric study and literature review. *Surg Radiol Anat.* 2017;39(5):559-565. doi: 10.1007/s00276-016-1796-5
2. Gross RE. Surgical treatment for dysphagia lusoria. *Ann Surg*. 1946;124(3):532-534.
3. Silva HM, Silva G, Lima R. Dysphagia lusoria: uncommon cause of dysphagia in children. *Rev Esp Enferm Dig*. 2018;110(9):600.
4. Janssen M, Baggen MGA, Veen HF, et al. Dysphagia lusoria: clinical aspects, manometric findings, diagnosis, and therapy. *Am J Gastroenterol.* 2000;95(6):1411-1416. doi:10.1016/S0002-9270(00)00863-7
5. Rathnakar R, Agarwal S, Datt V, Satsangi DK. Dysphagia lusoria with atrial septal defect: simultaneous repair through midline. *Ann Pediatr Cardiol*. 2014;7(1):58-60. doi:10.4103/0974-2069.126562
6. Mayer J, van der Werf-Grohmann N, Kroll J, Spiekerkoetter U, Stiller B, Grohmann J. Dysphagia after arteria lusoria dextra surgery: anatomical considerations before redo-surgery. *World J Cardiol*. 2017;9(2):191-195. doi:10.4330/wjc.v9.i2.191
7. Yu D, Guo Z, You X, et al. Long-term outcomes in children undergoing vascular ring division: a multi-institution experience. *Eur J Cardiothorac Surg.* 2022;61(3):605-613. doi:10.1093/ejcts/ezab432

Anomalous Origin of the Left Coronary Artery from the Pulmonary Artery Associated with Right Coronary Giant Aneurysm

Martin Antelo, MD[1,2], Diego Freire, MD[2], Alvaro Dendi, MD[1], Gabriel Parma, MD[2], Nicolas Fernandez, MD[1], and Dante Picarelli, MD[1]

[1] Instituto de Cardiologia Integral, Montevideo, Uruguay
[2] Centro Cardiovascular Universitario, Hospital de Clinicas, Montevideo, Uruguay

DOI: 10.1177/21501351221135767

Abstract

Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) is a rare congenital malformation, usually diagnosed in the infant period due to myocardial ischemia and heart failure, with the need for emergency surgery. Less commonly, it can be asymptomatic until adulthood. Coronary artery aneurysms are also rare anatomical anomalies with symptoms of acute or chronic angina or even remain completely asymptomatic. We present an unusual case of ALCAPA, associated with a giant aneurysm of the right coronary artery.

Meeting presentation: American Association for Thoracic Surgery 102nd annual meeting, Boston MA, USA, May 16, 2022.

Introduction

Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) is a rare congenital anomaly, usually diagnosed early in life, with symptoms of severe heart failure requiring urgent heart surgery.

In the infant period, due to the physiological reduction in pulmonary vascular resistance and the closure of the ductus arteriosus, the left coronary flow is reversed, generating a coronary to pulmonary artery fistula and myocardial ischemia.

Submitted September 7, 2022; Accepted October 4, 2022.

Corresponding Author:
Martin Antelo, Instituto de Cardiologia Integral, 8 de Octubre s/n, CP:11600, Montevideo, Uruguay.
Email: martin.antelo@hotmail.com