

Fluttering cord-like thrombus in the aortic arch

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Abstract

Optimal treatment for aortic thrombus remains to be determined, but surgical treatment is indicated when there is a risk for thromboembolism. We report a rare case of a fluttering cord-like thrombus extending from the ascending aorta to the left carotid artery that was removed under hypothermic circulatory arrest and direct cannulation of the left carotid artery to avoid carotid thromboembolism. The patient had an uneventful postoperative course and was discharged 9 days after surgery.

Introduction

A fluttering cord-like thrombus in the aortic arch is occasionally observed in clinical practice. The pathophysiology of these lesions is unclear, however, and optimal management remains debated. Emergent surgical removal is necessary when the risk for embolism is high. Here, we report a useful strategy for a fluttering cord-like thrombus in the aortic arch extending to the left carotid artery.

Case Report

A 47-year-old male presented with weakness in his left arm upon awakening. Mild fine motor impairment and mild paresthesia were observed. Magnetic resonance imaging (MRI) showed cerebral infarction in the left frontal and parietal lobe. Contrast-enhanced computed tomography (CT) revealed a well-defined pedunculated cord-like object in the aortic arch extending from the lesser curvature of the ascending aorta into one-third the length of the left common carotid artery (**Figure 1**). CT also showed mural thrombus and stenosis of the abdominal aorta and obstruction of the right common iliac artery and the left deep femoral artery. Transesophageal echocardiography revealed a mobile pedunculated object suggestive of a thrombus arising from the ascending aorta and extending to the left common carotid artery (**Figure 2**). Hematologic investigations, including lipid profile, hematocrit, platelet count, protein C, protein S, and antiphospholipid antibody, were unremarkable.

Because the object was considered high risk for additional embolic events, the patient underwent emergent surgery. The operation was performed through a median sternotomy. Cardiopulmonary bypass was established by cannulation of the right femoral artery and right atrium. In order to prevent embolism of the thrombus, we undertook direct cannulation into the left common carotid artery distal to the thrombus. The left common carotid artery was exposed by a separate left cervical incision (parallel to the left sternocleidomastoid muscle). While cooling the patient to 28°C, the left common carotid artery was incised and directly cannulated with a balloon-tipped catheter for selective antegrade cerebral perfusion (SACP) via the left cervical incision. The proximal side of the left common carotid artery was clamped. Under deep hypothermic circulatory arrest, the ascending aorta was opened through a longitudinal incision. The cord-like object suggestive of a thrombus was attached to the lesser curvature of the ascending aorta and extended into the left common carotid artery. The thrombus was easily removed from the aortic wall. The brachiocephalic artery

was cannulated with a balloon-tipped catheter for SACP. Thrombectomy with a 5 Fr Fogarty catheter was performed into the left common carotid artery, but no thrombus remained. The aortotomy was closed with 4-0 polypropylene continuous suture.

Histopathological examination revealed that the object was a thrombus (**Figure 3**). The postoperative course was uneventful. No additional embolism was observed. The patient was discharged 9 days after surgery. The patient was treated with oral aspirin, clopidogrel, and warfarin postoperatively. No recurrence of the thrombus was observed at the one-year follow-up.

Discussion

The pathophysiology of a fluttering cord-like thrombus in the aortic arch is unclear. Thrombophilic states are infrequently observed. Laperche et al. reported that, among 23 patients with mobile thrombi of the aortic arch, only 4 cases presented with thrombophilic states [1]. In our case, the patient did not have a thrombophilic state, but the aorta was atherosclerotic. Mural thrombus and stenosis of the abdominal aorta and obstruction of the right common iliac artery and the left deep femoral artery were observed.

Evidence related to management of thrombus in the aorta is very limited. A few cases reported successful management with anticoagulant therapy [2] [3]. Medical treatment (heparinization), endovascular stenting [4], and surgery have been proposed, but no comparative data are available. In our case, because MRI revealed cerebral infarction and the fluttering cord-like thrombus extended to the left common carotid artery, the thrombus was considered high risk for additional cerebral infarction and we performed thrombectomy.

Traditionally, aortic thrombus have been removed under hypothermic cardiac arrest either by distal ascending aortic cannulation [5] or femoral cannulation [6]. Kalangos et al. reported the successful removal of a thrombus in the proximal ascending aorta without hypothermic circulatory arrest [7]. We performed thrombectomy under hypothermic circulatory arrest and selective cerebral perfusion using cardiopulmonary bypass through the femoral artery and the right atrium. In our case, a fluttering cord-like thrombus attached to the aortic arch extended to the left common carotid artery. To prevent distal embolization of the thrombus, the left common carotid artery was directly cannulated with a balloon-tipped catheter for SACP via the left cervical incision and the proximal side of the left common carotid artery was clamped. After thrombectomy under hypothermic cardiac arrest, the brachiocephalic artery was cannulated with a selective cerebral perfusion cannula. This technique is considered useful when a thrombus in the aortic arch extends to the neck arteries.

Conclusion

A fluttering cord-like thrombus in the aortic arch may develop in patients who are not in the thrombophilic state. When a thrombus in the aortic arch extends to the neck arteries, direct cannulation of the neck arteries with selective cerebral perfusion via cervical incision is a useful technique.

References

- [1] Laperche T, Laurian C, Roudaut R SP. Mobile thromboses of the aortic arch without aortic debris. A transesophageal echocardiographic finding associated with unexplained arterial embolism. The Filiale Echocardiographie de la Société Française de Cardiologie. *Circulation* 1997;96:288–94. [2] Stoßlberger C, Kopsa W, Finsterer J. Resolution of an aortic thrombus under anticoagulant therapy. *Eur J Cardio-Thoracic Surg* 2001;20:880–2. [3] Maloberti A, Oliva F, Chiara B De, Giannattasio C. Asymptomatic aortic mural thrombus in a minimally atherosclerotic vessel. *Interact Cardiovasc Thorac Surg* 2016;22:371–4. [4] Scott DJ, White JM AZ. Endovascular management of a mobile thoracic aortic thrombus following recurrent distal thromboembolism: a case report and literature review. *Vasc Endovasc Surg* 2014;48:246–50. [5] Choi JB, Choi SH, Kim NH, Jeong JW. Floating Thrombus in the Proximal Aortic Arch. *Texas Hear Inst J* 2004;31:432–4. [6] T Walther, M Mochalski, V Falk FWM. Resection of a Thrombus Floating in the Aortic Arch. *Ann Thorac Surg* 1996;62:899–901. [7] Kalangos A, Vala D, Bednarkiewicz M, Faidutti B. Technical Implications regarding Surgical Removal of a Floating Thrombus Located in the Ascending Aorta or Aortic Arch. *Ann Vasc Surg* 1999;13:115–20.

Figure Legends

Figure 1

Contrast-enhanced sagittal oblique view of the thoracic aorta showing intraluminal, hypodense, and linear strands of a nonenhancing structure (red arrows) in the ascending aorta extending to the left common carotid artery (yellow arrow), suggestive of a thrombus.

Figure 2

Transesophageal echocardiography showing a fluttering cord-like thrombus in the aortic arch extending to the left common carotid artery.

Figure 3

Specimens of the excised thrombus.



