Surgical Repair for Chronic Traumatic Thoracic Aneurysm after 12-year Follow-up

A 39-year-old man underwent surgical repair of chronic traumatic thoracic aneurysm after 12-year follow-up at our hospital. Eighteen years prior to surgery, he had been involved in a traffic accident, suffering a left hemopneumothorax. Chronic traumatic thoracic aneurysm is extremely rare that few guidelines for surgical intervention exist for this disorder. However, it has been observed that all patients with new symptoms should be operated promptly, and that asymptomatic aneurysm detected over 2 years after the initial trauma can be monitored by careful follow-up pending symptomatic or radiologic change. The present case provides additional support for these strategies.

Key words: trauma, aneurysm, surgery

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Although thoracic aneurysm resulting from nonpenetrating trauma is a well-recognized clinical entity,1 few guidelines exist for delayed surgical intervention after unoperated traumatic thoracic aneurysm, as it is extremely rare for those who sustained this injury to survive long enough to develop a chronic aneurysm.2 In Japan, some case reports about this disorder have occasionally appeared in the literature.3-4 In consideration of the fact that accumulated reports of this disorder are important in determining therapeutic strategies, the authors report a case of chronic traumatic thoracic aortic aneurysm treated surgically after long-term conservative management.

Case

A 39-year-old man was admitted to First Department of Surgery, Hirosaki University School of Medicine to undergo surgical repair of thoracic aortic aneurysm. The patient had been referred at the age of 27 after widening of the mediastinum was observed on the routine chest X-ray. Initial enhanced computed tomography (CT) revealed a densely calcified thoracic aortic aneurysm with a maximal diameter of 43 mm at the aortic isthmus. At the age of 21, the patient had been involved in a traffic accident and sustained traumatic left hemopneumothorax and compression fractures of thoracolumbar vertebrae. The aneurysm was therefore suspected to be a chronic traumatic aneurysm. Although surgical intervention was offered at this stage, the patient declined this approach as he was asymptomatic, and it was therefore decided to conduct a careful follow-up in order to detect any change in symptoms or radiological findings. No change in size occurred during 11-year follow-up (Fig. 1).

At the age of 38, hypertension developed and the aneurysm enlarged by 5 mm in the next year (Fig. 2). The patient consequently elected to undergo thoracic aortic repair. At operation, the thoracic aneurysm was exposed by left posterolateral thoracotomy through the fifth intercostal space. Femoro-femoral bypass was performed for spinal cord and abdominal visceral protection. The aneurysm began just proximal of left subclavian artery and terminated at the level of Th6. The maximum diameter was 45 mm and longitudinal length of aneurysmal segment was 12 cm. After clamping the aorta proximal to the left subclavian artery and terminated at the level of Th6, aortotomy revealed the aneurysm with circumferential projections at the proximal and distal margins of the aneurysmal wall. Between these projections, the aneurysmal wall was highly calcified although thrombus...
Fig. 1. Contrast computed tomography performed 17 years after injury revealed a densely calcified aneurysm at the aortic isthmus. The aneurysm measured 43 mm in maximum transverse diameter. No change in size occurred during 11-year follow-up.

Fig. 2. Preoperative computed tomography revealed slight (5 mm) enlargement compared to that performed in the previous year.

was absent. The wall of non-aneurysmal portion of the aorta was considered to be normal, and therefore suitable as an anastomotic site. The aneurysm was replaced with a 24-mm Hemiashield® graft (Meadox Medicals, Inc., NJ, USA). After proximal anastomosis, the aortic clamp was moved to distal to left subclavian artery and distal anastomosis was performed at the level of Th6. The postoperative course was uneventful. Histopathological appearance of the aneurysmal wall was consistent with traumatic aortic aneurysm, showing destruction of the intima, absence of atherosclerotic change in the aneurysmal wall, and a clear boundary between the aneurysmal wall and normal aorta. At 6 years after surgery the patient resumed normal activities and has remained on antihypertensive medication.

Discussion

Finkelmeier et al. defined chronic traumatic aneurysm as follows: a duration of 3 months or more after injury, a documented history of a major deceleration injury, and disruption of layers of the thoracic aorta confirmed on autopsy or operative exploration. Hence, the present case met these criteria. Traumatic thoracic aortic injury is often lethal, with mortality being high in the acute phase. Parmley et al. reported that only 2% of such patients survived long enough for chronic aneurysm to develop. Finkelmeier et al. conducted a comprehensive review of these cases, and concluded that chronic traumatic thoracic aneurysm is not a benign disease. At 15 years after injury, fewer than 16% of patients who had undergone surgery died, in contrast to almost 35% of those who did not. Although 75% of the deaths in the nonoperative group were due to hemorrhage, it is hard to predict aneurysm rupture. Moreover, some surgeons are reluctant to operate owing to the risk of major complications such as bleeding, spinal cord injuries, and cerebrovascular accidents.

Few guidelines exist regarding treatment of chronic traumatic aortic aneurysm. Some reports recommend that all patients should undergo surgery when new aneurysm-related symptoms and/or radiographic changes occur. In addition, Katsumata et al. made the recommendation that densely calcified asymptomatic aneurysms detected more than 2 years after the accident can be observed by repeated tomography unless new symptoms arise. The present case illustrates that aneurysmal enlargement can occur after a prolonged latent period. This finding thus confirms the above recommendation. When surgery is undertaken, extracorporeal circulation is recommended in order to remove time constraints and hypothermic circulatory arrest should be performed if needed. With chronic traumatic thoracic aneurysm tending to occur in young people, a long life expectancy can be anticipated. With this in mind, Roques et al. reported the usefulness of direct suture for this disorder in avoiding long-term complications due to prosthetic material. They also reported that a long interval (over 10 years) between injury and surgery impeded direct suture with mean durations of 18.8 years for aorto-aortic graft interposition versus 4 years for direct suture. In the present case, graft interposition was performed because 18 years had elapsed since the injury and aneurysmal length was 12 cm.

In the last decade, endovascular stent grafts have been proposed as an alternative technique. While safety and effectiveness of endovascular stenting have been reported over medium-term follow-up periods, results of long-term follow-up are not available. It would therefore appear reasonable to perform graft interposition in