Right Heart Failure Secondary to Compression of the Right Pulmonary Artery by a Large Proximal Aortic Aneurysm

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A 73-year-old woman, who was known to have a large proximal aortic aneurysm, was referred from the Gastroenterology Department for reevaluation for possible aortic surgery. At that time, she complained of fatigue and shortness of breath, which corresponded to New York Heart Association class III symptoms.

The patient had initially consulted us 1 year before this presentation. She had been diagnosed recently as having gastric cancer at that time, and additional tests revealed that she also had a proximal aortic aneurysm. Although the aneurysm was large, with a maximum diameter of 67 mm, her gastric cancer, classified as being in stage 4, was considered inoperable. The gastroenterologist estimated that she could probably live for ≈1 year. We discussed the options with the patient, and she rationally decided not to undergo aortic surgery at that time. She did not have any cardiac-related symptoms at that time. A chest radiograph showed a right-sided bulge of the mediastinum (Figure 1).

Chemotherapy was initiated for the cancer. It responded unexpectedly well to the chemotherapy, and the lesion in the stomach and a metastatic lesion in the liver both completely disappeared. Her physician started to think that she had a chance to live for >5 years and sent her to our clinic for a reevaluation.

At this second visit, she told us that she had started to experience shortness of breath and fatigue a couple of months after the first visit. She also had started to have leg edema and bilateral pleural effusion (Figure 1), so her physician had put her on oral diuretics. On physical examination, her heart rate was 82 beats per minute. The liver was enlarged and palpable 10 cm below the right costal margin. Transthoracic echocardiography was ordered, and it revealed a dilated right ventricle, dilated inferior vena cava with reduced inspiratory collapse, mild tricuspid regurgitation, and an estimated right ventricular systolic pressure of 51 mm Hg, whereas the left heart system was normal.

The 3-dimensional reconstructed computed tomography scan revealed that the proximal aortic aneurysm had become enlarged, with a maximum diameter of up to 78 mm, and it was compressing the right pulmonary artery between the aneurysm itself and the thoracic vertebrae (Figure 2; see Movie I in the online-only Data Supplement).

We scheduled an elective surgery. She underwent replacement of the aortic arch and the ascending aorta with a branched Dacron graft. The surgery went smoothly, and the postoperative course was uneventful. Pathological diagnosis was a degenerative aneurysm. Postoperative computed tomography showed well-expanded right pulmonary artery behind the graft (Figure 3; see Movie II in the online-only Data Supplement). Postoperative transthoracic echocardiography revealed that her right ventricular pressure had dropped to 23 mm Hg, and the inferior vena cava and the right ventricle had become normal sized. At 6 months after surgery, the patient was considered to be in New York Heart Association class I. Chemotherapy has been already discontinued with no sign of recurrence of the gastric cancer.

A large thoracic aneurysm may cause symptoms via a mass effect. We herein described a case in which a large proximal aortic aneurysm compressed the right pulmonary artery and thus caused right ventricular hypertension and right heart failure, which was resolved by surgery.

These relatively rare cases were reported in the literature more frequently in the prewar period when syphilis was much more common.1 From 1881 to 1946, 87 cases of corpulmonale caused by compression of the pulmonary arteries by aortic aneurysms were reported. Surgery for the proximal aorta was impossible in this era, so the prognosis was inevitably poor.1 In the modern era, because syphilis has dramatically decreased after the advent of antibiotics, only a few cases have been reported.2–4 Most of the reported cases of pulmonary hypertension caused by compression of the pulmonary arteries by true aneurysms did not undergo surgery, either because of the surgeons’ judgment or the patients’ wishes,2 and some who underwent surgery died after the procedure.3,4 Therefore, physiological changes after...
a successful surgery have not been well documented. This report showed that one can expect symptomatic and physiological relief after successful surgery in such cases, and modern computed tomography imaging makes it easier to understand the anatomy and pathophysiology and to evaluate the effects of treatment.

**Disclosures**

None.

**References**


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**Figure 1.** A, A chest radiograph taken at the patient’s first visit showed a right-sided bulge of the mediastinum. B, A chest radiograph at the patient’s second visit 1 year later showed bilateral pleural effusion.

**Figure 2.** Preoperative enhanced computed tomography images. A, Horizontal view. A large proximal aortic aneurysm is compressing the right pulmonary artery between the aneurysm itself and the thoracic vertebrae. B, Anterior view of the 3-dimensional reconstructed image. C, Posterior view of the 3-dimensional reconstructed image.

**Figure 3.** Postoperative enhanced computed tomography images. A, Horizontal view. The right pulmonary artery is well expanded behind the graft. B, Anterior view of the 3-dimensional reconstructed image. C, Posterior view of the 3-dimensional reconstructed image.
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Circulation. 2013;128:1588-1589
doi: 10.1161/CIRCULATIONAHA.113.001546

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/128/14/1588

Data Supplement (unedited) at:
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