Tuberculous pseudoaneurysms of the aortic arch

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Tuberculous aneurysms of the aorta are supposed to be exceedingly uncommon. In a recent review of the English literature from 1945 to 1999, 41 cases were counted, with only 2 aneurysms located at the aortic arch.¹ Incidence and presentation of tuberculosis change rapidly because of migration, traveling, and immunosuppression. Multiresistant strains and comorbidity impair the effects of medical therapy and might result in surgical complications.² Here we report on 2 patients on whom we have operated for tuberculous pseudoaneurysms of the aortic arch.

Clinical Summaries

PATIENT 1. A 54-year-old man had chronic silicotuberculosis after having worked in a quarry for more than 3 decades. He had a history of heavy smoking and drinking. Five months before the operation, he was admitted to another hospital for fever, weakness, and weight loss of 30 kg within a 2-month period. On the basis of positive sputum cultures and tubercular granulomas in liver and bone marrow biopsy specimens, he was given a diagnosis of reactivated miliary tuberculosis. Although quadruple tuberculostatic therapy somewhat improved his general condition, progressive enlargement of a mediastinal mass was observed during the following months. Computed tomography finally showed a 6-cm saccular aneurysm at the concavity of the aortic arch. The patient was transferred for urgent surgical intervention. On admission to our institution, the patient presented with dyspnea during minimal exertion and a CO diffusion capacity of 35%. Intraoperatively, a false aneurysm with excessive scarring and extremely dense adhesions of all surrounding tissues was encountered. Considering the reduced general condition of the patient, particularly the residual pulmonary function, a limited operation was performed. By using deep hypothermic circulatory arrest, the opening of the false aneurysm with a diameter of 3 cm was closed with a Dacron patch and a running suture. Substantial amounts of thrombus and necrotic tissue required extensive debridement. Histopathologic examination showed a tuberculous pseudoaneurysm, and adjacent

lymph nodes contained granulomas. Pulmonary infection and sepsis complicated the postoperative course. One month after the operation, the patient was discharged in stable condition with ongoing tuberculostatic medication. During a 3-year follow-up, the patient's health status improved considerably, including a gain in weight of more than 20 kg. Repeated computed tomographic scans showed a stable aortic situation.

PATIENT 2. A 72-year-old tourist from northern Germany collapsed in the city center. He was urgently admitted to the internal medicine service, where he experienced a general seizure. The deteriorating cardiopulmonary status of the patient required intubation and mechanical ventilation. Catecholamines and intravenous fluids were administered. A chest radiogram suggested and a computed tomographic scan confirmed the diagnosis of an 8-cm arch aneurysm with rupture into the left pleural cavity. An emergency operation was performed with total replacement of the aortic arch using femoral cannulation, deep hypothermic circulatory arrest, and retrograde cerebral perfusion for a false and supposedly mycotic aneurysm at the concavity of the aortic arch. The surrounding thrombotic debris was removed, and the diseased aortic wall was resected up to 5 cm distal from the ostium of the left subclavian artery. The tissue quality of the descending aorta at the suture line was friable and showed evidence of inflammation. Therefore an elephant trunk extension of the tubular graft deep into the descending aorta was performed. The aortic wall around the ostium of the left subclavian artery was completely resected, and the ostium was anastomosed separately from the other arch vessels to the tubular graft. Two liters of blood were removed from the left pleural cavity.

Tuberculosis was suspected in this patient because of (1) the macroscopic findings, (2) the experience with patient 1, and (3) the information from the patient's wife about a prolonged episode of fever and coughing after a trip to Russia 7 months earlier, followed by reduced general condition ever since. Histology and tissue cultures of the wall of the pseudoaneurysm confirmed the diagnosis of active tuberculosis.

After a stormy postoperative course, the patient recovered completely. Quadruple tuberculostatic therapy was continued for 1 year. Follow-up examinations in his hometown showed a stable aortic situation 2 years postoperatively.

Discussion

Tuberculosis is a substantial cause of infectious disease in the world, with about 8 million new cases and 3 million deaths each year.^{2,3} Major epidemiologic factors fostering the current spread of this disease in industrialized countries are traveling, migration, marginalized populations (eg, homeless or addicts), and immunosuppression, particularly concomitantly with AIDS.^{2,4} Our first patient was a heavy drinker and had chronic silicotuberculosis. The second patient had traveled to Russia, where tuberculosis is increasingly out of control.

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Aortic aneurysms are generally presumed to be an exceedingly rare complication of tuberculosis. Localization at the aortic arch is even less common, with only 2 cases in the literature in which aneurysms of the thoracic and abdominal aorta are reported with equal frequency.¹ However, a group from India recently identified 5 patients with tuberculous aortic aneurysms during a 3-year period, with one aneurysm localized at the aortic arch.⁵

As in our patients, greater than 80% of tuberculous aneurysms are in fact pseudoaneurysms.^{1,5} The perforation of the aortic wall is generally surrounded by thrombous debris and inflammatory tissue. *Mycobacterium tuberculosis* might reach the aortic wall through the blood stream, either directly in damaged intimal areas of the aorta as in atherosclerosis or through the vasa vasorum.¹ The most common mechanism in approximately 75% of patients is contiguous extension from an infectious focus, which are lymph nodes in two thirds of cases.¹

Clinical presentation in our patients as a rapidly enlarging aneurysm or as acute rupture corresponds well to the literature.^{1,5}

In 4 of 5 patients with tuberculous aortic aneurysms in the series by Choudhary and colleagues,⁵ tuberculostatic treatment was ongoing or completed. As in our first case, this demonstrates that medical therapy might not hinder development of a tuberculous aneurysm. This might be facilitated by the steadily increasing percentage of multiresistant strains of *M tuberculosis*.⁴ Vice versa, surgical therapy alone is not able to cure tuberculous aortic aneurysms. Survival and recovery are only possible by a combination of medical and surgical treatment.¹ Like others, we found that in contrast to other mycotic aneurysms, total removal of all infected tissue is not a requirement for recovery.⁵ In both of our patients, infected tissue probably remained postoperatively in close proximity to prosthetic material. In the second patient even the wall of the descending aorta was inflammatory and friable at the suture line. This problem was overcome by a long elephant trunk exten-

sion of the prosthesis. Local healing was uneventful, and both patients made a complete recovery, with a stable aortic situation 2 and 3 years postoperatively. Resection of the infected tissues and tube graft replacement of the aorta is supposed to be the standard surgical treatment.¹ More limited surgical intervention, such as patch closure of the aortic rent, is an option in selected cases such as our first patient because comorbidity significantly increases the mortality of tuberculosis per se.² However, undue tension in direct closure with sutures or with a small patch might result in treatment failure.⁵

In conclusion, tuberculous mycotic aneurysms of the aorta usually present as rapidly growing or ruptured pseudoaneurysms. Because of traveling, migration, immunosuppression, and multiresistant strains, surgeons might be confronted more often with this entity. A combination of medical therapy with operative debridement and graft placement is the only way to salvage patients struck with this disease.

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