# Multiple isolated aneurysms in a case of "burned out" Takayasu aortitis

**Janet J. Chieh, BS,[a] Lucy S. Brevetti, MD,[b] Peter M. Scholz, MD,[c] Alan M. Graham, MD,[b]** and **Rocco G. Ciocca, MD,[b]** *Piscataway and New Brunswick, NJ*

**Takayasu aortitis (TA) is a chronic inflammatory disease predominantly seen in young Asian women. The disease is idiopathic and largely affects the aorta and its major branches. The basic pathologic changes in TA are fibrosis and subsequent occlusion of the large arteries. TA is classically termed "pulseless" disease, with manifestations during the occlusive stage including limb ischemia, renovascular hypertension, and heart failure. Arterial dilation and aneurysm are largely unappreciated manifestations of TA, but they occur in as many as 32% of affected patients. We report chronic "burned out" TA in a 23-year-old Hispanic woman with isolated aneurysms of the descending thoracic aorta, abdominal aorta, and common iliac arteries, without occlusive disease. (J Vasc Surg 2003;37:1094-7.)**

Takayasu disease or aortitis is a chronic, idiopathic, inflammatory arteriopathic condition that leads to occlusion and ectactic changes in the aorta and its main branches. Predominant arterial complications of Takayasu aortitis (TA) are stenotic or occlusive changes, but fusiform or saccular aneurysms are reported in 2.8% to 31.9% of patients.[1,2] A limited number of reports have been published that describe TA with isolated multiple aneurysms in the absence of occlusive lesions and their subsequent physical findings, ie, classic "pulselessness."[3] An interesting case of chronic "burned out" TA and a brief review of the literature are presented.

## CASE REPORT

A 23-year-old Hispanic woman with history of hypertension reported dyspnea on exertion and back pain to her local physician in El Salvador in 1999. Aortic dilatation was indicated at chest radiography (Fig 1, *A*), and subsequent magnetic resonance angiography (MRA) revealed isolated thoracic aortic aneurysm (TAA), abdominal aortic aneurysm (AAA), and common iliac artery aneurysm (Fig 1, *B*). The patient was referred to our vascular service for treatment. She denied any recent fever, malaise, rest pain, or claudication, as well as any previous visual aberrations, rash, oral or genital ulcer, arthralgia, myalgia, or gastrointestinal tract disturbances. The medical history was unremarkable except for a 2-month episode of quadraplegia after a brief viral illness at 18 months of age, which resolved without neurologic complications. Family history was negative for aneurysmal disease or connective tissue disorders.

Physical examination demonstrated normal sinus rhythm, with blood pressure 131/81. There was no retinopathy or heart murmur signifying aortic regurgitation. There was an abdominal bruit and a mildly tender aneurysm, with normal upper and lower extremity pulse. Blood analysis including liver enzyme levels yielded normal findings. Rapid plasmin reagent test results and antinuclear antibody and rheumatoid factor levels were normal. Erythrocyte sedimentation rate was mildly elevated at 20 mm/h. The thoracic CT scan demonstrated the TAA, with maximum diameter of 8.5 cm, extending from the origin of the left subclavian artery to the diaphragm (Fig 2, *A*). The infrarenal AAA component measured 4.4 cm (Fig 2, *B*). A cardiac magnetic resonance image demonstrated no congenital abnormalities and an ejection fraction of 64%. A renal artery duplex scan was normal.

The thoracic aneurysm was repaired through a left thoracoabdominal incision with atriofemoral bypass. The left subclavian artery was controlled separately because of its proximity to the aneurysm. The thoracic aneurysm was severely fibrotic and thickened, consistent with a previously inflamed rather than an atherosclerotic aorta. A Dacron graft was placed just distal to the origin of the left subclavian artery, to the distal thoracic aorta and the aortic hiatus (Fig 2). The patient did well postoperatively and was discharged to home without complications. Three months later we performed an open AAA repair with a bifurcated Dacron graft. The infrarenal aorta was fibrotic and thickened, similar to the thoracic aorta. Its appearance was most consistent with an inflammatory aneurysm. The patient was again discharged to home in good condition. Cultures of the aneurysm tissue were negative. Histologic analysis of sections from the thoracic and abdominal aorta were evaluated by two pathologists at separate institutions. Multiple sections were reviewed, and the findings were consistent with TA.

## DISCUSSION

TA is an inflammatory disease of unknown cause that affects the aorta and its main branches and is found mainly in young women. It was first reported in 1908 by Takayasu, a Japanese ophthalmologist.[4] Distribution of TA worldwide is more common in Asia, but studies have shown an increased incidence in Mexico, Brazil, and Columbia.[1,5]

University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School, Piscataway, NJ[a]; and the Divisions of Vascular Surgery[b] and Cardiothoracic Surgery,[c] University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School, New Brunswick, NJ.

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Reprint requests: Rocco G. Ciocca, MD, Associate Professor, Division of Vascular Surgery, UMDNJ-Robert Wood Johnson Medical School, One Robert Wood Johnson Place, MEB 541, New Brunswick, NJ (e-mail: cioccarg@umdnj.edu).

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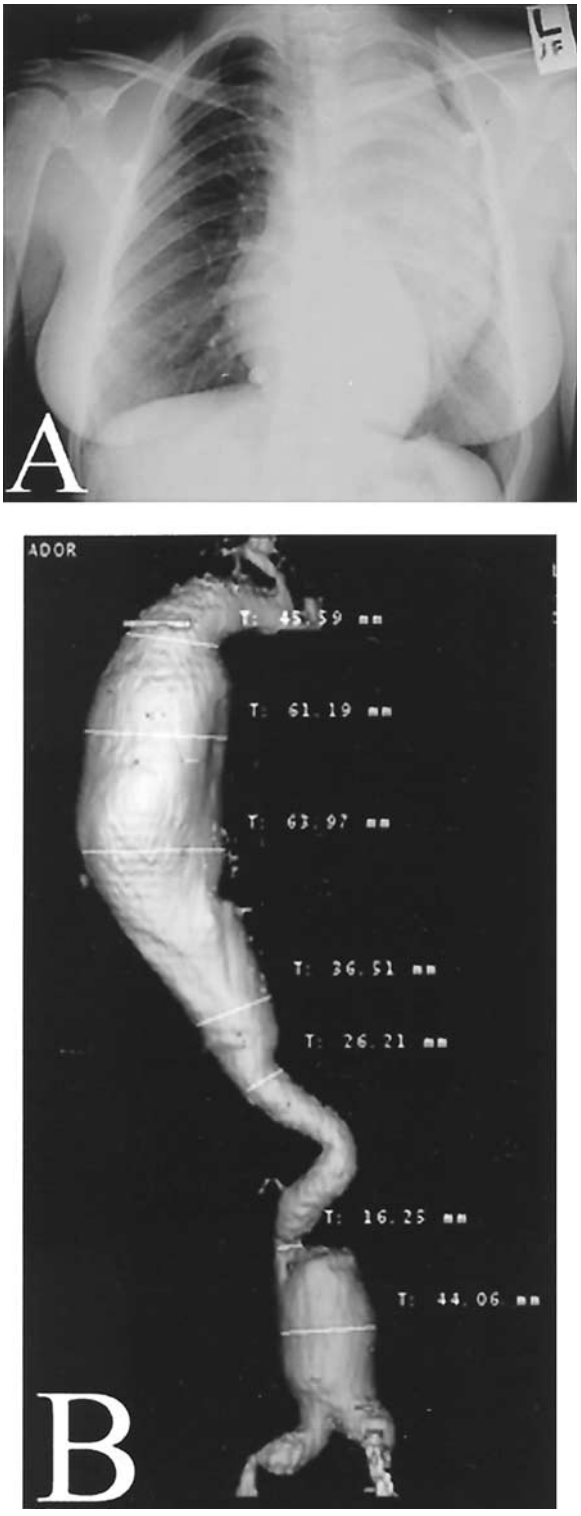


**Fig 1. A** and **B,** Chest radiographic and MRA findings. **A,** Anteroposterior chest radiograph demonstrates substantial aortic dilatation of the descending aorta. **B,** Three-dimensional reconstruction of MRA demonstrates isolated thoracic and abdominal aortic aneurysms extending from the origin of the left subclavian artery to the iliac bifurcation (posteroanterior projection).

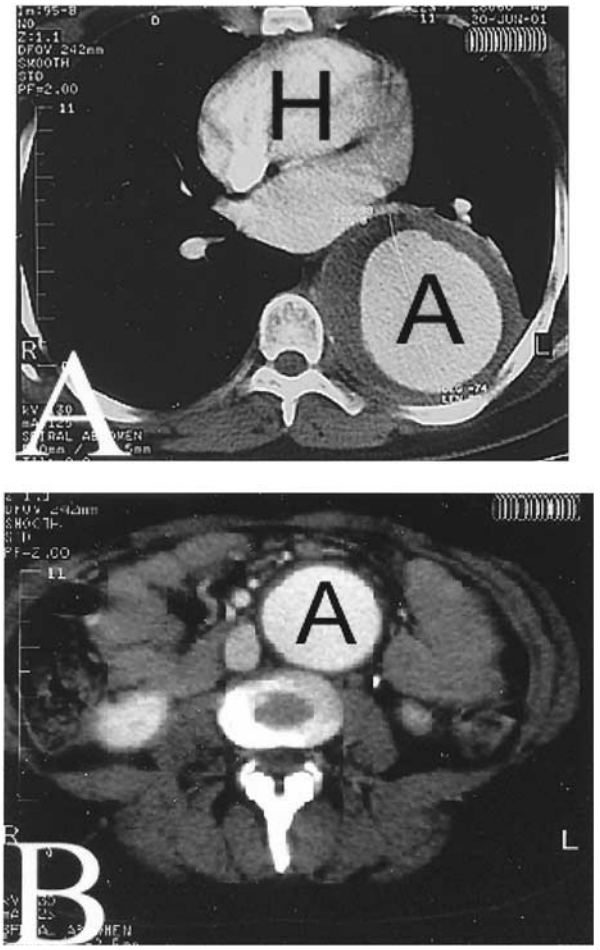


**Fig 2. A** and **B,** CT findings. **A,** Chest CT demonstrates 8.5 cm TAA *(A). H,* heart. **B,** Abdominal CT demonstrates 4.4 cm infrarenal AAA *(A).*

The course of TA usually extends over many years, with varying activity. Diagnosis begins with the clinical suspicion of aortitis, including the manifestations of pulselessness, atypical coarctation of the aorta, and renovascular hypertension in a young woman. Our patient's ethnicity, age, and history of hypertension were consistent with a diagnosis of TA. Selective angiography based on symptoms is then performed to define the distribution and extent of the disease. Finally, a diagnosis is made based on clinical findings at presentation and histopathologic analysis.

Normally TA is clinically subdivided into an early (prepulseless) stage and a late occlusive (pulseless) stage. The early stage consists of signs and symptoms of systemic inflammatory illness, eg, fever, malaise, weight loss, arthralgia, myalgia, chest or abdominal pain, and skin rash. The late occlusive stage consists of arterial insufficiency, eg, cerebrovascular symptoms (syncope, stroke, amaurosis fugax), myocardial or visceral symptoms, and upper or lower extremity involvement (claudication or rest pain). The diagnosis is usually made during the late occlusive stage

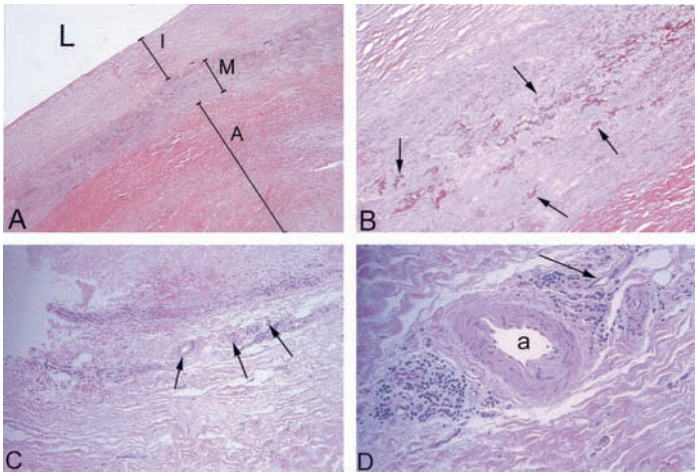


**Fig 3. A-D,** Pathohistologic findings of thoracic aorta. *A,* Low power view of the thoracic aorta shows marked intimal fibrosis. There is also extensive medial elastic degeneration and fragmentation, with increased collagen (Von Verhoeff stain, ×20). *L,* lumen; *I,* intima; *M,* media; *A,* adventitia. **B,** High-power view of Fig 2, A demonstrates scattered, fragmented elastic fibers *(arrows)* (Von Verhoeff stain, ×100). **C,** Low power view of thickened adventitia demonstrates common features of "burned out" TA, ie, irregular fibrosis and patchy collections of lymphocytes and plasma cells (hematoxylin-eosin stain, ×40). *Arrows,* vasa vasora. **D,** High power view of Fig 2, C demonstrates chronic perivasculitis with sparse infiltrate of mononuclear cells surrounding vasa vasora (hematoxylin-eosin stain, ×400). *a,* arteriole; *arrow,* venule.

because of the nonspecific nature of the early inflammatory symptoms. In our patient TA was noted incidentally on a chest radiograph, after the inflammation had resolved and before development of occlusive manifestations.

The pathologic features of TA vary according to stage of disease. The early stage is characterized by edema, patchy necrosis of the media and elastin, and chronic inflammation with infiltration by lymphocytes, plasma cells, and rare giant cells in the outer two thirds of the media, adventitia, and vasa vasorum. The late "burned out" stage is characterized by marked intimal and adventitial thickening, caused by fibrous scarring, which may contain dystrophic calcification and eventually lead to progressive luminal narrowing and stenosis. The intima is also hypocellular, with scattered smooth muscles and fibroblasts of the vessels. Suggestive of healed aortitis, specifically TA, the thickened adventitia and its vasa vasorum exhibit patchy collections of perivascular lymphoplasmacytic infiltrates. The elastic lamina of the media are disorganized or absent, replaced with collagen and granulation tissue. These changes predispose the vessel to aneurysmal degeneration.[11] These findings, often noted in the burned-out stage of TA, were seen in our patient (Fig 3, *A-D*).[7]

Our patient's clinical and histopathologic findings were consistent with TA. While the occlusive forms of TA have a highly characteristic appearance, the aneurysmal forms, as in this case, may create diagnostic difficulties, because the arteriographic appearance may be indistinguishable from other types of aortitis. Aneurysms with aortitis secondary to syphilis, Reiter syndrome, or Behçet syndrome were excluded in our patient with the absence of positive VDRL test results, arthritis, and oral or genital ulcers and ocular disturbances, respectively. Negative cultures of the aneurysm also excluded pyogenic aortitis as a possible diagnosis. Histopathologically, although many other causes of AAA also include extensive degeneration of the medial elastic fibers (eg, Marfan syndrome, Ehlers-Danlos syndrome), they also lack the dense adventitial fibrosis and perivasculitis characteristic of chronic TA. Other causes of aortitis, eg, inflammatory aneurysm with thinned media, giant cell arteritis, and syphilis, were also ruled out because of lack of atherosclerotic plaque, giant cells, and gummas, respectively. Therefore a diagnosis of TA was made on the basis of exclusion.

Isolated aortic aneurysms in TA are extremely rare in an already rare disease. Sheikhzadeh et al[8] described isolated aneurysms in 2% of their patients with TA. Most studies describe TAA and AAA in conjunction with stenosis. Aneurysms are a marker of extreme disease activity and are usually found in older patients with a longer history of the disease. Matsumura et al[2] described aneurysms in 31.9% of patients with TA, with higher frequency in patients older than 40 years, and mostly within the ascending aorta. This is in sharp distinction from the atypical findings in our patient, who was only 23 years of age and had multiple aneurysms without occlusive disease.

Anti-inflammatory and immunosuppressive agents are the cornerstone of medical therapy for TA. Although steroid therapy is still the treatment of choice in the active phase, it is not clear that steroids eradicate the inflammatory process completely,[3] and its indication in burned-out disease has not been widely studied. Ishikawa[9] reported angiographic improvement in 88% of patients with TA treated with steroids, although other studies show that 50% of patients who responded to steroids later had relapse of disease.

Operative management should consider the complexity of the pathologic changes produced by the inflammation, and surgery should be performed preferably when the disease is quiescent or if a sudden increase in aneurysm size occurs during observation. Weaver et al[12] suggest that medical treatment of TA in the acute phase leads to fewer surgical complications. Operative repair of TA is indicated if complications include retinopathy, hypertension, and cardiac involvement. Aortic regurgitation and aortic or arterial aneurysms left untreated result in greater morbidity and mortality.[6] Inasmuch as these patients are young and can anticipate a long life, aneurysms due to TA in a medically stable patient should be treated surgically. Although some report that incidence of rupture of either AAA or TAA is low (1-7%),[2,13] others report that repair of abdominal and thoracic aneurysms associated with TA is indicated if they are greater than 5 cm in diameter, believing that they are at high risk for rupture.[14] Operative morbidity and mortality specifically related to TA have not been well reported, but are not expected to be significantly different from surgery performed to treat other conditions.

Morbidity from TA is significant. Kerr et al[6] reported that 74% of patients had decreased activities of daily living, eg, bathing, feeding, and dressing, due to complications such as hemiparesis, blindness, nephrectomy, and opportunistic infections. Overall mortality from TA, however, was low (2%). The slow progression and occasional inactivation of TA allows for a good prognosis in most patients. Ishikawa et al[10] reported 5-year and 10-year survival rates between 80% and 90%.

TA should be considered in the differential diagnosis of descending aortic aneurysm in young women, even in the absence of occlusive or stenotic lesions. Arteriographic studies along with histopathologic analysis of the entire aorta and its major branches enable confirmation of the disease. The final result is a remarkable fibrotic process with thickening of the arterial wall, leading to obstruction (89%) and isolated aneurysmal dilatation (2% to 32%). An involvement with a mixed pattern has also been observed in approximately 13% of patients.[8] It is important for physicians to coordinate medical and surgical therapy carefully. Follow-up must be comprehensive and long-term.

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