

Brief report

## Takayasu's arteritis: a rare cause of cardiac death in a Caucasian teenage female patient

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### Abstract

A Caucasian teenage Dutch schoolgirl with known chronic low visual acuity and albinism, presented with frank acute pulmonary oedema, died after 1 h of cardio-pulmonary resuscitation for bradyarrhythmia and cardiac arrest. Two weeks prior to presentation, during sport training, she complained of oppressive chest pain on exertion accompanied with vomiting without any other systemic symptoms. Post-mortem examination revealed supravalvular stenosis of the pulmonary trunk and ascending aorta with irregular intimal thickening associated with stenosis of the left coronary artery. Microscopic examination demonstrated cellular infiltration of the wall of the aorta and pulmonary trunk with formation of granulomas with multinucleated giant cells. These features are compatible with Takayasu's arteritis. © 1997 Elsevier Science B.V.

*Keywords:* Takayasu's arteritis; Supravalvular aortic stenosis; Supravalvular pulmonary stenosis; Pulmonary oedema

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### 1. Introduction

Takayasu's arteritis (TA) is characterized by chronic vasculitis involving the aorta, the coronary and pulmonary arteries. Its aetiology is unknown, but autoimmune pathogenesis has been suggested by some workers. Generally, it is found in younger patients [1,2], with female preponderance [3,4].

Takayasu's arteritis is very rare in Caucasians but frequently found in South East Asian, South and Central American countries [1,2]. It has been re-

ported that the prevalence of TA in North America and Sweden is between 0.26 and 0.64 persons per 100 000 population per year [3,4]. Diagnosis of TA is often delayed because of a non-specific clinical presentation and absence of early pathognomonic signs or features of this disease. Therefore, criteria have been established for proper diagnosis and classification of TA [2,5].

This report presents the case history of a teenage schoolgirl who complained shortly before death of oppressive chest pain on exertion and died of frank pulmonary oedema and cardiac arrest subsequent to severe coronary artery narrowing, and supravalvular aortic and pulmonary stenosis caused by Takayasu's arteritis. The post-mortem findings are described.

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## 2. Case report

The patient was a 15-year-old Caucasian girl, with known chronic bad visual acuity, albinism and torticollis since birth. She had no history of hypertension and there were no other risk factors (hyperlipidaemia, diabetes mellitus, tobacco smoking, family history) for coronary artery disease.

Two weeks prior to admission, she was seen by her general practitioner because of oppressive chest pain and vomiting on physical exercise (athletic training) without other signs or symptoms. She was referred to the outpatient clinic of the Streektziekenhuis Midden-Twente. But, unfortunately, 2 days before the girl was actually seen at our outpatient department, she suddenly collapsed with hypotension, cardiac asthma and cyanosis. During transportation by ambulance to the hospital, furosemide intravenously and oxygen were given. Upon arrival at the hospital, her condition deteriorated rapidly into coma ( $E_1M_1V_{tube}$ ). She was in acute distress and expectorating frothy sputum streaked with blood. She was pulseless and had unmeasurable blood pressure. Cardio-pulmonary resuscitation (CPR) was initiated. She was intubated and mechanically ventilated with positive end-expiratory pressure (PEEP). For bradyarrhythmia and asystole, CPR was continued. After 1 h of external cardiac massage alternating with the administration of intravenous adrenalin and temporary transthoracic pacing, the procedure was terminated due to lack of response. During the whole procedure the Glasgow-coma score was  $E_1M_1V_{tube}$  and the pupils were wide and fixed. She was pronounced dead and her family gave permission for organ and tissue donation.

Her admission 12-lead ECG showed atrial fibrillation with rapid ventricular response of 140 bpm and complete left bundle branch block. Soon thereafter she developed bradyarrhythmia and asystole.

The laboratory test (normal values are indicated

between parentheses) demonstrated elevated white blood count  $19.3 \cdot 10^9/l$  (4.0–10.0), haemoglobin 7.8 mmol/l (7.6–9.6), haematocrit 0.46, sodium 137

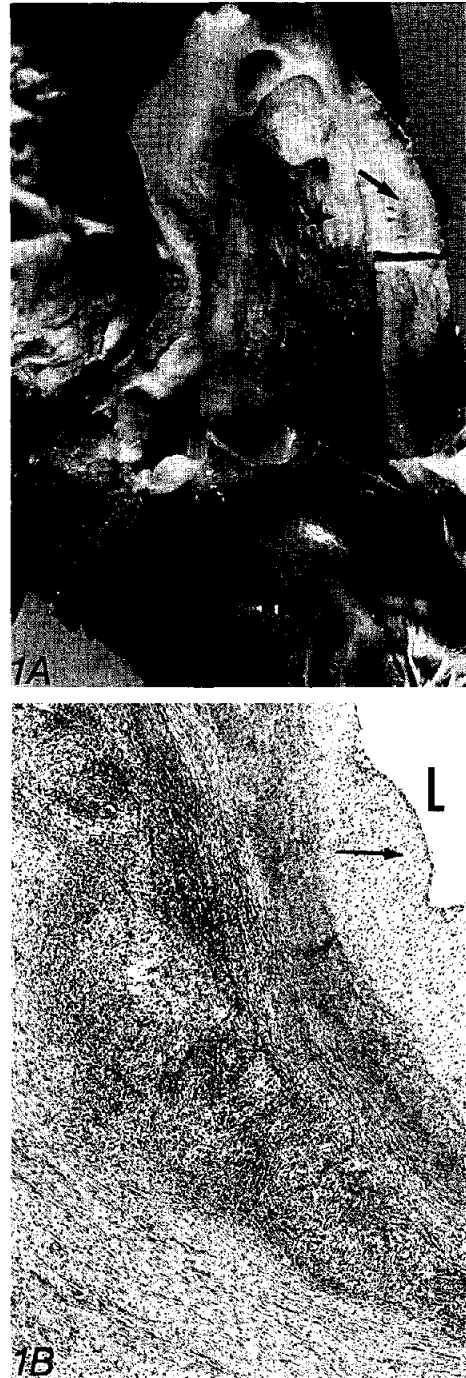


Fig. 1. (A) Gross macroscopic view of severely stenosed ascending aorta (arrow) with markedly thickened wall and irregular intimal surface (black star). (B) Microscopic examination demonstrating origin of the left coronary artery with severe narrowing of the lumen (L.) caused by thickened intimal fibrosis (arrow) (haematoxylin and eosin stain).

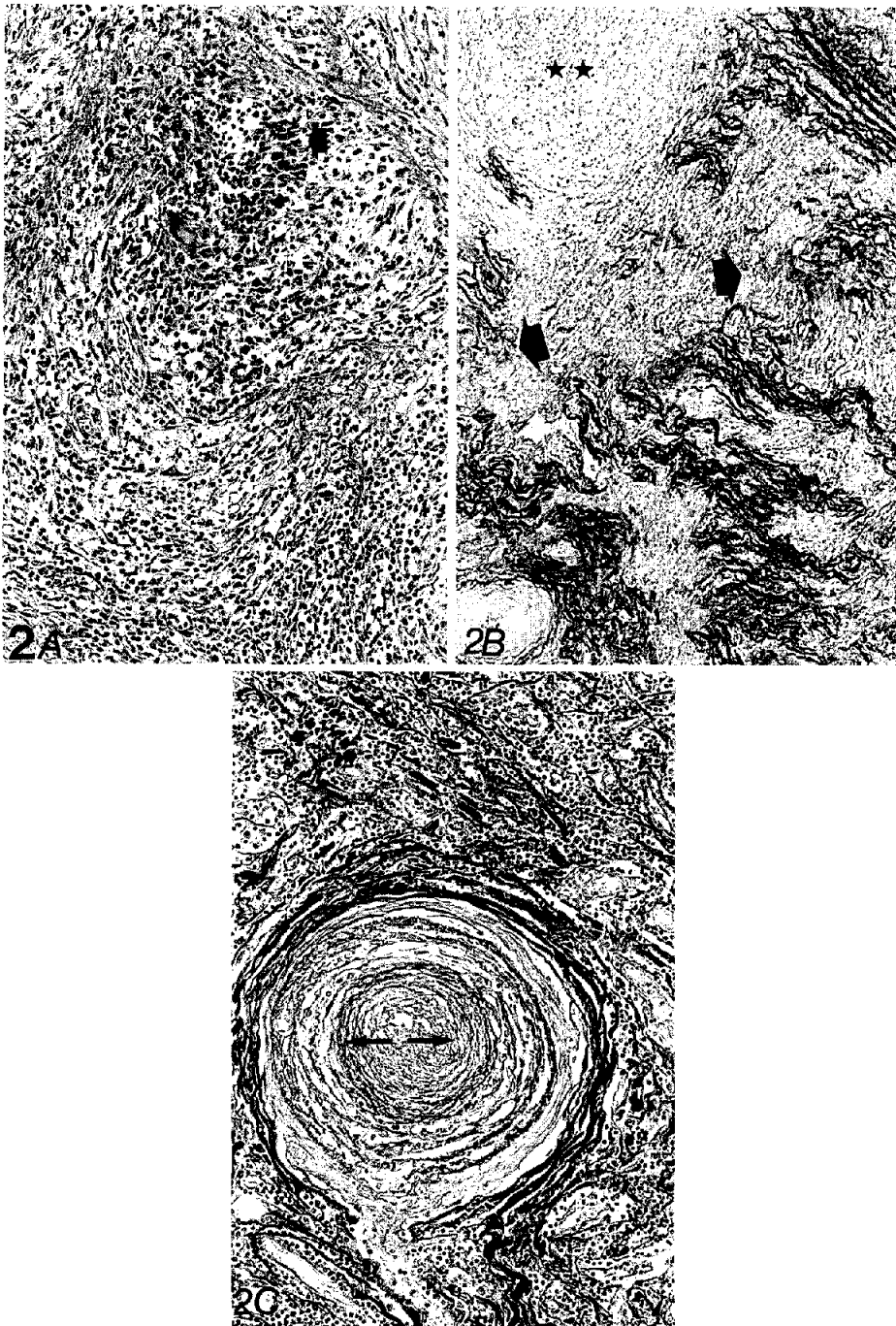


Fig. 2. (A) Microscopic examination showing granuloma in the wall of the left coronary artery with a multinucleated giant cell (black arrow) (haematoxylin and eosin stain). (B) Microscopic examination illustrating severe destruction of the elastic fibres (arrows) of the aortic wall (tunica media) and intimal fibrosis (\*\*\*) (clastin van Giesen stain). (C) Microscopic examination showing severe stenosis (<math>\langle \rangle</math>) of an artery in the adventitia of the aorta due to chronic inflammation (elastin van Giesen stain).

mmol/l (135–145), potassium 5.5 mmol/l (3.5–5.0) and creatinine of 127  $\mu$ mol/l (60–120). In the acute phase, the C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR) were unfortunately undetermined.

At autopsy, the heart was extirpated for taking out the aortic and pulmonary valves for transplantation. However, this was abandoned because of severe macroscopically visible pathology. The heart weighed 336 g. The epicardial surface showed multiple petechiae and there was a pericardial effusion (sterile after culture). The ascending aorta as well as the pulmonary trunk showed a severe supravalvular stenosis with irregular intimal thickening (Fig. 1A). The origin of the left coronary artery was found to be severely narrowed (Fig. 1B). Other findings were pulmonary oedema and congestion of the liver, spleen and kidneys.

Microscopic examination of the coronary arteries, the ascending aorta and the pulmonary trunk showed dense infiltration of the aortic wall and the wall of the pulmonary artery as well as the wall of the left coronary artery at its origin. This infiltration consisted mainly of lymphocytes, plasma cells and histiocytes, with, dispersed, several small granulomas with multinucleated giant cells (Fig. 2A). The tunica media of all three vessels showed extensive fragmentation and destruction of the elastic fibres (Fig. 2B). In the adventitia many arteries showed severe stenosing due to chronic fibrosing arteritis (Fig. 2C). The other coronary artery showed no abnormalities. The findings were compatible with Takayasu's arteritis.

### 3. Discussion

TA was first reported in 1908 by Dr. M. Takayasu, who described the ocular changes of the optic fundi consisting of wreath-like arteriovenous anastomosis around the optic disc in a 21-year-old woman [6]. Our 15-year-old Caucasian schoolgirl with chronic bad visual acuity and albinism complained of oppressive chest pain and vomiting on strenuous physical exercise shortly prior to her acute presentation with pulmonary oedema and atrial fibrillation with left bundle branch block quickly thereafter deteriorating into circulatory arrest, with fatal outcome, subsequent to bradyarrhythmia and asystole.

Congestive heart failure and terminal cardiac arrhythmia are found to be the main cause of death in patients with TA. In the series of Hata and associate 7 of 11 patients died of congestive heart failure or arrhythmia [1]. It has been reported that patients with TA are frequently found in South East Asia and South and Central America, but very rarely in Caucasians. The reported incidence in the Japanese population is 0.0025% [1].

In our case, there were no risk factors for coronary artery disease. The diagnosis was suspected and confirmed at autopsy.

Takayasu's arteritis is rather difficult to diagnose at its early stage, because the disease has no specific symptoms.

In 1990, the American College of Rheumatology suggested a set of criteria for the diagnosis of TA. The criteria consists of (a) age < 40 years, (b) claudication of an extremity (c) decreased brachial artery pulse (d) > 10 mmHg difference in systolic pressure between arms (e) a bruit over subclavian arteries or aorta and (f) angiographic evidence of narrowing or occlusion of the aorta or its primary or proximal branches. Presence of 3 of the 6 criteria is required for the diagnosis TA [2]. The obligatory criteria of age was removed by Sharma et al. [5].

Our 15-year-old patient did not fulfil all clinical criteria of TA. It was impossible to match the criteria because of the rapid course of her acute catastrophic illness. The diagnosis was based mainly on the findings of post-mortem investigation and pathological anatomy studies.

Patients with Takayasu's arteritis could seek treatment for various kinds of complaints such as dizziness, faintness, neck pain, dullness, palpitation, and dyspnea [1]. In addition, complaints could include fever, nausea, weight loss, paresthesias, visual disturbance, myalgias, arthralgias and syncope [2,5]. In our case, oppressive chest pain and vomiting on physical exertion were the only symptoms. She had no other complaints till she developed frank pulmonary oedema and circulatory arrest due to bradyarrhythmia and asystole.

The pathological findings in our case were pericarditis, intimal thickening and supravalvular luminal narrowing of the aorta and pulmonary artery, and coronary artery stenosis. The microscopic study revealed cellular infiltration of lymphocytes, plasma

cells and histiocytes and destruction of the elastic fibres.

It has been demonstrated that the most characteristic gross pathological features are marked thickening of the wall due to fibrosis of all three layers, intima, media and adventitia [2,7]. This thickening of the wall that is responsible for luminal stenosis [7]. In the present case, the diagnosis was established at autopsy. The post-mortem examination demonstrated, in contrast to the findings of Waern et al. [4], supravalvular stenosis of the ascending aorta and pulmonary trunk with severe narrowing of the orifice of the left coronary artery. Waern et al. found that the most frequently occurring lesions were in the subclavian arteries, in contrast to the usual described changes of the ascending aorta [4].

The histopathological spectrum of TA included the often-overlapping features of granulomatous arteritis (marked with inflammatory process confined to the media and adventitia with cellular infiltrate consisting predominantly of lymphocytes, plasma cells, histiocytes and giant cells, probably representing the active phase) and sclerosing arteritis characterized by intimal hyperplasia, medial degeneration and adventitial fibrosis (representing the chronic phase). Disruption of the elastic lamellae were found in both the active and chronic phases [3].

This case illustrates that the diagnosis (during life) of Takayasu's arteritis could be delayed or even overlooked and that the first clinical manifestation of Takayasu's arteritis could be a fatal episode of severe pulmonary oedema.

Clinical awareness is important for recognition and treatment of this morbid condition at an early stage.

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