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Resistant Hypertension Secondary to Large Vessel Vasculitis in Adult Female

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ABSTRACT

Takayasu arteritis (TA) is an uncommon chronic inflammatory condition targeting large arteries, especially the aorta and its major branches, and often results in vessel narrowing or occlusion . It is characterized by granulomatous inflammation of the vascular layers leading to thickening, causing stenosis and occlusion along with microaneurysms. TA is more common in young females with a female-to-male ratio of 8:1. This case involved a 37-year-old female who presented with headache, giddiness, and left upper limb pain. She had elevated blood pressure with unequal limb measurements, raising suspicion of TA. Treatment with high-dose prednisolone and methotrexate improved the patient's symptoms and reduced the levels of inflammatory markers. This case report is to emphasize the importance of considering TA as one among the causes of secondary hypertension, particularly in young women, and highlight the value of early diagnosis and appropriate management in preventing end organ damage

Keyword: *: Takayasu arteritis, Secondary hypertension, Large-vessel vasculitis*

1. INTRODUCTION

Takayasu arteritis (TA) is an idiopathic, granulomatous inflammation affecting large vessels, primarily involving the aorta, its main branches, and, less commonly, the pulmonary arteries.[1] The inflammatory process causes damage to the endothelium, leading to thickening of the vessel walls, thrombus formation, and the development of stenotic or occlusive lesions. Additionally, the breakdown of the muscular and elastic layers can result in vessel dilation and aneurysm formation. These vascular changes often lead to ischemia-induced organ dysfunction.[2] Large artery granulomatous inflammation is most commonly caused by TA. However, advancements in early diagnosis and comprehensive management have improved survival rates.

The disease frequently exhibits a persistently active course, leading to gradual, unrecognized damage that elevates the risk of both immediate and long-term morbidity and mortality. TA is documented globally, with an annual incidence of approximately 2–3 per 1,000,000 annually.[3] The disease predominantly affects females, with a peak incidence between 15 and 19 years of age.

The underlying cause of Takayasu arteritis (TA) remains unclear. Nevertheless, the development of disease is significantly influenced by genetic factors, particularly through associations with specific HLA complex variations, which vary across ethnic backgrounds. Certain polymorphisms, such as rs9366782 and rs12524487 in the HLA-B/MICA genes, have been linked to increased susceptibility to TA or higher chance of ischemic complications affecting the brain.[4] Research indicates that TA patients have a higher frequency of the G allele at TNF-α-308 compared to controls, but afflicted persons seem to have a lower frequency of the A allele compared to other groups.

Inflammation of the arterial walls in Takayasu arteritis (TA) leads to thickening, resulting in stenotic (narrowed) or occlusive (blocked) lesions that reduce arterial lumen size. TA commonly affects the aortic arch and can extend to major branch arteries like the subclavian, renal and carotid arteries. The resulting vascular changes, particularly in the renal arteries, reduce blood flow to the kidneys, prompting the kidneys to interpret this as hypoperfusion.[5]

In response, they activate the renin-angiotensin-aldosterone system (RAAS), a hormonal pathway that increases blood pressure across the body to ensure adequate kidney perfusion. This combination of structural narrowing or occlusion and hormonal response leads to secondary hypertension that is directly related to TA-related arterial changes. Notably,

hypertension in TA can be severe and resistant to standard treatment, especially when renal artery stenosis is involved. This type of hypertension, termed "renovascular hypertension," poses a significant risk if left untreated.

Reducing the mortality and morbidity connected with TA requires early diagnosis and targeted therapy, as elevated blood pressure can cause further complications if not managed effectively.[6] This study highlights the need for awareness of TA's role in secondary hypertension and the importance of targeted therapeutic strategies to prevent its long-term impact

2. CASE REPORT

A 37-year-old female visited the outpatient department with complaints of headache and giddiness on and off over the past month. The patient had a history of left upper-limb pain and fatigue during routine daily activities and also had a history of fever and malaise on and off. There was no history of blurred vision, diplopia, nausea, or vomiting. She had a known case of type 2 diabetes and systemic hypertension. She is on irregular medication for the past 3 months, with no other comorbidities (Table 1). ECG doesn't indicate LVH pattern.

Table 1. Vital signs and laboratory parameters of a patient on admission

S. No	Parameter	Result
1	Blood pressure (right upper limb)	170/90 mmHg
2	Blood pressure (left upper limb)	110/80 mmHg
3	Blood pressure (right lower limb)	160/90 mmHg
4	Blood pressure (left lower limb)	150/80 mmHg
5	Heart Rate	104 bpm
6	Temperature	Afebrile
7	C-reactive protein (CRP)	29 mg/L
8	Haemoglobin	9.3 g/dL
9	Erythrocyte sedimentation rate (ESR)	45 mm/h

During auscultation, a systolic murmur was observed in the left infraclavicular area. A 2D echo screening showed no RWMA, normal LV systolic function, LVEF of 68%, grade 1 LVDD, thickened aortic valve, and ascending aorta dilated to 39 mm. Mild aortic regurgitation (AR) and normal RV function were observed.

Computed tomography (CT) angiography of the aorta and its branches revealed diffuse, irregular circumferential intimal thickening in the descending and abdominal aorta, causing less than 20% luminal narrowing in the thoracic aorta, 30–40% luminal narrowing in the suprarenal aorta, and 35–40% luminal narrowing in the infrarenal aorta after the origin of the inferior mesenteric vein. It also showed unilateral constriction of the left subclavian artery, with a reduced flow signal in the middle and distal segments .

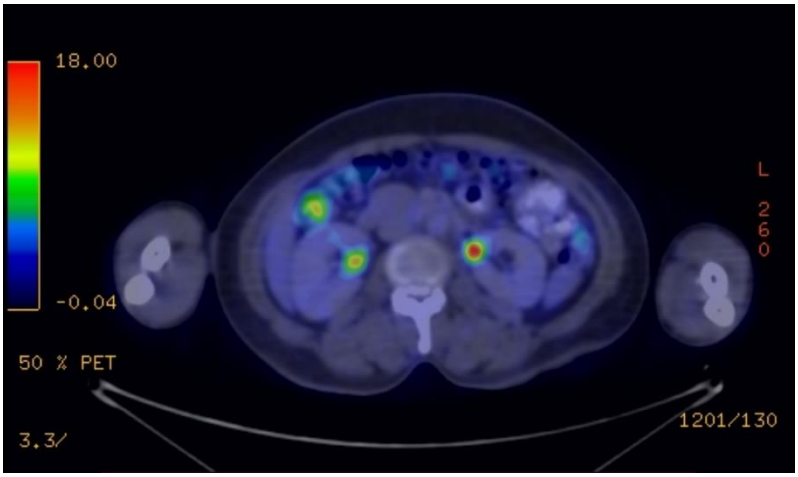

Figure 1. PET/CT scan showing the focal area of increased metabolic activity in the bilateral

Suprarenal arteries

Takayasu arteritis was diagnosed when the patient met the ACR criteria, which were based on the patient's history, laboratory and clinical results, and imaging characteristics. The patient was administered high-dose prednisolone (1 mg/kg/day), folic acid (5 mg/week) and MTX (15 mg/week). The inflammatory indicators reverted to normal as the patient's symptoms gradually subsided. Two weeks later, the patient was followed up for OPD. The patient remained symptom-free at follow-up and was prescribed antihypertensives, including beta, alpha, and calcium channel blockers, as well as an ongoing dose of 16 mg/day of methylprednisolone.

3. DISCUSSION

The present case highlights the complexity of managing Takayasu arteritis (TA) in adult females, particularly its role in causing severe and treatment-resistant hypertension, which emphasizes the significance of prompt identification and intervention in preventing the progression of vascular problems. The aorta and its major branches are the main large blood arteries that are affected by TA, an unusual chronic inflammatory illness that can lead to compromised blood flow or complete obstruction.[7,8]

The patient was continued on a maintenance regimen of methylprednisolone and methotrexate. This case underscores the importance of regular follow-up in managing Takayasu Arteritis, especially during the acute inflammatory phase. A diagnosis is established if the patient meets any of the following combinations of criteria: four minor criteria, two primary criteria, or one major criterion plus two minor criteria.

Our case report was compared with that of Qi et al.[9], who conducted a large cohort study to investigate how 381 hospitalised patients with TA-related hypertension present and are treated. The average age at which hypertension first appeared in their study was 25.0 ± 14.3 years. Patients without bilateral subclavian artery stenosis (84.3%) had an average upper extremity blood pressure of 176.0 ± 29.4 mmHg/97.2 ± 23.0 mmHg, while those (15.7%) with bilateral subclavian artery stenosis had an average central blood pressure of 192.7 ± 30.8 mmHg/102.4 ± 121.1 mmHg. They also found that renal artery stenosis was the most common cause (69.3%), followed by severe aortic regurgitation (11.8%), abdominal aorta stenosis (20.5%) and descending thoracic aorta stenosis (25.7%).[9]

Similar to this, Sadurska et al.[10] described a 16-year-old girl who had Takayasu arteritis (TA), which was mostly indicated by severe arterial hypertension on her right arm. Spiral computed tomography angiography was used to confirm the diagnosis, revealing a thicker thoracic aorta wall and lumen narrowing. They came to the conclusion that accurate diagnosis and treatment of patients with TA depend heavily on clinical suspicion and appropriate imaging.[10]

An 18-year-old female patient with renal artery stenosis from Takayasu arteritis (TA) and hyperthyroidism—both of which are causes of secondary hypertension—presented with palpitations and weakness after physical exertion, according to He et al.[11] They came to the conclusion that major consequences can be avoided with early detection and treatment of TA and hyperthyroidism.

4. CONCLUSION

This case emphasizes the significance of timely identification and thorough management in addressing elevated blood pressure resulting from Takayasu arteritis (TA) in adult females. The patient’s presentation highlights how TA can lead to treatment-resistant hypertension due to progressive vascular inflammation and stenosis, especially in large arteries. Effective management requires a combination of high-dose corticosteroids, immunosuppressive therapy, and antihypertensive agents, demonstrating the necessity for an aggressive, multifaceted approach to control both inflammation and blood pressure. This case emphasizes the need for ongoing monitoring to prevent relapse and mitigate complications, reinforcing that prompt diagnosis and sustained intervention are paramount for improving outcomes in patients with TA-associated hypertension

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