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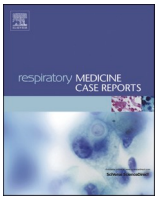

Case Report

Tuberculosis presenting as uncontrolled hypertension

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ABSTRACT

We analyzed the issue of a young woman who wanted our opinion regarding uncontrolled hypertension. Her hypertension was discovered to have a highly unusual origin, but it is fairly prevalent in nations like India.

A 19-year-old woman who complained of blurred vision was presented to an ophthalmologist, who diagnosed her with grade IV hypertensive retinopathy. Her 2D ECHO was normal, hence a thorough screening for secondary hypertension was carried out. A left paravertebral tumor that may have squeezed the left renal artery and contributed to her hypertension was discovered during the workup by a CECT chest and abdomen scan. She also exhibited widespread lymphadenopathy; a condition known as granulomatous pathology. She was started on anti-TB medication, and after six months of treatment, her radiological and clinical conditions improved. This case highlights a rare instance of TB causing excessively elevated blood pressure.

1. Introduction

In many low to middle-income countries (LMICs), tuberculosis (TB) remains a significant health concern despite the worldwide TB burden significantly decreasing [1].India ranks among the nations with the highest incidence of tuberculosis (TB) cases and fatalities worldwide. It is accurate to state that India must eradicate tuberculosis to eradicate the disease globally. More than 25 % of the 10 million estimated cases and 449,700 of the 1.3 million estimated deaths worldwide from tuberculosis are attributed to India [1]. Non-communicable diseases (NCDs), such as diabetes, cancer, and cardiovascular illnesses, are on the rise in low- and middle-income countries (LMICs) as a result of rising socioeconomic levels, widespread population growth, and dietary and lifestyle changes [2].

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Cardiovascular diseases account for one-third of all deaths globally, and over 75 % of these deaths happen in low- and middle-income countries[3].One of the main risk factors for mortality from cardiovascular disease (CVD) is hypertension [3]. It is widely recognized that lifestyle factors raise the risk of hypertension; nevertheless, chronic infections, including tuberculosis, can also have a role in the development of these medical conditions in different ways.

The immune system may be triggered by tuberculosis (TB), impairing endothelial function and raising the risk of cardiovascular disease and possibly hypertension [4,5]. TB can also result in the destruction of lung parenchymal tissue, vasculitis, endarteritis, and, on rare occasions, a decrease in the pulmonary artery's cross-sectional area, which can result in pulmonary hypertension. When tuberculosis (TB) induces an infection in the kidney, the tissue of the kidney may be destroyed parenchymally, impairing the kidney's capacity to control blood pressure [6,7]. 50–65 % of individuals with TB-related deaths had kidney involvement in their autopsy reports. However, TB-related renal artery blockage has been documented as an uncommon cause of hypertension [8,9].We hereby report the case of a 19-year-old female patient, whose uncontrolled hypertension was found to be caused by tuberculosis.

2. Case history

A 19-year-old female presented with a headache and accompanying blurred vision at an external medical facility. She underwent evaluation by an ophthalmologist for blurred vision and was diagnosed with bilateral papilloedema and grade IV hypertensive retinopathy. To investigate intracranial pathology associated with papilloedema, MRI brain, and MRV were conducted. The MRI brain revealed bilateral prominent CSF spaces around the optic nerve. In the initial stage, she started taking telmisartan and acetazolamide. Her blood pressure was measured at 200/100 mmHg during a medical appointment. A well-defined, non-enhancing paravertebral hypointense lesion measuring $3.9 \times 1.4 \times 2.8$ cm near the left kidney was seen on an abdomen MRI performed as part of the study into secondary hypertension. The adrenal glands on both sides appeared normal. The results of the MRV were normal.

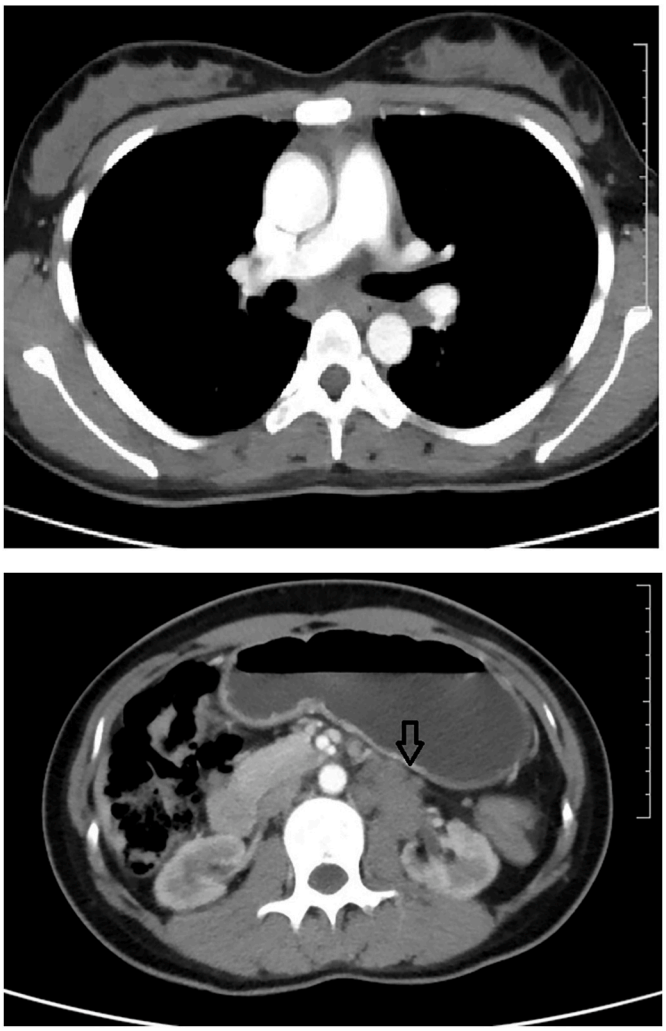

Fig. 1. (a)CT chest showing subcarinal lymphnode from where EBUS TBNA was taken. (b) showing para vertebral mass lesion adjacent to left kidney.

Blood examinations at the time of admission were found to be Hb 12.1 gm/dL, PCV 33.7, platelets 307 ku/mL, total WBC 13.59 ku/mL, neutrophils 76.0, lymphocytes 14.1, eosinophils 3.0, CRP 35 gm/dL, and ESR 12mm/1st hour. Parenchymal lesions were absent on the chest radiograph. 2DECHO showed Grade I diastolic dysfunction. Bilateral elevated renal echotexture with preserved corticomedullary distinction was seen on abdominal ultrasonography.

The Doppler characteristics of the bilateral primary renal arteries were normal; however, the polar arteries exhibit a little reduced slope. She was evaluated for possible pheochromocytoma in view of persistent hypokalemia. The urine potassium to creatinine ratio was determined to be 25.5 meq/gm (high), and the amount of metanephrine in the serum (4.31 pg/ml) was inconclusive. Potassium in urine was determined to be borderline normal after 24 hours (19.69 mmol/day). Serum levels of aldosterone and renin were both higher. The dexamethasone suppression test was found to be negative. A contrast-enhanced computed tomography scan of the chest and abdomen revealed paravertebral conglomerate mass and mediastinal lymph nodes (Fig. 1a and b). It was thought that atypical paraganglioma might be more likely than lymphoma. Following a multidisciplinary team discussion, PET CT was performed on the oncologist's recommendation. Along with FDG avid lymph nodes in the left supraclavicular, right paratracheal, left lower paratracheal, left hilar, subcarinal, celiac, and paraaortic regions, it also revealed an FDG avid hypodense soft tissue lesion next to the left adrenal gland.

(Fig. 2c).The subcarinal LN measured 2.9 × 1 cm and the SC LN measured 0.9 × 0.6 mm, so MDT chose to proceed with EBUS-guided FNAC. EBUS revealed 1.5 × 1 cm oval hypoechoic lymph nodes with central hilum at stations 10R and 10L, and 2.5 × 2 cm hypoechoic lymph node at station 7. Stations 7 and 10L were used for transbronchial needle aspiration (TBNA). It revealed

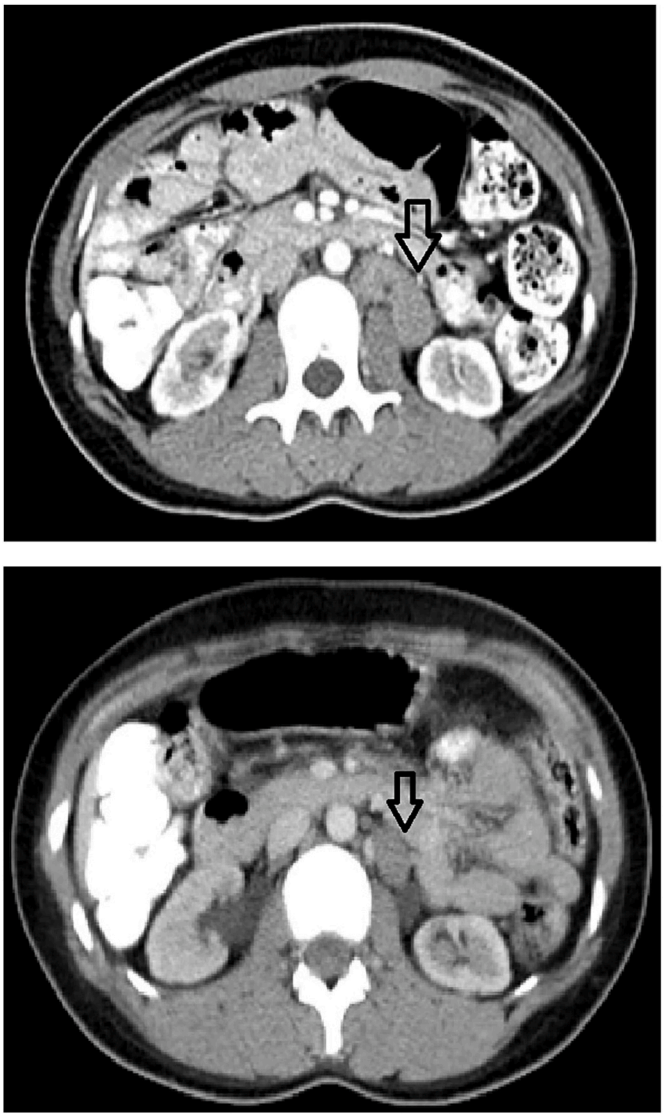

Fig. 2. (a) Pre-treatment CT showing paravertebral mass. (b) showing post treatment reduction in size. (c) Pre-treatment PET CT showing paravertebral mass. (d) showing post treatment FDG non avidity and reduction in size.

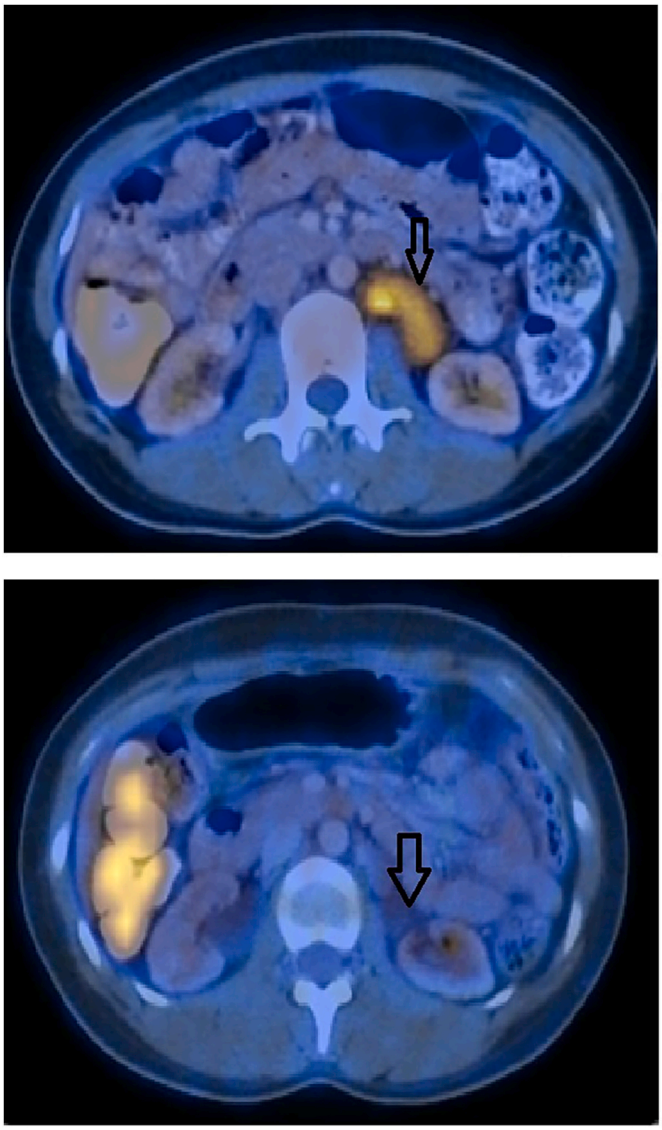

Fig. 2. (*continued*).

multinucleated large cells free of necrosis and a few epithelioid granulomas (Fig. 3). Following another MDT discussion, it was determined to perform an SCLN biopsy as well, given that granulomatous inflammation may coexist in the backdrop of other malignant disorders. A supraclavicular lymph node biopsy was subsequently performed, and the results revealed granulomatous inflammation. AFB smear, AFB culture, and Xpert MTB Rif were all negative for both sites. 27 IU was the serum ACE level. Mantoux measured 29 mm. Therefore, she was initiated on anti TB drugs.

After five months of treatment, a PET CT scan revealed a considerable resolution of paravertebral and the patient became FDG non-avid (Fig. 2a–d). LN DMSA was used to rule out renal artery compression or stenosis. Following bilateral renal parenchymal failure, it revealed a slightly decreased cortical tracer distribution on both sides. The ratio of the left kidney's DMSA uptake to the right kidney was 46:54. Hypertension decreased along with the regression of the lymph nodes. She was successfully weaned off of all hypertension medications (calcium channel blockers).

3. Discussion

Although it is rare, previous reports have documented tuberculosis as a cause of uncontrolled hypertension.[1]We presented a case where TB manifested as malignant hypertension. Various theories exist regarding the mechanisms through which TB might induce hypertension [10].

As mentioned previously, systemic hypertension can arise from the destruction of renal parenchyma, possibly due to immune-mediated endothelial vascular destruction [5–8]. However, several other theories propose mechanisms for hypertension that do not

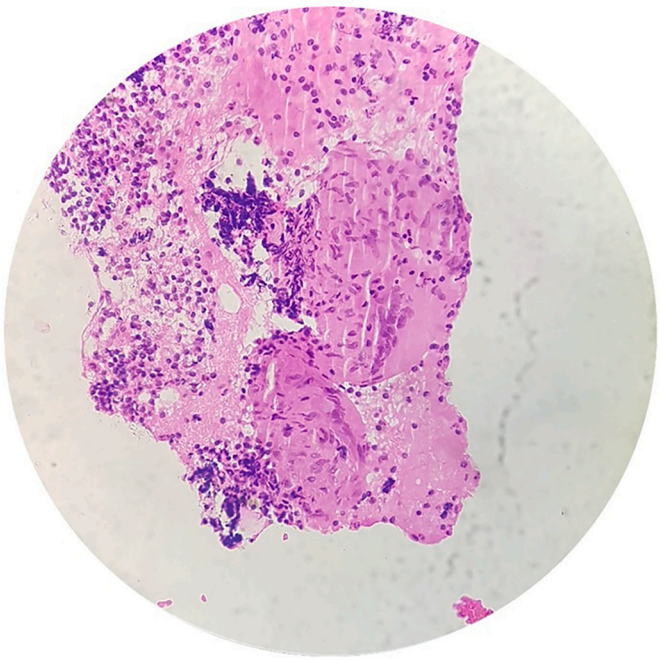

Fig. 3. Histopathology H & E stain, showing granulomatous inflammation without necrosis.

involve direct damage to renal or cardiac vessels, which could also be relevant in our patient's case.

Studer et al. [7], Weidmann et al. [11] and Stockigt et al. [12], suggest that increased renin secretion in the kidneys of patients with renal TB and hypertension could indicate renal ischemia as the underlying cause of hypertension in such cases. TB, a chronic inflammatory disease, can initiate a complex cascade of immunological responses, potentially leading to the formation of atherosclerotic plaques [13]. This phenomenon involves antibodies generated during infection cross-reacting with self-antigens, such as heat-shock proteins (HSP). HSPs belong to a family of proteins expressed by cells in response to various stressful conditions [14]. Their coding genes have been highly conserved throughout evolution, with many species sharing identical epitopes. For instance, human HSP60 shares a 40–50 % identical resemblance with HSP in Mycobacterium spp [15]. The development of hypertension in TB patients may occur through a similar mechanism. Rodríguez-Iturbi et al. [15] reported that the overexpression of HSPs can induce autoimmunity, leading to the accumulation of macrophages and T-lymphocytes in the kidney, which has been associated with hypertension in experimental animal models. In patients with essential hypertension, elevated levels of anti-HSP 70 and anti-HSP65 have been observed, independent of age, smoking habits, blood lipids, or evidence of atherosclerosis [15].

In rare instances, swollen lymph nodes or tuberculous aneurysms may directly compress the renal arteries, leading to renal ischemia and hypertension. In the present case, we believe that decreased uptake in the left kidney (46:54) on DMSA scan may provide a possible explanation for the hypertension. Additionally, upon reviewing the literature, we identified six previously reported cases where hypertension was the presenting feature of TB, with the probable cause being compression of the renal arteries (Table 1) [16–19]. As depicted in Table 1, there were three females and two males, ranging in age from 7 to 25 years. Headache was the most common symptom, followed by weight loss. Most patients exhibited unilateral or bilateral renal artery compression on DSA. Almost all patients showed improved hypertension control following ATT.

Our patient demonstrated weight gain and improved hypertension control within five months of commencing anti-TB medication, coinciding with the resolution of lesions observed on PET CT (Fig. 2). Uniquely, our case involves a presentation of malignant hypertension and increased intracranial pressure. Her medical journey began with an ophthalmologist, culminating in treatment by pulmonologists. This case underscores the significance of a multi-disciplinary approach for achieving successful outcomes.

4. Conclusion

Our findings suggest that even common diseases like TB can present with uncommon manifestations, such as hypertension, as observed in our case. We recommend maintaining a high index of suspicion and conducting thorough investigations to facilitate prompt initiation of appropriate treatment.

All contributors give permission to be included, as authors

I, Dr Asmita Mehta, as corresponding author state that I have taken permission from all the authors. I also am responsible for the overall content accept full responsibility for the finished work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Table 1
Showing comparison of the present case with previously published cases.

Author/Year	Age/ sex	Presenting feature	CXR/CT chest	ECG/ECHO	Xray abdomen/CT Abdomen/USG Abdomen	Special investigations (Excretoryurography/DSA/ DTPA)	Final diagnosis	Treatment	Status of hypertension After treatment
C Madiwale et al., /1993 (16)	25/ Female	Weight loss, headache, weakness, systemic HTN	Normal	Not commented	Not commented	DSA- Beaded renal artery Aortogram- Occlusion of left renal artery + small left kidney	Renal artery TB	Nephrectomy + ATT	Reduced
P Roux et al., /1997 (17)	7/ female	Night sweat/LOW/ convulsions /Systemic HTN	Mediastinal adenopathy with left upper lobe infiltrate	Left ventricular hypertrophy	Reduced size of right kidney and lymphadenopathy in porta hepatis and para aortic region	Renogram- reduced perfusion. Aortogram and arteriography -narrowing of right renal artery	Abdominal TB	ATT	Reduced (100/60)
Bradly T et al., /2001 (18)	25/ male	Dyspnea on exertion ,systemic hypertension	Cardiomegaly with features of pulmonary edema	Cardiomyopathy with biventricular dysfunction	Not commented	Renal arteriography-Multiple renal artery aneurysms+ Biopsy of LN -AFB bacilli+	Tuberculous aneurysm + TB lymphadenitis	Aneurysmal resection + ATT	Reduced
Z.Bouziane et al., /2009 (19)	17/ male	Headache, tinnitus, systemic hypertension	Not commented	Not commented	Not commented	Aortoarteriography revealed a right renal artery occluded at its origin	Arterial tuberculosis	Aortorenal bypass + ATT + antihypertensives	Reduced
Mehta et al. (Current case −22)	19/ female	Headache, blurring of vision, raised intraocular pressure, HTn	CXR: bilateral hilar prominent CT chest: Mediastinal and hilar lymphadentopathy	Normal	USG Abdomen showed bilateral raised renal echotexture. CT Abdomen: hypodense soft tissue lesion adjacent to left adrenal gland	bilateral renal parenchymal dysfunction. Percentage DMSA uptake in left kidney to right kidney was 46:54.	Compression of renal artery by pararenal mass	Anti TB drugs	reduced

CRediT authorship contribution statement

Asmita A. Mehta: Writing – review & editing, Writing – original draft, Conceptualization. **Aditya Ashok:** Project administration, Investigation, Data curation. **V.P. Praveen:** Investigation, Formal analysis. **Bobba Kiran Kumar:** Investigation, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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