

INCIDENTAL TUBERCULOMA IN A CHRONIC KIDNEY DISEASE PATIENT: A RARE EXTRA-PULMONARY MANIFESTATION OF TUBERCULOSIS

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Abstract

Chronic kidney disease associated with incidental tuberculoma represents one of the rarest conditions occurring worldwide. Among tuberculous patients, only 1% show Central Nervous System involvement. We present a case of 45-year-old male with CKD who presented with seizure, diagnosed to have incidental Tuberculoma

INTRODUCTION:

Chronic Kidney Disease (CKD) is one of the most prevalent diseases worldwide accounting for approximately 10-13% in the general population. It is a result of a decrease in the glomerular filtration rate below 60 mL/min and /or an increase in the concentration of albumin excreted by the urine. It is diagnosed by the persistent decrease in renal function for at least 3 months [1,2].

The role of kidney includes the homeostatic regulation of the blood by waste excretion, acid/base regulation and fluid /electrolyte balance, the secretion of renin to regulate the tension of the blood, the production of erythropoietin and the maintenance of the homeostasis of calcium and phosphorus. According to these significant functions, its damage will have significant comorbidities like diabetes, hypertension [2,3,4].

Chronic kidney disease associated with incidental tuberculoma represents one of the rarest conditions taking place worldwide. Among tuberculous patients, only 1% show CNS involvement leading to the alteration of the mental status, damaging the cranial nerves, and causing seizures. *Mycobacterium tuberculosis* (TB) is disseminated by blood to the central nervous system presenting as an inflammation of the brain and meninges, and leading to the formation of pus. Hence, an accurate diagnosis must be made early with the aid of computerized tomography (CT-scan) and magnetic resonance imaging (MRI). In certain cases, a biopsy is also indicated [5,6].

On account of the high risk of morbidity and sequelae associated with the tuberculoma, immediate assessment must be initiated in order to define the location of the tuberculoma and decide on its adequate management. Surgical resection is required in certain cases to save the patient's life [7].

CASE REPORT:

A 45-year-old male was referred to the hospital due to failed Left Arteriovenous fistula. He was a known case of chronic kidney disease (CKD) and Hypertension for 10 years. Past Medical History includes an episode of Generalized Tonic-Clonic seizures (GTCS) which was further managed in a tertiary care hospital. There was no history of past HIV, Hepatitis, and TB infection. Additionally, there was no history of any trauma or alcohol abuse.

On admission, the patient was hemodynamically stable and oxygen saturation at room air was 100%. Respiratory system examination revealed normal vesicular breath sound in the chest without any adventitious sounds and cardiovascular examination revealed normal heart sounds without any murmur. The abdomen was soft without any tenderness and organomegaly. On neurological evaluation, right side upper and lower limb tone was increased. Deep tendon reflexes and muscle power on both upper and lower limbs were normal. Sensory function, cranial nerve, and higher function were within normal limits. On the 4th day of admission, he developed 3 episodes of Generalized Tonic-Clonic seizures (GTCS) within a 3-hour duration and were subsequently stabilized with Midazolam.

Computed tomography (CT) scan of the brain was performed which revealed a cystic ring-enhancing lesion seen with surrounding edema in the left frontal lobe. (Fig. 1)

Magnetic resonance imaging (MRI) of the brain showed a relatively well-defined altered signal intensity lesion of size 2.47cm *1.76cm in the left frontal lobe, appearing predominantly hyperintense with peripheral hypointense rim with significant perilesional edema. (Fig. 2) Imaging guided Biopsy was performed. Histopathological examination was suggestive of necrotizing granulomatous inflammation diagnostic of tuberculoma. Hence, ATT was initiated and left frontal craniotomy was performed and the mass lesion was excised in view of lesion size, edema, and its compressive effects. (Fig. 3 and 4)

Postoperatively, the patient was started on anti-tubercular, anti-seizure medications and is on regular follow up doing well without any further complains of seizures.

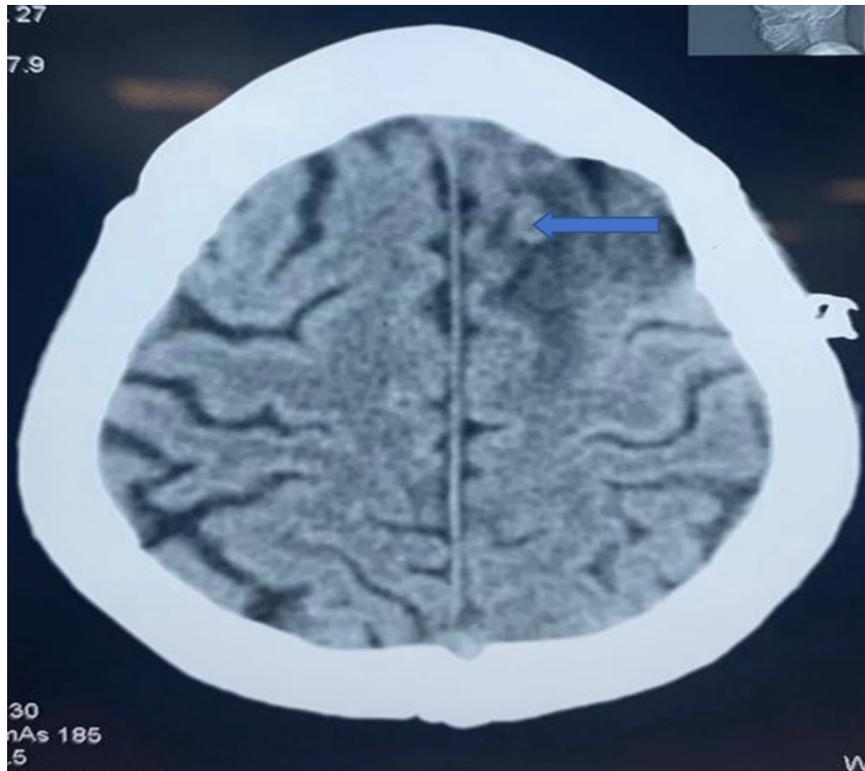
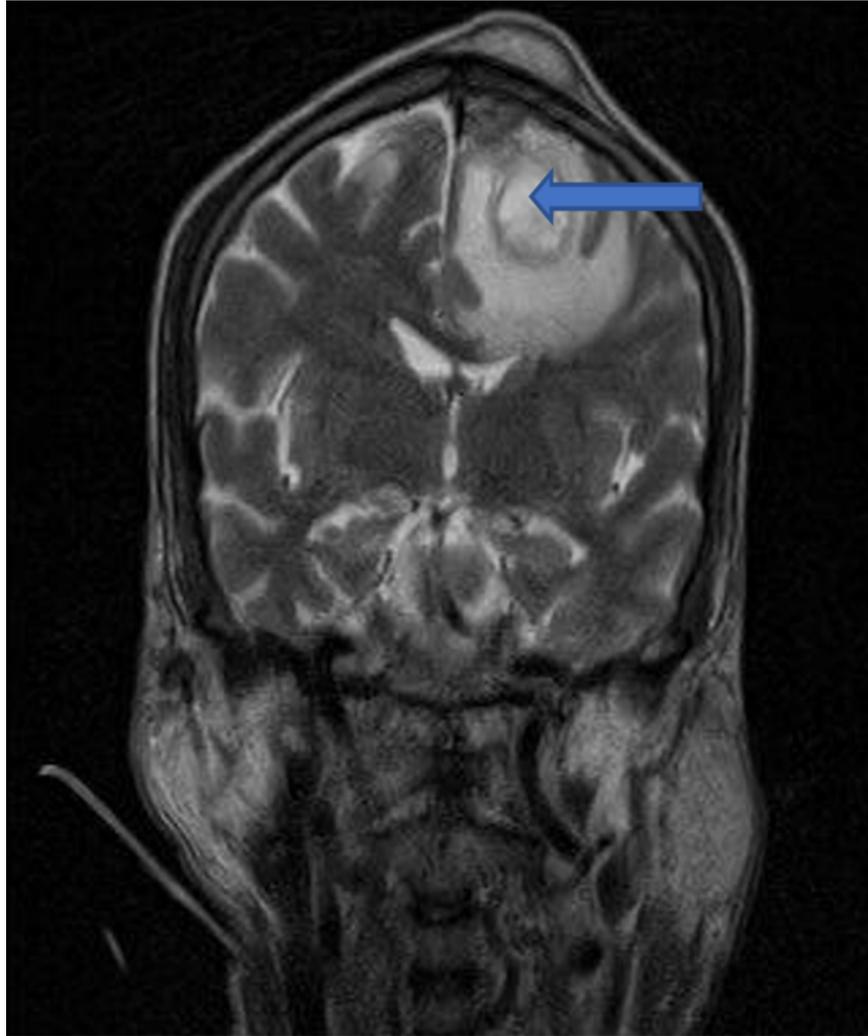


Fig. 1: Computed tomography (CT) scan of the brain showing cystic ring enhancing lesion (in blue arrow) seen with surrounding edema in the left frontal lobe.



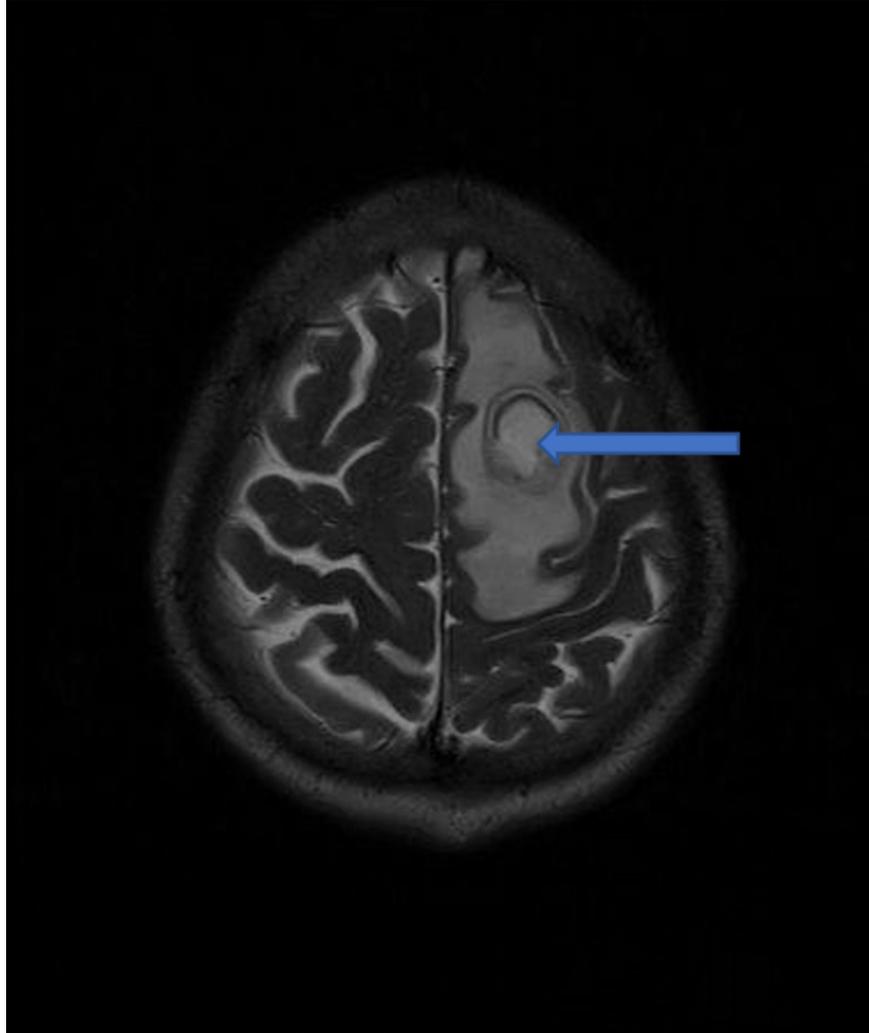


Fig. 2: MRI image of brain (T2 weighted - Axial and coronal section) showing altered signal intensity lesion of size 2.47cm *1.76cm in left frontal lobe with peripheral hypointense rim with significant perilesional edema (in blue arrows)



Fig. 3: Intraoperative Image showing mass lesion



Fig. 4: Gross specimen of excised mass lesion showing grayish white, diffuse, firm with granular

appearance

DISCUSSION:

Tuberculosis continues to remain one of the leading causes of death due to infectious diseases with a global total of 10 million cases diagnosed in 2020 [8].

Intracranial tuberculomas account for 0.15–4% of space-occupying lesions in developed countries. However, in developing countries, they account for 30-34% of intracranial space-occupying lesions [9,11]. Among these, calvarial involvement is seen in 0.2-1.3% of the affected individuals with skeletal TB [10]. There have been many case reports showing an increased incidence of tuberculoma in patients with CKD and patients on hemodialysis [12]. CKD is associated with various comorbidities and has been identified as one of the independent risk factors for active tuberculosis. The incidence of TB in patients with End Stage Kidney Disease has been observed to be 10-15 times higher than that in healthy population [13]. This can be attributed to the immunocompromised state of individuals with CKD. Oxidative stress, inflammation, 25-hydroxyvitamin D deficiency, malnutrition associated with advanced CKD may act as predisposing factors. Changes in the immune system begin in Stage 3 of CKD with progressive worsening in later stages, presenting with functional abnormalities in B and T cells, white blood cells (predominantly neutrophils and monocytes) and natural killer cells [14].

Patients undergoing hemodialysis are at a higher risk of developing TB. Numerous studies have confirmed a higher incidence of TB in patients with CKD on dialysis [13-17]. Studies indicate 3-to-25-fold higher risk in these patients compared to healthy individuals [17]. Impaired cell-mediated immunity in dialysis predisposes patients to infections and their complications [14].

Our patient is a known case of CKD for the past 10 years and is undergoing hemodialysis. CKD being an independent risk factor for TB and hemodialysis being a predisposing factor may have contributed as etiological factors for tuberculoma in this case. Tuberculomas occur secondary to a primary infection, the focus usually being lungs or lymph nodes. The mode of spread is through the hematogenous route. It can occur from granuloma in the parenchyma or through the spread of foci from the meninges to the brain parenchyma. Lesions affecting the skull are more common in the frontal and parietal regions. The granulation tissue replaces the bony trabeculae and the capillary is seen. Concentrically placed proliferating fibroblasts contain the spread of infection to either table [10]. A history of tubercular meningitis isn't a necessity for the diagnosis of tuberculoma.

Tuberculomas are slow-growing lesions, that can be single or multiple with a thicker wall compared to a pyogenic abscess [18,19]. They can have varied clinical presentations. Seizures, headache, vomiting, giddiness, sensory and motor deficits, and cranial nerve palsies are some of the symptoms observed in previous case reports [20]. Our patient had 4 episodes of seizures with a past history of similar episode of GTCS managed in a tertiary care center. Presentation of a soft, painless, fluctuant swelling over the scalp has also been observed in many cases.

Radiological diagnosis, supported by microbiological and histological evidence, serves as the diagnostic modality for tuberculomas. PCR detection of mycobacterial DNA in paraffin-embedded tissue has also been used successfully in recent publications though the definitive diagnosis still remains to be biopsied material showing granulomas complemented by acid-fast staining and culture [12].

CT is one of the radiological diagnostic tests performed on these patients. Tuberculoma lesions are seen as isodense or hyperdense lesions surrounded by peripheral edema. They may be disc-shaped or calcified. In the initial stages, they can appear as non-enhanced hypodense lesions, but mature granulomas are seen as mixed or combined forms with nodular or ring enhancement. A ring lesion with a central hyperdensity is the pathognomonic finding of tuberculoma which is also called the target sign [21]. The CT scan of our patient showed punched out cystic ring-enhancing lesion with surrounding edema in the left frontal lobe. The diagnosis was confirmed by the histopathological report and the acid-fast bacilli seen on Ziehl Neelsen staining.

Management strategies include surgery and anti-tubercular therapy. Hemodialysis and other symptomatic management of CKD was carried out [22]. Recent reports indicate that a combination of surgery and chemotherapy shows better results compared to chemotherapy alone [12,23,24]. In our case, a similar treatment strategy was followed.

CONCLUSION:

Incidental tuberculoma in the setting of chronic kidney disease is a very rare extrapulmonary manifestation of the M. Tb. An accurate diagnosis is made based on imaging studies and histopathological examination. The treatment is based either on anti-tubercular therapy including 4 drugs: Ethambutol, Isoniazid (INH), Rifampicin and Pyrazinamide or on surgical intervention in specific cases.

CONFLICTS OF INTEREST:

None declared.

AUTHOR CONTRIBUTION:

All the authors contributed equally in drafting, editing, revising and finalizing the case report.

ETHICAL APPROVAL:

The ethical approval was not required for the case report as per the country's guidelines.

CONSENT:

Written informed consent was obtained from the patient to publish this report.

DATA AVAILABILITY STATEMENT:

The data that support the findings of this article are available from the corresponding author upon reasonable request.

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