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Glomerular Bacillary Entrapment – A Rare Case Scenario

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Abstract*: As per World Health Organization data, approximately 36.9 million people were infected with HIV/ AIDS in the year 2014. Coexistent Tuberculosis in HIV positive patient is increasing in incidence. We discuss a case of diffuse global granulomatous glomerulonephritis in an HIV positive patient. The glomeruli are studded with numerous acid fast bacilli. We highlight the patient because of the rarity of such bacillary load in tissue sections and its ominous prognostic implication.*
Keywords*: acid –fast bacilli, glomerulonephritis, Mycobacterium tuberculosis, genitourinary tuberculosis*

I. Introduction

According to WHO, there were approximately 36.9 million people worldwide living with HIV/AIDS by the end of 2014. Also it is estimated that approximately 34 million people have died from AIDS related causes. The Human Immunodeficiency virus is epidemic in causing increases in the number of tuberculosis cases, particularly in Africa, with increases expected in South East Asia [1]. We are presenting a case report in an HIV infected patient with septicemic spread of Tubercle bacilli. The rarity is because of the bacillary entrapment in the glomeruli highlighted with Ziehl-Neelson stain.

II. Case Report

2.1Case History : A 28 year old man with seropositivity for HIV- I infection presented with chronic productive cough, fever, dysuria and pedal edema. His renal parameters including blood urea and serum creatinine were elevated being 70mg/dl and 3.1 mg/dl respectively. Urine report revealed broad waxy hyaline casts and numerous bacilli. Complete haemogram revealed Haemoglobin to be 6 gm/dl and total WBC count being 3600 cells/cu.mm.Chest X-ray revealed no significant findings. Tuberculin test had no yielding points. In sputum examination and culture no significant finding was present. Ultrasonography of the abdomen and pelvis revealed multiple echogenic areas in the kidney. Ultrasound – guided biopsy of kidney was performed and submitted for histopathological analysis.

2.2Microscopy : Histopathology of kidney revealed multiple epithelioid cell granulomas with extensive caseous necrosis both in the glomeruli and in the tubulo – interstitial area. Inflammatory cells predominantly histiocytes, lymphocytes infiltrated into the glomerular tuft and the Bowman's space and extended to the periglomerularinterstitium. Periarteritis and fibrinoid necrosis were focally present in the arterioles and small arteries running through the renal parenchyma.

2.3 Special stain : Ziehl – Neelson stain was performed and it revealed numerous acid – fast bacilli trapped in the glomeruli of the kidney.

2.4 Diagnosis : On the basis of histopathological findings and special stain reports a diagnosis of Diffuse Global Granulomatous Glomerulonephritis was arrived. The patient was treated as per the guidelines for Genitourinary Tuberculosis.

2.5 Differential Diagnosis: Granulomatous diseases of the kidney include the following:
1. Sarcoidosis
2. Xanthogranulomatous pyelonephritis
3.Malakoplakia
4. Fungal Infection
5. Parasitic infection
6. Urate Nephropathy
7. Vasculitis
8. Drug hypersensitivity

Our patient had granuloma and caseous necrosis in the routine staining and Ziehl-Neelson stain revealed numerous acid- fast bacilli which favors a diagnosis of Diffuse Global Granulomatous Tuberculosis.
Considering the patient as having Genito Urinary Tuberculosis the patient was treated with Anti-Tuberculous drugs as per the standard regimen.

III. Discussion

3.1Epidemiology: Tuberculosis is one of the leading cause of deaths worldwide accounting for 8 to 10 million new cases and 1.9 to 3 million deaths each year [2]. Among these Genito Urinary Tuberculosis is the most common extrapulmonary site of infection, and it occurs in 5 % of patients [3, 4].

3.2 Age Group: Genito Urinary Tuberculosis usually affects young to middle – aged patients, 75 % of them being younger than 50 years old. Our patient is 28 years old.

3.3 Clinical Features: Patients of Genito Urinary Tuberculosis usually present with symptoms when bladder is involved. Thus, storage symptoms, dysuria and hematuria are the most common clinical features. 5.7% of patients develop end stage renal chronic renal failure [2]. Our patient had abnormal renal function tests and was in end stage chronic renal failure as indicated by broad waxy hyaline casts in the urine.

3.4 Diagnostic Modalities: Imaging studies of Kidney including
1. Intravenous Urography
2. Bilateral percutaneous Nephrostomogram
3. Retrograde pyelography
4. Ultra sonogram
5. CT Scan

Wang et al noted three patterns in renal involvement in IVU. It includes a. multiple stricture sites b. Single stricture site c. Auto nephrectomy [5].Other abnormalities including cavitary lesions and calyceal deformity can also occur. Imaging techniques are usually 90% sensitive for Genito Urinary Tuberculosis.

However, most of the patients do not have radiographic or clinical evidence of pulmonary involvement during the diagnosis of Genito Urinary Tuberculosis.

Polymerase Chain Reaction for Mycobacterium tuberculosis in the urine is one of the most applicable test as it yields result within 24 to 48 hours. In our patient, ultrasonographic finding was multiple echogenic areas in the kidney.

3.5 Gross: In the kidney, the lesions usually measure up to 3 mm in diameter and usually are pale or white. Spread to the renal pelvis produces a tuberculous pyelonephritis that may even progress to a pyonephrosis - like lesion, also known as a "cement" or "putty" kidney[6] .

3.6Sites Involved In Kidney: Tuberculosis may involve the kidney as part of generalized disseminatedinfection or as localized genitourinary disease. When renal involvement occurs as a part of disseminated infection as in miliary tuberculosis, tubercles are found scattered throughout the renal substance, mostly in the cortex. Medullary involvement is usually due to reactivation. Loop of Henle is the preferred site for localization of granuloma. This further leads to papillary necrosis with further spread to collecting system and lower urinary tract.

When the lower urinary tract is involved, it results in fibrosis and contraction of the collecting system, ureter and bladder. In our patient diffuse and global involvement of the glomeruli were noted.
When there is haematogenous dissemination, initially bilateral renal parenchyma is affected. Microscopically it begins as a small, cortical microabscess composed of neutrophils, later on evolving into granuloma and leading to caseous necrosis. Our patient had granuloma with caseous necrosis and demonstrable acid fast bacilli in the glomeruli.

3.7Probable Reason For AFB In Glomeruli: When the patient is immunosuppressed, the granulomas may be less well formed and organisms may be more readily demonstrated. Caseous necrosis is seen less frequently when the immunosuppression is severe[7]. The lesions may be more diffuse and poorly formed than the usual miliary lesions; the granulomatous response consists of histiocytic cells with abundant pale cytoplasm, packed with organisms .

In our patient as he was immunocompromised rampant invasion of the bacilli to the kidney was seen . This illustration depicts the Tubercle bacilli spreading haematogenously, trying to get filtered by

the glomeruli, thus concentrated heavily in the glomeruli and causing diffuse global granulomatous glomerulonephritis.

The endothelial cells of the glomerulus have fenestrae that are negatively charged and are 70 to 90 nanometers in diameter [8]. The size of Mycobacterium tuberculosis ranges from 1000 to 4000 nanometer in length and 200 to 500 nanometer in width. Hence, thebacilli were retained in the glomerulus limited by the glomerular basement membrane.

3.8 Course of The Disease: Latent foci of extrapulmonarytuberculous foci are reactivated after a decrease in immunity occurring due to malnutrition, diabetes mellitus, steroid administration, Use of immunosuppressant drugs and immunodeficiency states. The usual latent period between acquiring pulmonary infection and clinical genitourinary tuberculosis is approximately 22 years [2].

3.9 Complications ofGenito Urinary Tuberculosis: Complications include

1. Perinephritis
2. Perinephric abscess
3. Fistulae
4. Psoas abscess
5. Renal failure
6. Amyloidosis
7. Squamous metaplasia

3.10 Review OfLiterature:

S.No	Author	Year	No. of patients	Gender	Age	Summary
1.	William.I. Christensen MAJ,MC	1974	102 patients	72 male patients and 30 female patients	Mean age of the men was 29 (18 – 59 years) Women was 31 (17 – 66 years)	Evidence of prior incidence of tuberculosis, could be helpful in the diagnosis of genitourinary disease which might occur 20 or more years after initial pulmonary infection [9].
2.	Harvey Simon et al	1977	78 patients	-	-	Patients with genitourinary tuberculosis had features of local organ dysfunction rather than systemic symptoms of infection [10].
3.	Matthew R.Wein M.D., et al	1985	45 foci of extrapulmonary infection was diagnosed in 38 patients.	-	-	Extrapulmonary tuberculosis remains an important infectious disease problem despite the overall decrease in incidence of tuberculosis[11].
4.	Andre A Figueiredo MD Ph D and Antonia.M.Lucon, MD, Ph d	2008	8961 patients	-	Mean age 40.7 years (range 5 to 88 years)	Extrapulmonary sites occur in 10 % of tuberculosis patients. Urogenital tuberculosis, occurs in 30 – 40 % of all extrapulmonary patients next to lymph node involvement[2].

IV. Conclusion

Genito Urinary Tuberculosis is a term coined by Windbolz in the year 1937[12]. Tuberculosis is the commonest worldwide cause of mortality from infectious diseases[13] with nine million cases and two million fatalities per year[14]. Worldwide 15 % of Tuberculous patients are co-infected with HIV and in HIV –endemic areas[15].Renal tuberculosis is relatively uncommon, but the risk of acquiring the disease is increased in immunosuppressed individuals. The morphology of the lesions depends on the site of infection, the virulence of the organism, and the immune status of the patient[16].

Mycobacterium involving the kidney should also be considered in HIV patients with disseminated tuberculosis so that appropriate therapy is instituted to improve the quality of life. Systematic search to detect Genito Urinary Tuberculosis in the early stages, must be given due importance. Groups at risk for developing Genito Urinary Tuberculosis must be defined.

Images:

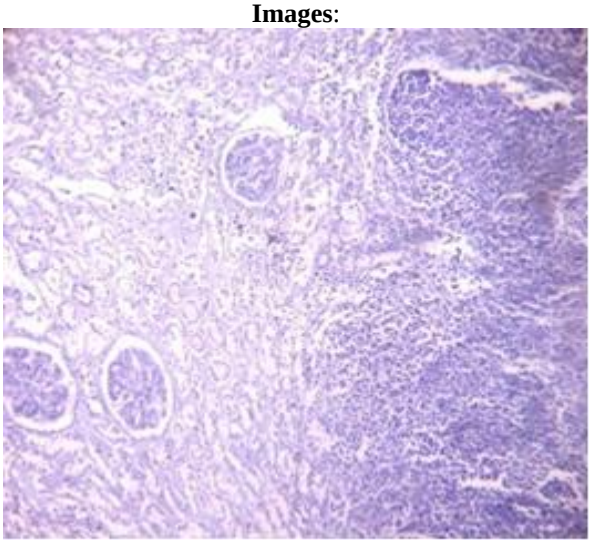

Fig 1: H & E staining of renal biopsy (x 4X)

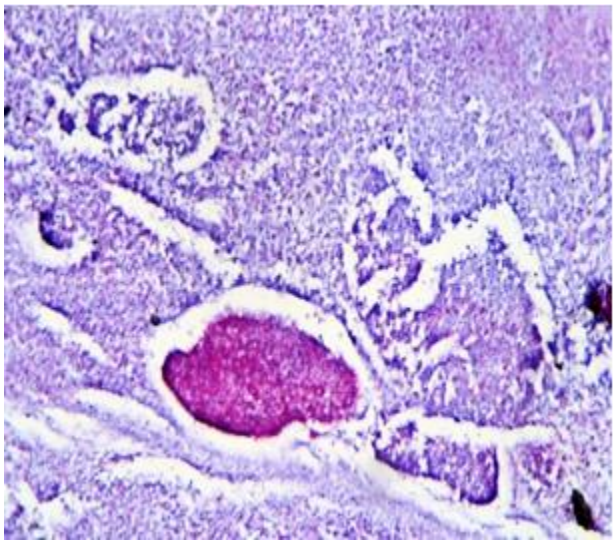

Fig 2 :Ziehl – Neelson staining of renal biopsy (x4X)

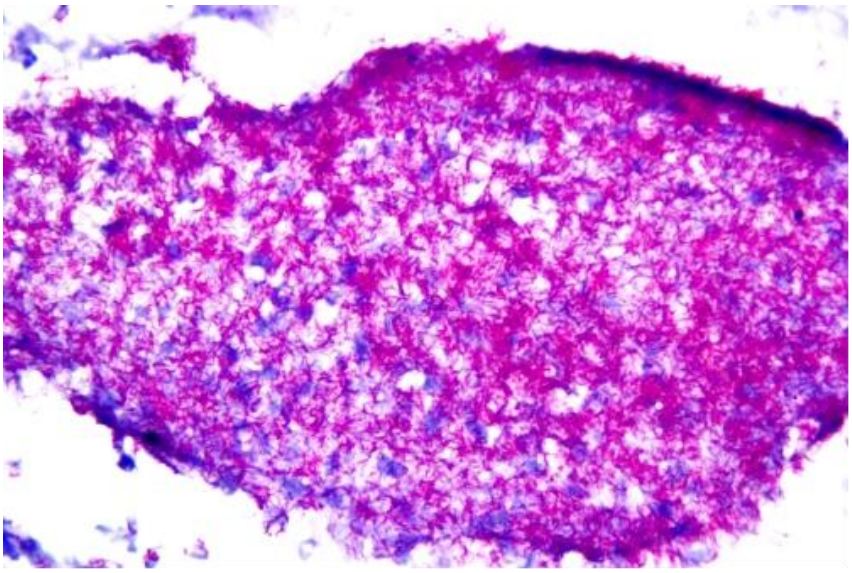

Fig 3 : Low power view of acid fast bacilli in the glomeruli (x 10 X)

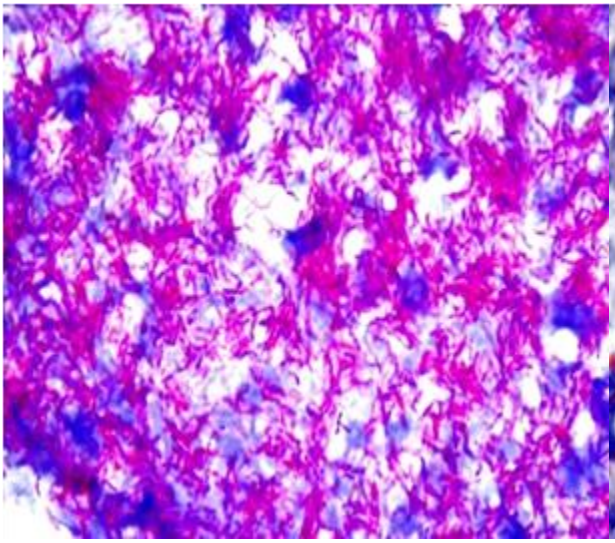

Fig 4 : High power view of AFB (x 40x)

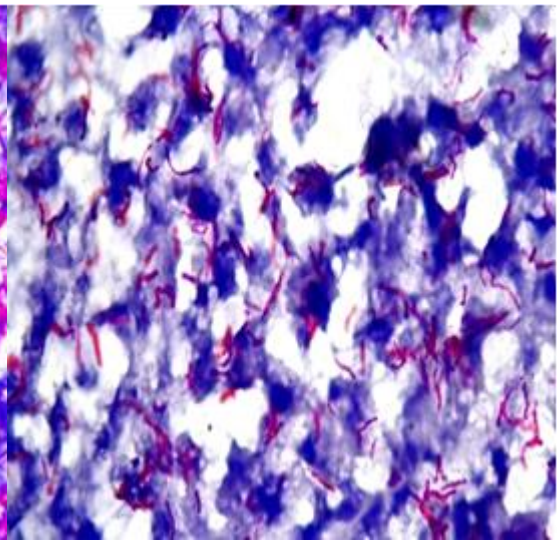

Fig 5 : AFB in oil immersion field (x 100 X)

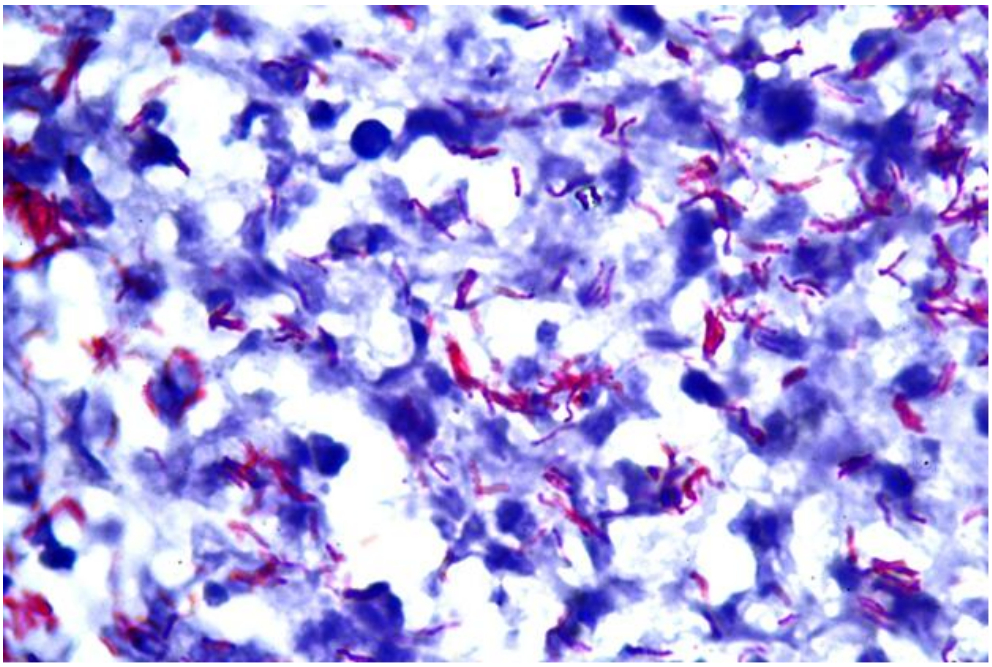

Fig 6 : Acid – fast bacilli in Oil- immersion field in renal parenchyma (x 100X)

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