CASE REPORT

Isolated renal zygomycosis in an immunocompetent patient

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SUMMARY

Zygomycosis is a rare opportunistic fungal infection in immunocompetent patients. Isolated renal involvement by zygomycosis is extremely rare and diagnosed mainly during postmortem study. We report a case of a 22-year-old man with right upper quadrant pain and fever. The CT of the abdomen revealed renal cell carcinoma and subsequent nephrectomy was performed. The histopathological diagnosis of nephrectomy established zygomycosis. After that patient was given 2 months antifungal therapy and is living well even after her 1 year follow-up.

BACKGROUND

Zygomycosis is a rare opportunistic fungal infection. They seldom occur in individuals with competent immune system.^{1–3} Renal involvement in disseminated zygomycosis (mucormycosis) ranges from 14% to 19% of patient.² Isolated renal zygomycosis is extremely rare, only very few case reports have been published in the English literature.^{4–5} These fungi can produce fulminant infection in a patient with underlying immunocompromised condition such as diabetes mellitus, HIV infections, malignancy, organ transplant, burns, starvation, insect bites and broad-spectrum antibiotic therapy.⁴

CASE PRESENTATION

A 22-year-old male student presented with right upper quadrant pain, and fever for 6 months. He had no previous history of diabetes mellitus, chronic disease, cancer, steroid therapy, solid organ transplant, etc. On physical examination, the patient was febrile (T=38.5°C), heart rate 116/min, blood pressure 126/86 mm Hg and right flank tenderness with a mass palpable in the lumbar region. Serological investigation revealed HIV I and II, hepatitis B surface antigen and hepatitis C virus were non-reactive. Chest radiograph also revealed no significant abnormalities. CT of the abdomen (figure 1) revealed an ill-defined heterogeneously enhancing soft tissue attenuation lesion with foci of necrosis involving the middle and lower poles of the right kidney with involvement of the pelvicalyceal system with para-aortic and aortocaval lymph nodes. Radiological diagnosis of renal cell carcinoma was considered.

On the basis of clinical presentation and contrast CT scan, clinical diagnosis of renal cell carcinoma was suggested and nephrectomy was performed. Gross examination of nephrectomy specimen revealed greyish-white areas with necrosis measuring

Figure 1 CT scan showing hypoechoic lesion in middle and lower poles of the right kidney.

6×5×4.5 cm involving middle and lower poles with unremarkable upper pole (figure 2).

The histopathological sections demonstrated multiple epithelioid cell granuloma admixed with multinucleated giant cells along with necrosis and inflammation involving the cortex and medulla (figure 3). Suspicious fungal elements were noted. The Gomori silver methenamine and periodic acid-Schiff staining showed non-septate to occasional pauciseptate broad irregular fungal hyphae with right angle branching (figure 4). The final impression of invasive zygomycosis was given. The patient was given antifungal (amphotericin B) therapy for 2 months. The patient had healthy scar and is asymptomatic at 1 year follow-up.

INVESTIGATIONS

Laboratory investigation revealed total leucocyte count (normal 400–11 000/mm³) 13 000 cell/mm³,

Figure 2 Gross specimen—cut surface of nephrectomy specimen showing mass-like greyish-white area in the lower pole with area of necrosis.

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Figure 3 (H&E $\times 20$) Section showing granuloma formation, multinucleated giant cells with inflammation along with one unremarkable glomerulus.

haemoglobin 11 g%. CT scan showed heterogeneous enhancing attenuation with foci of necrosis suggested as renal cell carcinoma. Histopathology having granulomatous inflammation showed zygomycotic fungal infection.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis of this kidney lesion included renal cell carcinoma, tuberculosis and fungal infection. The given differential diagnosis was of renal cell carcinoma having atypical malignant cells. However, tuberculosis and fungal infections both have granulomas and multinucleated giant cells. The diagnosis of tuberculosis was made with a positive acid-fast bacilli and fungal infections present with hyphae in Gomori silver methenamine and periodic acid-Schiff stain.

TREATMENT

Nephrectomy and antifungal (amphotericin B) therapy was given for 2 months.

OUTCOME AND FOLLOW-UP

After nephrectomy and antifungal therapy for 2 months, the patient was discharged with advice to attend the outpatient

Figure 4 (Gomori methenamine silver $\times 40$) Section showing broad, aseptate fungal hyphae with right angle branching in necrosed and inflammation area.

clinic for follow-up. On patient follow-up after 2 months, scar was healthy and antifungal treatment discontinued. The patient was again followed up after 6 months and 1 year in the outpatient clinic. The last follow-up was on March 2013 and the patient is living well.

DISCUSSION

Zygomycosis is the third most important invasive mycosis after *Candidiasis* and *Aspergillosis* and is caused by fungi of the class Zygomycetes.⁶ Mucormycosis (phycomycosis, zygomycosis) is a ubiquitous, opportunistic infection caused by species in the order Mucorales of the class Zygomycetes. Zygomycetes are organisms with distribution in soil, decaying organic matter and air.⁷ These organisms have minimal intrinsic pathogenicity but are known to initiate aggressive and often fatal infections in immunocompromised individuals. Conditions that predispose an individual to this infection include burns, diabetes mellitus, diabetic ketoacidosis, cancer, steroid therapy, solid organ transplantation, malnutrition, renal failure, trauma, insect bites, broad-spectrum antibiotic therapy and HIV infections. Renal involvement occurs as part of disseminated zygomycosis in 22% of cases.^{8,9} Involvement of single organs such as the bone, heart and kidneys is rare.⁸ Isolated renal zygomycosis in immunocompetent patients is extremely rare.^{9,10} Zygomycosis infection often presents clinically and radiologically as hypoechoic lesions that mimic neoplasia.^{11–13} There are few case reports of renal zygomycosis reported in India as per literature.^{14,15} Overall, very few cases are diagnosed in the antemortem and cured after surgery.

The survival rate of patients with isolated renal zygomycosis is estimated to be 65%.^{16,17} The pathogenesis of renal zygomycosis is unclear. Haematogenous dissemination to the kidneys and lower urinary tract infections from retrograde spread have been suggested.¹⁸ Zygomycosis (mucormycosis) is characterised by uniform presence of extensive angioinvasion with resultant vessel thrombosis and tissue necrosis. This angioinvasion is associated with penetration through the endothelial lining of the blood vessels and haematogenous dissemination of the fungus from the original infection site to other organs.

The histopathology of zygomycosis consists of multiple epithelioid cell granulomas with multinucleated giant cells, necrosis and inflammation along with fungal hyphae that stain positive for periodic acid-Schiff and Gomori methenamine silver stain. The fungal hyphae of zygomycosis are thin walled and branched at right angles. These organisms are often surrounded by extensive necrotic debris. Owing to their thin walls, they stain weakly with periodic acid-Schiff and Gomori methenamine silver. Infections with other fungi such as *Aspergillus*, *Fusarium* and *Scedosporium* may look similar to zygomycosis. However, these moulds are septate, having uniform width and dichotomous branching at acute angles.

The treatment of zygomycosis (mucormycosis) requires rapid diagnosis, correction of predisposing factors, surgical resection, debridement and appropriate antifungal therapy.

Some studies mention that 50% of cases are diagnosed only during postmortem study.⁵ Delayed diagnosis means a worse disease prognosis, because the infections spread in various other organs. Expedited radical surgical treatment is the best treatment for zygomycosis (mucormycosis). Surgery combined with the use of antifungal drugs has better outcomes than antifungal therapy alone.¹⁹ Previous results have shown that many patients died or were diagnosed only during postmortem study. The current patient was clinically and radiologically misdiagnosed as renal cell carcinoma. After nephrectomy diagnosed as

zygomycosis infection, antifungal therapy was given. He is still alive and all tests are within normal limits at 1 year of follow-up.

Learning points

- ▶ Isolated renal zygomycosis is a rare condition and a high index of suspicion is required for its diagnosis.
- ▶ Patients with a renal mass on CT of the abdomen and fever, malaise, weight loss and leucocytosis should be suspected of having an infective cause and investigated for zygomycosis.
- ▶ Nephrectomy and prolonged use of antifungal medication is required to cure renal zygomycosis in immunocompetent patients.

Competing interests None.

Patient consent Obtained.

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