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CASE REPORT

Amoebic brain abscess associated with renal cell carcinomaUmme Hani Abdullah,¹ Mirza Zain Baig,¹ Muhammad Azeemuddin,² Mohammad Wasay,³ Javed Yakoob³ and Mohammad Asim Beg⁴ ¹Medical College, and Departments of ²Radiology, ³Medicine, and ⁴Pathology and Laboratory Medicine, Aga Khan University Hospital, Karachi, Pakistan**Key words**cerebral amoebiasis, *Entamoeba histolytica*, headache, magnetic resonance imaging, renal cell carcinoma.

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CorrespondenceMohammad Asim Beg
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Road, Karachi 74800, Pakistan.
Email: muhammad.azeemuddin@aku.edu**Abstract**

Entamoeba histolytica is a protozoan parasite that is associated with diarrhea, but can extend to involve several organs. We report a case of amoebic brain abscess in a man who presented with fever, vomiting and headache with confusion and right hemiparesis. Brain magnetic resonance imaging showed a mass in the left frontal lobe, while abdominal computerized tomography showed a left renal malignancy. Brain biopsy showed *Entamoeba histolytica* infection. He was treated with intravenous metronidazole and nephrectomy that was followed by complete recovery. The present case report emphasizes that cerebral amoebiasis is associated with renal cell carcinoma.

Introduction

The majority of renal malignancies arise from renal cortical cells. It is twofold more common in men, and tends to occur in the sixth decade of life. In a local study, a frequency of 1.8% of renal cell carcinoma (RCC) among men was reported in 2393 cases of solid malignancies.¹ RCC induces tolerance by active suppression of immune effector cells. The dysfunctional lymphocytes are incapable of mounting a reaction and are susceptible to cell death on activation.² In RCC patients, a decreased expression of the T-cell receptor ζ chain, reduced tyrosine kinase activity³ and defective activation of nuclear factor- κ B leads to the failure of T cells to mount an immune response.⁴ RCC stroma, and immune and vascular cells produce cytokines; for example, tumor necrosis factor- α , transforming growth factor- β , interleukin-1 β , interleukin-6 and interleukin-10, and vascular endothelial growth factor or granulocyte-macrophage colony-stimulating factor that cause immunosuppression by induction of T- and natural killer cells apoptosis, blocking of lymphocyte homing and activation, and impairment of macrophage and dendritic cell (DC) function and maturation.⁵ Gangliosides expression on the surface of RCC tissue induces apoptosis of T cells, and inhibits antigen processing and presentation, T-cell proliferation, and production of type 1 and 2 cytokines.⁶ Tumor necrosis factor- α synergistically activated the apoptotic pathway in the lymphocyte. RCC cells arrest differentiation of antigen presenting cells from its myeloid progenitors and triggers accumulation of myeloid-derived suppressor cells.⁷

When ingested, *Entamoeba histolytica* infectious cysts reach the intestine and can cause diarrheal disease or can be

passed out in feces. Penetration through the colonic mucosa allows the trophozoites to seed into the blood stream and disseminate. The organism might involve extra intestinal sites, such as the liver, the lung and the central nervous system – often manifesting as amoebic abscesses. Brain abscess is a rare complication of protozoal infection, with >95% mortality.⁸ We present a case of a 44-year-old man who was diagnosed with cerebral amoebiasis and RCC, and who made a full recovery from this often fatal disease.

Case report

A 44-year-old man with a history of hypertension presented with history of fever, headache and vomiting for 2 weeks. His physical examination showed a blood pressure of 165/95 mmHg, temperature 39°C, and moderate distress as a result of pain and frequent vomiting. There was no neck stiffness. His neurological examination revealed mild confusion, and right hemiparesis involving the upper and lower limb and extensor planters. White blood count was elevated to $17\,500 \times 10^9/L$ with 80% neutrophils, lymphocytes were 10%, CD4⁺ cell count was 150 cells/ μ L and the erythrocyte sedimentation rate was 76 mmHg. Tests of liver function, protein immunoelectrophoresis, blood urea and creatinine were normal, and a HIV test was negative. Brain magnetic resonance imaging (Fig. 1a) showed a well-defined rounded mass in the left frontal mass that was hypointense on T1-weighted image and hyperintense with some signal heterogeneity on T2 weighted image. There was no surrounding edema. However, there was a mass effect over the left frontal horn and effacement of adjacent sulci. On the post-contrast T1-weighted image, the lesion showed enhancing thick



Figure 1 (a) Magnetic resonance imaging shows a well-defined rounded mass in the left frontal mass that is hypointense on T1-weighted image and hyperintense with some signal heterogeneity on T2-weighted image. There is no surrounding edema. However, there is a mass effect over the left frontal horn and effacement of the adjacent sulci. There is no intraventricular extension. (b) Computed tomography of the abdomen suggested a large multilobulated renal mass reported involving the left kidney. (c) Hematoxylin–eosin stain shows dark staining of *Entamoeba histolytica* trophozoites.

walls and fine internal septations. A presumptive diagnosis of a fungal infection was made, and the patient was started on amphotericin. A chest X-ray showed evidence of old pulmonary tuberculosis. A urine examination showed hematuria. An ultrasound of the abdomen revealed a large multilobulated renal mass involving the left kidney. A computed tomography scan of the abdomen suggested RCC (Fig. 1B) and the liver was normal. Renal mass biopsy had features of Fuhrman nuclear grade III clear cell RCC. Kidney parenchyma was infiltrated by neoplastic cells arranged in nests with intervening, thin fibrous septae, abundant clear cytoplasm with distinct cell borders, and vesicular nuclei with irregular nuclear contours and inconspicuous nucleoli. Foci of hemorrhage and necrosis were seen. Immunohistochemical stain CD10 was diffusely positive, while vimentin was patchy positive in the neoplastic cells. Because of a worsening of the neurological condition and suspicion of metastatic disease versus fungal infection versus intracranial tuberculoma, an excision brain biopsy was undertaken. Microbiological examination of the excised material confirmed the presence of *E. histolytica* trophozoite (Fig. 1c). Treatment with metronidazole 500 mg 6 h intravenously was carried out for 3 weeks. Subsequent bacterial and fungal cultures of the biopsy material were negative, whereas enzyme-linked immunosorbent assay and indirect hemagglutination assay titers for *E. histolytica* were 1:3200 and 1:512 respectively.

Discussion

Immunosuppression occurring in a malignancy can affect different components of the immune system. The functional abnormality might affect humoral immunity and compromise T-cell function. All immunosuppressed patients are at risk of infection by parasites associated

with gastrointestinal disease; for example, *E. histolytica*, *Giardia* and *Cryptosporidiosis*. The outcome of infection by enteric protozoan parasites is dependent on CD4⁺ cell counts. Immunosuppressed hosts are more likely to acquire parasitic infection after exposure and have severe disseminated infection, as they are unable to clear parasites when the CD4⁺ cell count is <200 cells/ μ L.⁹ In 40% of cases, the patients had no history of amoebic dysentery. However, patients having RCC with and without metastatic disease show immunological dysfunctions. Some mechanisms are specific to RCC; that is, production of immunosuppression mediators that can suppress T-cell response through different mechanisms.^{4–6} Significant increases in T cells co-expressing CD4 and CD8 antigens in RCC possess minimal anticancer activity. A significant decrease in circulating DC further complicates the immunocompetence state. In RCC, significantly higher vascular endothelial growth factor titers diminish host immunity by altering the function of major antigen-presenting cells, such as DC. The reduced number of natural killer cells and DC in the systemic circulation also suggested their sequestration by the tumor.

In the present patient, immunosuppression was shown by a high neutrophil-to-lymphocyte ratio and low CD4⁺ cell count.¹⁰ A low lymphocyte count imparts an inadequate immunological reaction to a tumor, and a weakened immune system. The cytolytic activity of lymphocytes and natural killer cells is suppressed.¹¹ The outcome of cerebral amoebiasis is generally good with correct diagnosis and prompt initiation of proper treatment.

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