

Paraneoplastic Nephrotic Syndrome in a Patient with Planum Sphenoidale Meningioma

Abstract

A 60-year-old homemaker presenting with pedal edema and ascites was found to have a planum sphenoidale meningioma concurrently with nephrotic syndrome. On renal biopsy, the patient was found to have membranous glomerulonephritis. There was complete remission of nephropathy after excision of the meningioma. Nephrotic syndrome has been commonly found in association with malignancies and blood disorders but the association with a meningioma is extremely rare, and only one case has been previously reported as per our knowledge.

Keywords: Brain tumor, meningioma, nephrotic syndrome, paraneoplastic syndrome

Introduction

Paraneoplastic glomerulopathies are a known phenomenon. The literature reveals that a variety of renal diseases occur in association with tumors, chemotherapeutic drugs, and radiation.^[1] Nephrotic syndrome has been associated commonly with malignancies and blood disorders but association with meningiomas is extremely rare, and only one case has been previously reported as per our knowledge.^[2] Here, we report a case of planum sphenoidale meningioma with biopsy-proven membranous nephropathy who presented to us with nephrotic syndrome, in which there was complete remission of proteinuria after excision of the meningioma.

Case Report

A 60-year-old homemaker presented with complaints of holocranial headache associated with repeated episodes of vomiting for 3 years. She also had generalized tonic clonic seizures for 3 years and diminution of vision in both eyes for 2 years. For the last 1 month, she had abdominal fullness with generalized edema involving the whole body. There was no history of diabetes mellitus, weakness of limbs, diplopia, loss of consciousness, fever, weight loss, jaundice, lymphadenopathy, nasal discharge, or epistaxis. Examination revealed that she had pitting edema.

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Bilateral olfaction was impaired; visual acuity was 6/18 in the right eye and 6/60 in the left eye without any field cuts. Bilateral papilledema was present. Motor and sensory examinations were normal. Evaluation for ascites and bilateral pedal edema revealed a normal hemogram, serum albumin level of 1.8 g/dl, urinary 24-hour-protein of 16.6 g/day (normal - up to 0.5 g/day), and strongly positive urinary proteins (4+).

The patient underwent radiological evaluation, initially in the form of computed tomography, which revealed a homogeneously hyper-dense mass sized about 4 cm × 3.5 cm × 3.3 cm involving the cribriform plate and the planum sphenoidale region, enhancing intensely on postcontrast images. On magnetic resonance imaging (MRI), the lesion was hypointense on T1-weighted images and seen to be involving the floor of the anterior cranial fossa, starting just above the cribriform plate and indenting genu of corpus callosum and ventricle superiorly; anteriorly extending till the anterior limit of cribriform plate and posteriorly extending up to the tuberculum sellae. On T2-weighted images, the mass was iso-to-hypo-intense and on postcontrast images, it was uniformly and intensely enhancing [Figures 1 and 2].

The patient then underwent kidney biopsy under ultrasound guidance and was diagnosed to have membranous glomerulonephritis. Periodic acid-Schiff stained sections of the renal biopsy

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specimen showed thickening of the glomerular basement with stiff capillary loops; periodic silver methanamine stained sections showed epimembranous argyrophilic spikes [Figure 3b], features suggestive of membranous glomerulonephritis. Despite the heavy proteinuria (owing to a low-normal baseline blood pressure, proteinuria was managed conservatively with salt restriction and additional diuretics as required), the patient underwent right supra-orbital frontal mini-craniotomy with excision of the tumor. Histopathological examination of the tumor biopsy specimen revealed a syncytial pattern with occasional whorls and numerous psammoma bodies dispersed throughout the tumor, suggestive of psammomatous meningioma [Figure 3a].

Her postoperative period was uneventful. The patient had marked improvement in a headache, vomiting, and abdominal fullness. Postoperative MRI done at 3 months postoperatively showed near total excision of tumor [Figure 4]. In the postoperative period (on the 5th postoperative day) 24-h urinary protein was 7.59 g/day. One week later, it was 5.69 g/day.

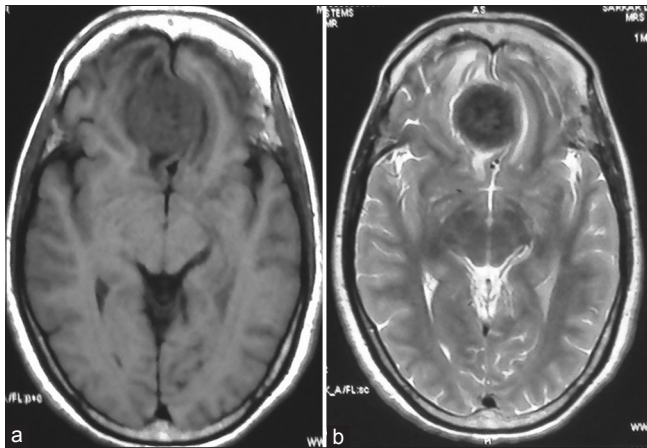


Figure 1: (a) T1-weighted axial magnetic resonance imaging showing iso-hypo-intense mass in base of anterior cranial fossa in region of planum sphenoidale; (b) T2-weighted axial image showing homogeneously hypo-intense mass with peri-lesional edema

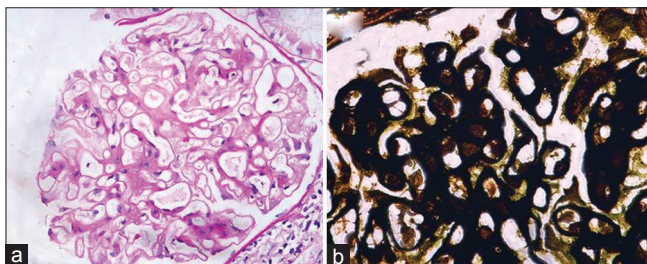


Figure 3: (a) H and E, x400 section shows a tumor disposed in a syncytial pattern with occasional whorls along with predominance of psammoma bodies dispersed throughout the tumor suggestive of psammomatous meningioma; (b) periodic acid-Schiff, x200 section shows thickening of glomerular basement membrane with stiff capillary loops (a); periodic silver methanamine stained section (x400) shows epimembranous argyrophilic spikes (b). These features are suggestive of membranous glomerulonephritis

At 3 months follow-up, the patient had significant improvement in her serum protein (6.8 g/dl) while the serum albumin was 3.9 g/dl and 24-h urinary protein was 0.3 g/day. The patient did not have a headache, vomiting or seizure and she was self-ambulatory. Pitting edema and ascites had significantly reduced in the postoperative period. At 20 months follow-up, the patient was asymptomatic, and there was no abdominal fullness. Her renal parameters in terms of proteinuria confirmed that she was in remission with stable renal function and normal serum albumin values.

Discussion

Many tumors have been reported as being associated with nephrotic syndrome and other renal diseases. Nephrotic syndrome is commonly associated with solid malignant tumors, most commonly with adenocarcinoma of the lung, breast, and gastrointestinal tract.^[3] Some benign tumors such as neuroblastoma, embryonal tumors, gonadoblastomas, and thymic tumors have also been associated with nephrotic syndrome.^[4] Although the etiology of nephrotic syndrome associated with malignancies is not well understood, some hypotheses have been postulated.^[5] Paraneoplastic nephrotic syndrome can be due to membranous glomerulonephritis, minimal change disease, focal segmental glomerulosclerosis or amyloidosis, but the most common pathology is membranous glomerulonephritis.^[6] Certain tumor proteins

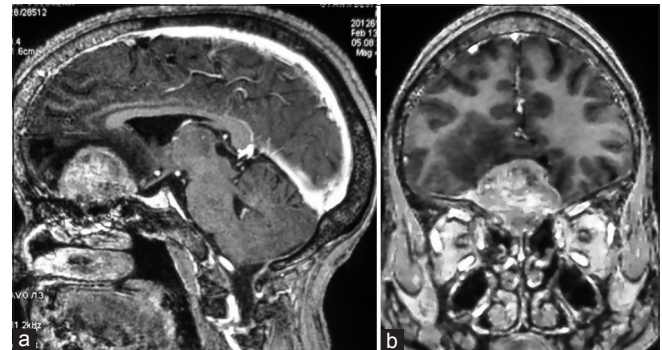


Figure 2: (a) T1-weighted contrast sagittal image, showing contrast enhancing mass in region of planum sphenoidale; (b) same mass on T1-weighted contrast coronal image

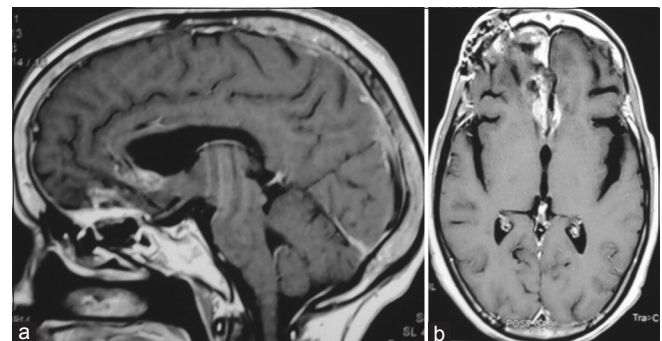


Figure 4: (a) Postoperative postcontrast enhanced sagittal magnetic resonance imaging showing near total removal of tumor; (b) residual seen on postoperative postcontrast enhanced axial magnetic resonance imaging

act as antigens and induce antibodies which form immune complexes which get deposited in the basement membrane. However, whether these antigens directly cause membranous nephropathy has not been established.^[7] It is possible that tumor antigens *per se* are not enough to cause paraneoplastic membranous nephropathy and enhanced immune reactions triggered by cancer itself may be required in the development of membranous nephropathy. Another hypothesis is that certain antigens with a high affinity for the basement membrane get implanted there and form immune complexes with circulating antibodies. There is some support for the theory of persistent viruses causing first the glomerulonephritis and then the malignancies, perhaps through a common pathogenesis.^[8] Several histological characteristics by immunofluorescence and electron microscopy may help to distinguish between idiopathic and secondary forms of membranous nephropathy. Presence of immunoglobulin G (IgG1) and IgG2 subtypes is more marked in the kidneys of patients with paraneoplastic membranous nephropathy than in those with idiopathic membranous nephropathy due to activation of both T_H1 and T_H2 cytokines which may be activated by tumor antigens or other stimulants, resulting in the unique pattern of IgG subtype and increased numbers of inflammatory cells. That glomerulopathy is due to the malignancy is supported by the fact that remission occurs after treatment of the primary etiology (surgical excision or chemotherapy) and relapse of proteinuria occurs after a recurrence of the tumor.^[3] The diagnosis of paraneoplastic nephrotic syndrome is usually made before the primary tumor is diagnosed (in 40–50% of cases).^[2] Primary membranous glomerulonephritis is usually found in old age and peaks between 50 and 70 years.^[3,6] It is also the most common type of glomerulonephritis found in adult-onset nephrotic syndrome and patients with paraneoplastic nephrotic syndrome.^[6] Apart from the renal manifestations, patients can present with dermatomyositis and chronic lymphocytic thyroiditis.^[5] Primary membranous glomerulonephritis can be stained by IgG4 while in secondary glomerulonephritis due to malignancy IgG1 is required.^[8] Eagan noticed that the number of inflammatory cells infiltrating the glomeruli were significantly higher in patients with membranous glomerulonephritis associated with cancer than in those with primary idiopathic membranous glomerulonephritis and also that the cut-off value for distinguishing the secondary variety from the primary variety was eight cells per glomerulus.^[6]

There are some animal-based studies supporting the association of malignancy with renal manifestations. The tumor-bearing rats in one study developed features of glomerulopathy.^[8] In a cohort study of 240 patients of membranous nephropathy, the authors concluded that age, smoking, and the presence of glomerular leukocytic infiltrates strongly increases the likelihood of malignancy in membranous nephropathy patients.^[9]

The treatment of paraneoplastic nephrotic syndrome comprises the removal of the primary tumor. There are few case reports in which remission of the nephrotic syndrome has occurred after cure of the tumor.^[2,3,10,11] Overall, nephrotic syndrome associated with malignancy has a poor prognosis as per literature.^[2]

Conclusion

Paraneoplastic nephrotic syndrome is a rare condition in which the most common pathology is membranous glomerulonephritis. It is commonly found in solid malignancies as well as hematologic malignancies. Association of nephrotic syndrome with meningioma is very rare, and only one case is described in literature. Possible hypotheses include immune complex reactions induced by either tumor antigen or viral infection. In our case, remission of the nephrotic syndrome occurred after excision of the tumor, supporting an etiological role for the tumor.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Bjørneklett R, Vikse BE, Svarstad E, Aasarød K, Bostad L, Langmark F, *et al.* Long-term risk of cancer in membranous nephropathy patients. *Am J Kidney Dis* 2007;50:396-403.
2. Zachariah PP, Mathew A, Rajesh R, Kurien G, Unni VN. Nephrotic syndrome associated with meningioma. *Indian J Nephrol* 2013;23:63-6.
3. Takeda S, Chinda J, Murakami T, Numata A, Iwazu Y, Akimoto T, *et al.* Development of features of glomerulopathy in tumor-bearing rats: A potential model for paraneoplastic glomerulopathy. *Nephrol Dial Transplant* 2012;27:1786-92.
4. Ronco PM. Paraneoplastic glomerulopathies: New insights into an old entity. *Kidney Int* 1999;56:355-77.
5. Lee JC, Yamauchi H, Hopper J Jr. The association of cancer and the nephrotic syndrome. *Ann Intern Med* 1966;64:41-51.
6. Eagan JW. Glomerulopathies of neoplasia. *Kidney Int* 1977;11:297-303.
7. Bacchetta J, Juillard L, Cochat P, Droz JP. Paraneoplastic glomerular diseases and malignancies. *Crit Rev Oncol Hematol* 2009;70:39-58.
8. Birkeland SA, Storm HH. Glomerulonephritis and malignancy: A population-based analysis. *Kidney Int* 2003;63:716-21.
9. Lefaucheur C, Stengel B, Nochy D, Martel P, Hill GS, Jacquot C, *et al.* Membranous nephropathy and cancer: Epidemiologic evidence and determinants of high-risk cancer association. *Kidney Int* 2006;70:1510-7.
10. Aslam N, Nseir NI, Viverett JF, Bastacky SI, Johnson JP. Nephrotic syndrome in chronic lymphocytic leukemia: A paraneoplastic syndrome? *Clin Nephrol* 2000;54:492-7.
11. Davison AM. Renal diseases associated with malignancies. *Nephrol Dial Transplant* 2001;16 Suppl 6:13-4.