In the name of God

Shiraz E-Medical Journal
Vol. 10, No. 3, July 2009

http://semj.sums.ac.ir/vol10/jul2009/87040.htm

Post-infectious Necrotizing Myelitis Associated with Meningitis: Report of a Fatal Case and Review of Literature.

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Received for Publication: November 25, 2008, Accepted for Publication: May 29, 2009.

Abstract:

Acute post-infectious necrotizing myelitis, a rare neurological complication of bacterial meningitis, is clinically defined by acute onset of paraplegia, or quadriplegia, sensory loss and loss of sphincter control. The condition should be differentially diagnosed from vascular accidents and immunogenic demyelination. This is a case of chronic otitis media complicated with meningitis which was further complicated with acute necrotizing myelitis.
An eighteen-year-old man presented with fever, headache and nausea of one day duration. He was suffering from actively purulent right sided otitis media for more than a year. Patient's data were first consistent with bacterial meningitis. Empirical antibiotic therapy was started and continued in spite of the CSF cultures showing no growth due to previous administration of antibiotics for otitis media. Again the patient was complicated with acute hydrocephalus and sudden attack of quadriplegia and loss of sphincter control after 48 hours. Cervical MRI was in favor of acute necrotizing myelitis, regarding the patient's clinical situation.

Keywords: Post-infectious Necrotizing Myelitis, Meningitis

Introduction:

Acute necrotizing myelitis is a rare neurological complication of bacterial meningitis. It is defined by acute onset of paraplegia or quadriplegia, sensory loss, and sphincter paralysis. The main clinical features that distinguish necrotizing myelopathy from the more common types of transverse myelitis are a persistent and profound flaccidity of the legs (or arms if the lesion is cervical), areflexia, and atonicity of the bladder – all reflecting a widespread pannecrosis that involves both the grey and white matter over a considerable vertical extent of the spinal cord – or spinal shock. None of the present methods of treatment seem to make a noticeable difference but some authors have the impression that high dose steroids, cyclophosphamide, or plasma exchange may have been beneficial in individual cases.

We wish to report an immuno-competent young adult with bacterial meningitis complicated by necrotizing myelitis.

Case Report:

An 18-year-old man was referred because of fever, headache and nausea of past 24 hours. His past medical story was only remarkable for an untreated right sided chronic otitis media with perforation of tympanic membrane of the affected ear and purulent discharge for quite more than a year for which he had received oral and local antibiotic therapy, during past weeks. On admission, physical examination showed high grade fever (39.5 degrees centigrade taken orally), pulse rate of 92 bpm, 14 respirations per minute and blood pressure of 120/85 mm Hg. Otitis was active and external auditory meatus was filled with malodorous puss. Nuchal rigidity was pronounced in antero-posterior axis; meningeal irritation signs were positive. He was also found to be fully alert and orient to time, place and person. No neurological deficits were found on admission. Ophthalmoscopy showed bilateral sharp disks with normal cup to disk ratio. No papilledema or any other abnormal findings were found. No hepatosplenomegaly or any other abnormalities were detected in physical examination of other parts of the body. Brain CT scan was normal. Lumbar puncture was done, thereafter. Regarding the results (table 1), antibiotic therapy was started with 2 grams of intravenous Ceftriaxone and one gram of Vancomycine given every twelve hours, waiting for CSF culture.

After 12 hours, the patient's level and content of consciousness grew dim. An emergency brain CT scan was requested, but before the scan being performed, the patient convulsed for duration of 45 seconds and a respiratory arrest ensued. He was resuscitated and convulsions were stopped by slowly infusing 10 mg Diazepam intravenously. Brain CT scan revealed ventriculomegaly in favor of acute four ventricle hydrocephalus and right temporofrontal subdural collection.

Ventriculostomy tube was inserted in the frontal horn of right ventricle. Soon the patient's mental status was reserved. The patient was dilantinized (750 mg as an intravenous bolus followed by maintenance of 100 mg intravenous Dilantin every 8 hours) and mannitol started 500 mg intravenously every 8 hours.

The follow up examination revealed that the patient was quadriplegic and had lost sphincter control. He was awake and alert. His pupils were same size (3 mm) showing brisk reaction to light. Optic disks were still sharp and ophthalmoscopy was normal, overall. Corneal reflex was present bilaterally and the patient had normal ocular movements. Gag reflex was absent. Sensorium was totally lost below the innervation level of C3. Cerebellar evaluation could not be done as the patient was quadriplegic; he did not have nystagmus. All superficial and deep tendon reflexes were missing. The patient was febrile and respirator dependent. Lab data were as followings: WBC count 10400 cells/ml, WBC differential: 89% polymorphonuclear cells, 17% lymphocytes, 2% monocytes and 1% stab, hemoglobin 10.2 g/dl, platelet count 348000 cells/ml, BUN 13, Creatinine 0.6 mg/dl, blood glucose 110 mg/dl, serum Na 137 meq/ml, serum K 4.4 meq/ml, serum calcium 8.9 mg/dl, serum phosphorus 3.6 mg/dl. Liver function tests, serum globulin level, thyroid function test, PMN myeloperoxidase and NBT were all normal. BACTEC resin-containing blood cultures were negative, as well. Anti HIV antibody was not detected with ELIZA method. In spite of the CSF culture being sterile, antibody therapy was continued, regarding the condition of our patient. Ear discharge culture was negative, also. Another CSF sample was sent to the lab for analysis and culturing. Intraventricular Gentamycine and Vancomycine was started and continued for 5 doses. Nevertheless, the patient remained febrile. Result of the second examination was as follows: total cell count: 4000/microL, total WBC: 3000/microL, PMN: 90%, Leukocyte: 10%, Protein: 59 mg/dl, Glucose: 73 mg/dl, Pressure: 110 mm H2O, Cultures: Negative, PCR for HSV: Negative .

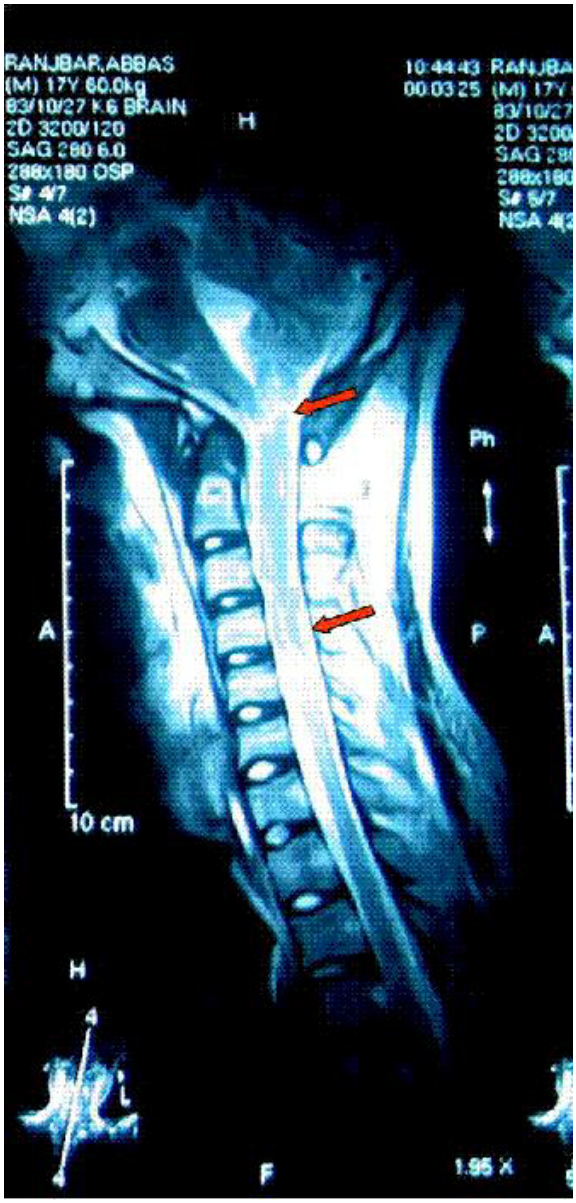
Brain MRI of the patient showed right temporofrontal subdural collection, some subdural fluid inferior to the tentorium and subcutaneous edema in right posterior parietal and temporal regions. Cervical MRI of the patient was reported to depict focal myelitis versus large demyelinating plaque at C1, C2, and C3 (figure 1). Since the patient was still febrile Ceftriaxone was substituted for Cefepime 2 grams intravenously every 8 hours. Metronidazole 500 mg intravenously every 8 hours was added to the antibiotic profile of the patient, as well. The combination made him afebrile in 24 hours.

The patient was sent to ICU and high dose Methylprednisolone (one gram intravenously everyday for 5 consecutive days) was administered as the diagnosis of "necrotizing myelitis" was advanced. Steroid therapy was followed by 50 mg of Prednisone on an everyday basis. The patient was not toxic, though respirator dependent. During 46 days of hospitalization, no neurological improvement was brought about in spite of all treatments and cares. Cardiopulmonary arrest happened to him once again. Unfortunately, resuscitation was not successful and he passed out.

Table 1, CSF analysis of the patient right after admission.

Total cell count	420/microL
Total WBC	390/microL
PMN	90%
Leukocyte	10%
Protein	50 mg/dl
Glucose	89 mg/dl
Pressure	110 mm H2O

Figure 1, Cervical MRI of the patient in favor of acute necrotizing myelitis.



Discussion:

A few such cases have been reported from different parts of the world. Although necrotizing myelitis is expected to be found in any age and both sexes[1], most of non-TB bacterial meningitis patients complicated by transverse myelitis have found to be children and neonates.[2, 3] Group B streptococcus, Streptococcus pneumoniae, Neisseria meningitides and Tuberculosis have been associated with postinfectious necrotizing myelitis.[4, 5, 6] Other infectious agents include HIV, Herpes simplex virus type 1 and type 2, and Diplococcus pneumoniae, Mycoplasma pneumoniae and schistosomiasis.[7, 8, 9, 10] In the setting of acquired immunodeficiency syndrome, varicella zoster virus and cytomegalovirus have also been associated with the development of necrotizing myelitis.[11, 12]

The disease course of our patient was actually the complication of chronically untreated otitis media by bacterial meningitis which was further complicated by such a rare complication as necrotizing myelitis. Acute quadriplegia, sensory loss and sphincter paralysis could be found with vascular lesions. Acute immunogenic demyelination (e.g. as a part of Devic syndrome), could be traumatic or a direct complication of abscess formation in the spinal cord. Unfortunately, the patient's family did not allow autopsy (this procedure is legally done with permission of the dead's family in Iran.)

MRI remains investigation of choice.[13] MRI scans showing hyperintense signals on T1 weighted and T2 weighted images indicate the presence of hemorrhagic necrosis and are diagnostic of the entity if these signals are not enhanced after gadolinium administration. The latter is also important in ruling out thrombosed arteriovenous malformation (Foix-Alajounnaie disease).[14] Vascular lesion was excluded from differentials as no area of infarction - justifying such a vast motor and sensory loss- was found in the series of imagings done during hospital course. The patient's medical story and laboratory evaluation did not support the idea of immunogenic

nor traumatic demyelination or necrosis. Moreover, no collections or abscesses were detected inside or in vicinity of the lesion.

Cultures of the spinal fluid prove to be positive in 70 to 90 percent of cases.[15] In this particular patient, recent oral and local antibiotic therapy for otitis media inhibited bacterial growth in CSF and blood cultures and cultures of ear discharge although BACTEC resin-containing media were used for blood cultures. Nevertheless, negative results of the cultures do not rule out the presence of a microorganism in the patient's CSF as its analysis was in favor of bacterial meningitis and his fever subsided with proper choice of antibiotics. In the absence of clinical manifestations of any other causes, the patient's death was attributed to the malignant course of necrotizing myelitis in this special case. Putting all these together, our patient represents a very rare complication of infectious meningitis, acute necrotizing myelitis. The management strategy of such patients relies on discovering the etiological agent; otherwise, supportive care remains the most important part of treatment.

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