

Special Article

- Medical ethics in the Neurosciences
S. K. Pandya 317

Review Articles

- Neuronal stem cells
D. Joshi, M. Behari 323
- Intraoperative MRI in neurosurgery: Technical overkill or the future of brain surgery?
V. Seifert 329

Technical Article

- Intracranial pressure monitoring in a resource-constrained environment:
A technical note
M. Joseph 333

Original Articles

- Diagnostic validity of the Ki-67 labeling index using the MIB-1 monoclonal antibody in the grading of meningiomas
A. Devaprasath, G. Chacko 336
- Clinical signs as a guide for performing HSV-PCR in correct diagnosis of herpes simplex virus encephalitis
B. B. Abbas, A. Abdolvahab, Y. P. Gholamali, B. Roshanak, R. Mahmood 341
- Outcome prediction model for severe diffuse brain injuries: Development and evaluation
S. V. Pillai, V. R. S. Kolluri, S. S. Praharaj 345
- Effect of mannitol in experimental spinal cord injury: An ultrastructural and electrophysiological study
A. Baysefer, E. Erdogan, S. Kahraman, Y. Izci, C. Korkmaz, I. Solmaz, U. H. Ulas, C. Ozogul, E. Timurkaynak 350
- Effect of losartan on albuminuria, peripheral and autonomic neuropathy in normotensive microalbuminuric type 2 diabetics
S. Kubba, S. K. Agarwal, A. Prakash, V. Puri, R. Babbar, S. Anuradha 355
- A study of epilepsy-related psychosis
A. K. Roy, S. V. Rajesh, N. Iby, J. M. Jose, G. R. K. Sarma 359
- Evaluation of nimodipine in the treatment of severe diffuse head injury: A double-blind placebo-controlled trial
S. V. Pillai, V. R. S. Kolluri, A. Mohanty, B. A. Chandramouli 361

Cryptococcal infection in patients with clinically diagnosed meningitis in a tertiary care center <i>K. N. Prasad, J. Agarwal, V. L. Nag, A. K. Verma, A. K. Dixit, A. Ayyagari</i>	364
Re-evaluation of reading frame-shift hypothesis in Duchenne and Becker muscular dystrophy <i>G. S. Pandey, A. Kesari, M. Mukherjee, R. D. Mittal, B. Mittal</i>	367
Venous air embolism: Does the site of embolism influence the hemodynamic changes? <i>P. Bithal, H. H. Dash, N. Vishnoi, A. Chaturvedi</i>	370
Hemangioblastoma: A study of radiopathologic correlation <i>C. Sundaram, S. Rammurti, J. J. M. Reddy, V. S. S. V. Prasad, A. K. Purohit</i>	373

Case Reports

Two cases of neuro-Behçet's disease mimicking cerebral tumor <i>S. Tuzgen, A. H. Kaya, D. Erdinçler, S. A. Oguzoglu, O. Ulu, S. Saip</i>	376
Choroid plexus papilloma of the posterior third ventricle during infancy & childhood: Report of two cases with management morbidities <i>S. J. Pawar, R. R. Sharma, A. K. Mahapatra, S. D. Lad, M. M. Musa</i>	379
Sporadic variety of pallido-pyramidal syndrome <i>J. Kalita, U. K. Misra, B. K. Das</i>	383
X-linked Charcot-Marie-Tooth disease with myokymia: Report of a family <i>A. Chakravarty, B. Ghosh, S. Sengupta, S. Mukhopadhyay</i>	385
A patient with reversible pupil-sparing Weber's syndrome <i>U. Umasankar, F. U. Huwez</i>	388
Delayed post-surgical development of dural arteriovenous fistula after cervical meningocele repair <i>T. Flannery, M. H. Tan, P. Flynn, K. A. Choudhari</i>	390
X-linked lissencephaly in an Indian family <i>S. Panda, M. Tripathi, S. Jain, P. Sharma</i>	392
Isolated fourth ventricular cysticercus cyst: MR imaging in 4 cases with short literature review <i>S. Singh, S. V. Gibikote, N. K. Shyamkumar</i>	394
Hemiplegia: An initial manifestation of Japanese encephalitis <i>A. Nalini, G. R. Arunodaya, A. B. Taly, H. S. Swamy, M. K. Vasudev</i>	397
Herpes simplex encephalitis: Some interesting presentations <i>S. Jha, M. Jose, V. Kumar</i>	399
Cerebrotendinous xanthomatosis: Neuroimaging findings in two siblings from an Indian family <i>S. B. Gaikwad, A. Garg, N. K. Mishra, V. Gupta, A. Srivastava, C. Sarkar</i>	401

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C O N T E N T S (Contd.)

Vol. 51 Issue 3

- Isolated ring-enhancing lesion of the brainstem in a patient with cyanotic heart disease: Role of stereotactic intervention
R. K. Moorthy, V. Rajshekhara 404
- Suprasellar arachnoid cyst presenting with bobble-head doll movements: A report of 3 cases
K. I. Desai, T. D. Nadkarni, D. Muzumdar, A. Goel 407

Short Reports

- Successful treatment of intrathecal morphine overdose
A. Yilmaz, A. Sögüt, M. Kılınç, A. G. Sögüt 410
- Unusual self-inflicted penetrating craniocerebral injury by a nail
S. N. Shenoy, A. Raja 411
- Juvenile amyotrophic lateral sclerosis with unusual presentation: A case report
A. Panagariya, A. Garg, B. Sharma 413
- Functional recovery in ischemic stroke
M. M. Paithankar, R. D. Dabhi 414
- Temporal bone carcinoma with intradural extension
A. K. Khan, S. Deb, D. K. Ray 416
- Merosin negative congenital muscular dystrophy: A short report
A. M. Ralte, M. C. Sharma, S. Gulati, M. Das, C. Sarkar 417
- Subdural hemorrhage associated with falx meningioma
A. Goyal, A. K. Singh, S. Kumar, V. Gupta, D. Singh 419
- Intravenous sodium valproate in status epilepticus
S. Jha, M. Jose, R. Patel 421
- Intracranial aneurysms causing spontaneous acute subdural hematoma
S. N. Shenoy, M. G. Kumar, A. Raja 422

Letter to Editor

- Focal early onset of delayed radiation encephalopathy with brainstem signs 425
- An early and isolated origin of the angular artery from the middle cerebral artery 425
- Anticonvulsant-hypersensitivity syndrome in a child 427
- Prognosis in children with head injury: Inaccuracies in the analysis 427
- Non-hypertensive intracerebral hemorrhage: Some interesting observations 428

Forthcoming Events

..... 429

Instructions for Contributors

..... 430

Case Report

Isolated ring-enhancing lesion of the brainstem in a patient with cyanotic heart disease: Role of stereotactic intervention

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A 23-year-old man with cyanotic heart disease, presented with a ring-enhancing mass in the brainstem. Stereotactic intervention for this clinically and radiologically diagnosed pyogenic abscess, revealed a tuberculoma. Antituberculous therapy led to complete recovery. Stereotactic intervention is an ideal management strategy in patients with cyanotic heart disease and an isolated ring-enhancing mass in the brainstem.

Key Words: Abscess, Brainstem, Tuberculosis, Stereotaxy.

Introduction

When a patient with congenital cyanotic heart disease presents with relatively rapid progression of neurological deficits suggestive of a brainstem lesion, and the CT scan shows a ring-enhancing lesion, a diagnosis of a pyogenic abscess would be the first consideration. However, several benign lesions of vascular, inflammatory or infective etiology, as well as malignant lesions can present as focal enhancing lesions of the brainstem.^{1,2} Hence it is mandatory to obtain a histological diagnosis before starting therapy. The following case illustrates how CT-guided stereotactic biopsy was used as a safe method to diagnose an isolated brainstem tuberculoma mimicking a pyogenic abscess in a patient with Tetralogy of Fallot and a ring-enhancing lesion of the brainstem.

Case Report

A 23-year-old man presented with one month history of progressively worsening holocranial headache and deteriorating vision associated with heaviness of the left upper and lower limbs for 15 days, incoordination of the right upper limb, imbalance while walking and dysarthria for 15 days. He had been diagnosed to have Tetralogy of Fallot one year earlier and was not on any treatment for the same. He had received antibiotics (ceftriaxone, gentamicin and metronidazole) with steroids for five days, prior to presentation at our hospital. There was no past history of tuberculosis.

Physical examination revealed clubbing and cyanosis with an ejection systolic murmur over the left sternal border. His sensorium was normal and visual acuity and fields were normal. There was no papilloedema. The pupils were equal and reacting to light. There was wasting of the right masseter with deviation of the jaw to the right on opening the mouth. He had a left lower motor neuron type of facial paresis. He had evidence of impaired rapid alternating movements in all the 4 limbs with exaggerated deep tendon reflexes bilaterally with a left extensor plantar response. There were no sensory deficits. The gait was mildly spastic with impaired tandem walking.

CT scan of the brain showed a 1.8 x 1.6 x 1.2 cm hypodense lesion in the pons with peripheral ring enhancement (Figure 1). The lesion appeared to have irregular margins and there was significant perilesional edema. Chest radiograph showed pulmonary oligemia and ECG revealed right axis deviation. He had polycythemia. Considering the radiological features and the evidence of congenital cyanotic heart disease, a diagnosis of cardiogenic brainstem abscess was made. CT-guided stereotactic aspiration of the mass was planned. The center of the lesion was targeted using the CRW system (Radionics Inc. Burlington, MA) and a right frontal approach was used. No pus was obtained on aspiration at the target site and therefore a biopsy of the lesion was done. Histopathology reported necrotic tissue and scanty chronic inflammation consistent with tuberculoma.



Figure 1: Stereotactic contrast enhanced CT scan showing an irregular ring-enhancing lesion in the pons with significant perilesional edema and partial effacement of the fourth ventricle

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He was started on antituberculous therapy with a 4-week course of dexamethasone. He was prescribed isoniazid, rifampicin and pyrazinamide for 3 months followed by isoniazid and rifampicin for 15 more months. He was followed up in the outpatient clinic and reported clinical improvement. Follow-up CT scan done after 6 months and 16 months (Figure 2) showed a small residual dot of contrast enhancement in the pons consistent with radiological resolution of the lesion. He did not have any significant neurological impairment when last seen 36 months after the diagnosis was established.

Discussion

Isolated brainstem tuberculoma is a tuberculoma present in the brainstem in the absence of other intracranial tuberculomas or systemic manifestation of tuberculosis. While tuberculomas of the brainstem are the least common of all intracranial tuberculomas,³ histologically proven isolated brainstem tuberculomas have been reported.⁴ They must be suspected in any focal ring-enhancing lesion of the brainstem. The role of histological confirmation through open biopsy or stereotactic procedures is especially important in an isolated lesion, as there are no systemic tuberculous lesions to support the presumptive diagnosis of tuberculosis. Several authors^{1,5-8} have recommended histological confirmation of the lesion prior to starting antituberculous therapy. Although some authors have described the use of antituberculous therapy as a diagnostic tool,^{9,10} it may lead to unnecessary exposure to antituberculous therapy¹¹ in patients with non-tubercular lesions.

Congenital cyanotic heart disease predisposes to the development of brain abscesses. These are more common in the supratentorial compartment. In a previous publication from this institution 18.7% of all brain abscesses were predisposed by an underlying cardiac condition.¹¹ Kagara et al have reported 4% cardiogenic brain abscesses to be in the posterior fossa in their series. These were all situated in the cerebellum and none were present in the brainstem.¹² The prognosis for cardiogenic brain abscess is comparatively poor and mortality rates range from 27.5% to 71%. Cardiogenic brainstem abscesses have been previously managed successfully by stereotactic aspiration.^{13,14} This method provides an added advantage in that it can be done under local anesthesia thus avoiding general anesthesia in a patient who is a poor candidate for the same due to compromised cardiac status.

The radiological differential diagnoses of a ring-enhancing lesion in the brainstem would include pyogenic abscess, metastatic disease, tuberculoma, cysticercus granuloma and a high-grade glioma. Tuberculomas generally have an irregular margin and have significant perilesional edema. While diagnostic criteria (clinical and CT) have been validated for differentiating a solitary cysticercus granuloma from a tuberculoma in patients presenting with seizures, no such definitive criteria are available for isolated ring-enhancing masses in the brainstem.^{15,16} As the positive predictive value of CT in the diagnosis of an intracranial tuberculoma is only 33%,¹⁷ em-



Figures 2: Follow-up contrast enhanced CT scan done showing marked reduction in the size of the lesion at 6 months. Note the normal shape of the fourth ventricle in the image

piric antituberculous therapy is not advised for it would lead to inappropriate treatment for several non-tubercular lesions.

In a series of 71 patients with brainstem masses, stereotactic biopsy had a high yield and it was also helpful as a therapeutic intervention for aspirating cystic lesions.¹ Histological confirmation of brainstem lesions is important as several lesions with radiological features of malignancy were proved to be benign on histology and this led to a change in their management.^{1,2,18} Stereotactic biopsy is a safer option with less morbidity than open procedures.

In our patient with a focal ring-enhancing brainstem lesion and an underlying congenital cyanotic heart disease, it was decided to do a stereotactic aspiration/biopsy of the lesion mainly to obtain pus for culture studies so that the patient could be treated with appropriate antibiotics. Additionally, it was felt that aspiration of the pus could relieve the pressure effect of the abscess and provide rapid symptomatic relief. If he had been continued on empiric antibiotic therapy for a suspected pyogenic abscess, the outcome would have been poor. Hence stereotactic intervention in our patient ensured an excellent outcome.

In patients with cyanotic heart disease and an isolated ring-enhancing mass in the brainstem, stereotactic intervention is an ideal management strategy to confirm the diagnosis. Even if the lesion is a pyogenic abscess, microbiological examination of the pus can lead to appropriate antibiotic therapy.

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Moorthy RK, et al: Isolated ring-enhancing lesion of the brainstem

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