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Intraventricular Cysticercosis

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Abstract

Twelve patients of intraventricular cysticercosis treated between 1986 and 1995 were analysed retrospectively. Five had cysts in the lateral ventricle, two in third ventricle and four others had cysts in fourth ventricle. One patient had cysts both in lateral and third ventricles. All patients underwent CT scan, four had ventriculogram and one patient also had MR scan. In five, a preoperative ventriculooperitoneal shunt was performed. Eleven patients underwent a microsurgical approach for the cyst excision, in another neuroendoscopic excision was performed. Nine patients received anticysticercal therapy postoperatively. There was no mortality or morbidity. The patients were followed up for a period of 6 months to s6 years (mean : 38 months) None had any recurrence of symptoms.

Key words -
Cysticercosis,
Neurocysticercosis,
Intraventricular cysticercosis

Intraventicular cysticercosis of considerable interest due its association with sudden nuerologic deterioration, and its amenability to surgical management. It constitutes 15-54% of all neuro-cysticercosis 1, 2. We report our experience with 12 cases of intraventricular neurocysticercosis treated over a 10 year period at the National Institute of Mental Health & Neuro Sciences, Bangalore .

Material and Methods

The case records of the patients of National Institute of Mental Health & Neuro Sciences were analysed from 1986 to 1995 and 12 cases of intraventricular cysticercosis were identified. These 12 patients were equally distributed among all age groups. Seven were males and five were females. All the patients had presented with features of raised intracranial pressure of recent onset ((6 months). Three patients had additional feature of frontal lobe dysfunctions, whereas two had seizures. One

patient presented with Parinaud's syndrome and another had feature of brain stem dysfunction (Table I). Only one patient had evidence of cysticercosis elsewhere clinically

Table I - Intraventricular cysticercosis: Clinical features (n = 12)

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Seven patients had raised erythrocyte sedimentation rate, whereas raised eosinophil count was present in six patients. The primary radiological evaluation in all patients was a plain and intravenous contrast enhanced computed tomographic (CT) scan (Table II). CT scan revealed asymmetric lateral ventricular dilatation in 5 patients, abnormal dilatation of the IIIrd ventricle in 3 patients and a ballooned fourth ventricle with hydrocephalus in 4 patients. In 2 patients calcifications were present in the plain CT scan. Four patients, in addition to CT scan, underwent contrast ventriculogram to locate the cysts, of which in 2 had post-intraventricular contrast CT scan. One patient was further investigated with a MRI scan. The MRI scan confirmed a cystic lesion in the third ventricle with a hyperintense speck in T1 weighted image suggesting a scolex. (Fig. 1A, B & C).

Table II - Intraventricular cysticercosis: Radiological investigations (n = 12)

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- ***Contrast enhanced axial CT scan showing evidence of asymmetric dilatation of the posterior third ventricle and frontal horn of the left lateral ventricle***
- ***Intraventricular iohexol enhanced CT Scan (Coronal view) of the same patient demonstrating a cyst in the third ventricle***
- ***T1 Weighted MRI (coronal section) of the same patient demonstrating a cystic lesion in the floor of the third ventricle with a hyperintense speck in it suggesting a cysticercal cyst with scolex***

Five patients had cysts in lateral ventricle, two in third ventricles and in one patient it was both in lateral and third ventricles. In the rest four it was located with 4th ventricle. One of these patients had associated multiple racemose cisternal cysticercal cysts.

A preoperative ventriculoperitoneal shunt was placed for acute progression of symptoms due to hydrocephalusin 5 patients. In these patients contrast ventriculogram was not performed and persistence of asymmetric ventri-culomegaly after the shunt surgery suggested the possibility of an intraventricular cyst. Two of these had persistence ballooning of the fourth ventricle in spite of reduction in the lateral ventricular size.

In eleven patients the cyst was removed by a microsurgical approach, whereas in one patient with lateral ventricular cysts a neuroendoscopic removal was performed (Table III). For the lateral third ventricular cysts a transcallosal approach or a transcortical transventricular approach was used; for the patients with fourth ventricular cysts a midline suboccipital transveriman approach was utilised.

Table III - Intraventricular cysticercosis: Surgical approach (n = 12)

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Six patients had a single cyst, three others had 2 cysts each, whereas in the rest 3 racemose cysts were encountered. The patient operated with the aid of a neuroendoscope had a racemose cyst which was removed in piecemeal. Majority of the lateral ventricular cysts were of racemose nature, whereas the third and fourth ventricular cysts were predominantly solitary (Table IV).

Table IV - Intraventricular cysticercosis: Location of the cysts (n = 12)

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There was no postoperative complications. One patient who had multiple racemose cisternal cysts and fourth ventricular cysts markedly improved in his neurological deficits after excision of the cysts. No features of disconnection syndromes were noted in the postoperative period in any of the patients who had undergone transcallosal approach.

Ventricular CSF studies were performed in all the patients (Table V). In seven patients the cell count was raised with lymphocyctic pleocytosis, whereas in another five it was normal. CSF proteins were elevated in seven patients, in rest five it was normal. Anticysticercal antibody detection by Enzyme Linked Immunosorbent Assay (ELISA) on ventricular CSF was performed in 5 patients in 4 of them it was positive. Nine patients were treated in the post-operative period with albendazole (15 mg/kg body weight) after it was available in India.

Table V - Intraventricular cysticercosis: Ventricular CSF studies

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All the patients were followed up for a period ranging from 6 months to 6 years, with a mean follow up of 38 months. All the patients had excellent outcome and had returned to their occupation. None had any recurrence of symptoms. Cranial CT scans were performed in 3 patients during the last follow up, and in all of them it was normal. The seven patients who did not have a preoperative ventriculoperitoneal shunt did not require it during their follow up.

Discussion

Cysticercosis is the commonest parasitic infection of the central nervous system. After ingestion, the ova of taenia solium loses its shell on contact with the gastric juice. The liberated oncospheres are transported by the blood stream to various tissues. In the nervous system it can be localised in the parenchyma, subarchnoid space, chroid plexus or in the spinal cord. From the choroid plexus they enter the ventricular cavity. Intraventricular cysticercosis constitutes 15-54% of neurocysticercosis in various reports [1], [2]; their higher detection has been since the advent of MRI. The relatively smaller sized cysts migrate along the CSF pathways with the CSF flow and thus they are commonly found in the fourth ventricle. Eighty six percent of intraventricular cysticercal cysts were located in the fourth ventricle in a report by Mehta [3] whereas a recent report mentions the incidence to be 65% [4]. However, in the present series, only 33% were located in the fourth ventricle.

Most commonly solitary, intraventricular cysts may occasionally be multiple or racemose in nature. Seventy six per cent of intraventricular cysts reported by Madrazo were solitary [5] whereas 86% of cysts were single in another report [3]. Fifty per cent of cysts in the present series were solitary, whereas in another 25% of cases two cysts were found. Racemose cysts were present in the rest 25%. The racemose cysts had a predilection for the lateral ventricles, whereas majority of the solitary cysts were located in the IIIrd and IVth ventricles. Association of parenchymal cysticercosis is uncommon in patients with intraventricular cysticercosis is uncommon in patients with intraventricular cysticercosis, the incidence varies between 6-24% [3], [4]. Sixteen per cent of patients in the present series had

associated parenchymal cysticercosis.

Intraventricular cysts may cause symptoms by mechanical obstruction of the CSF outflow, or death of the larvae cause epedymitis and adhesions resulting in hydrocephalus [6], [7]. Associated parenchymal cysts in patients of intraventricular cysticercosis may present with seizures alone.

After the advent of MRI, invasive diagnostic procedures like contrast ventriculogram and VT with positive intraventricular contrast are no longer considered to be the imaging modality of choice [4]. On routine plain or intravenous contrast CT scan the cysts appear isodense with CSF and hence may not be diagnosed without the administration of a positive intraventricular contrast medium. A high degree of suspicion is required to diagnose these cysts without a contrast ventriculogram. In the early part of the study period, an abnormal focal dilatation of the ventricles or persistent dilatation of the ventricles after a CSF drainage procedure lead to the suspicion of intraventricular cysts in 8 patients, leading to the diagnosis of the condition.

MRI plays a significant role in detection of the intraventricular cystsicercal cysts. The cysts wall and the hyperdense scolex is easily demonstrated in T1 weighted images; whereas in T2 weighted images due to partial volume averaging the cysts are not well seen due to the similar signal intensities of the cyst fluid and the CSF fluid and the CSF. The rural nodule also becomes undetectable in T2 images.

Granular ependymitis which occurs following death of the larvae is considered to be of significance as it influences the surgical technique and the outcome [7]. It may be detected in contrast enhanced CT or gadolinium enhanced MRI scans as ependymal enhancement. Gadolinium enhanced MR imaging has been reported to underlying ependymitis in patients with intraventricular cysts [4]. In the present series, contrast enhanced CT did not reveal evidence of ependymal enhancement in any of the patients.

Though immunological testing by ELISA or Complement Fixation Test (CFT) may suggest the diagnosis in nearly 60% of cases, the inability to perform a lumbar puncture in the presence of raised intracranial pressure in the preoperative period limit its usefulness in patients with intraventricular cysticercosis. The ventricular CSF obtained during the contrast ventriculogram or shunt surgery may be used to assist the diagnosis. However, immunologic studies for anticysticercal antibodies in ventricular CSF may be false negative. In a recent study of patients with hydrocephalus due to cysticercosis, ELISA and CFT in ventricular CSF for anticycticercal antibodies were negative in 25% of patients, whereas it was positive in all the lumbar samples [9]. In the present series it was positive in the ventricular CSF in 4 of the 5 patients in which it was performed.

Rapid deterioration in neurological status may occur due to sudden obstruction of the CSF pathways; 38% of patients in the series reported by Apuzzo had acute progression of symptoms over a 2-36 hr period [7]. Emergency ventricular diversion procedures may be indicated in such patients. A temporary ventriculostomy may be sufficient manage the acute condition. A permanent ventriculoperitoneal shunt has been preoperatively, advocated by a few [3], [5]. However, in our opinion it is seldom required; none of our 7 patients who id not have ventriculoperitoneal shunt prior to their cyst excision required it in the postoperative period or during the follow up. In the other five patients treated during the initial part of the study, it was performed for hydrocephalus and subsequently as a repeat CT scan demonstrated focal dilatation of the ventricles, the patients underwent surgical exploration and the cysts were excised. A permanent CSF diversion procedure primarily or sometimes after cyst excision however is indicated in presence of granular ependymitis or multiple cysts at different locations [4], [7], [10]. The untreated cysts may enlarge and cause subsequent comparison of neural structures in some patients, and hence a close follow up and routine radiological investigations at frequent intervals to

detect cyst expansion is required [4].

Primary surgical excision of the cysts is the treatment of choice in the absence of any associated ependymitis [7], [11]. In the present series, all the 11 patients in whom, a direct surgical excision was performed, recovered well and had no morbidity.

Cyst removal by an endoscopic approach has also been suggested [7], [12]. The free floating cysts are easily identified with the aid of endoscope and are removed. Rupture of the cysts during the endoscopic removal does not increase the morbidity or mortality [7], [11], [13] though Madrazo ascribed his two deaths due to rupture of the cyst during removal and consequent ependymitis [5].

The role of anticysticercal chemotherapy in intraventricular cysticercosis as the only mode of management is still controversial. Isolated cases of intraventricular cysticercosis have been successfully treated with albendazole [14] and praziquantel [15]. However, considering the high risk of acute neurological deterioration, the prolonged medical management may be associated with a significant risk [10]. A course of anticysticercal therapy is indicated in the postoperative period as neurocysticercosis is considered to be a systemic disease with a focal manifestation.

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