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Otogenic brain abscess and its management with review of literature

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ABSTRACT

Background: Proper management of chronic otitis media may reduce the incidence of otogenic brain abscess. The objective of this study is to present our experience in the management of otogenic brain abscess by neurosurgical and otolaryngological surgery simultaneously.
Methods: It is a retrospective study conducted between 2006-2015. 20 patients with otogenic brain abscess were admitted to neurosurgery and ENT wards for management were included in the study. On admissions patients had ENT, neurosurgery and neurological examinations. All the patients underwent neurosurgery followed by mastoidectomy. Repeat CT scanning/ MRI scanning done after 1 week to check for the success of the surgery and discharged on the 10th day after suture removal. Patients were followed up for 1-2 years.
Results: The study included sixteen males and four females. Their age ranged between 4-32 years with mean of 18 years. Their chief complaints were severe headache, vomiting and fever with unilateral and or bilateral foul smelling discharge. Brain and HRCT temporal bone CT scanning showed equal incidence of abscess on the sides with 8 cerebellar, 6 temporal, 5 tempero parietal and 1 fronto parietal abscess. After completion of surgery, eighteen patients improved and two patents expired due to septic shock.
Conclusions: This is technically more feasible technique with an added advantage of single anaesthesia, short stay of patient in the hospital and early disease clearance in the same procedure.

Keywords: Otogenic brain abscess, Modified radical mastoidectomy, Chronic suppurative otitis media

INTRODUCTION

Otogenic brain abscess is a relatively common problem in developing countries, where the prevalence of chronic suppurative otitis media (CSOM) is reported to be in the range of 30-40% and 0.5%-1% of developing brain abscess. The most commonly encountered intracranial complication is meningitis followed by brain abscess. The mortality of the brain abscess is in the range of 30-40%.[1] The eradication of infection in the brain and the ear is a major challenge which was realized as early as 1893 by Sir Williams Macewan, who described mastoid approach to both the abscesses. However with the development of otology and neurosurgery as separate entities, otologists started relying on neurosurgeons for the intracranial abscess removal followed by mastoidectomy.[2]

Hence the standard treatment for otogenic brain abscess evolved in two separate procedures addressing primary focus in mastoid its secondary complications in the brain, each with its own surgical mortality and morbidity.[3,4]

Chronic otitis media with cholesteatoma and/or granulation tissue are usually the cause. In developing countries with high incidence of cholesteatoma, brain abscess is not a rare complication. The first line of treatment is antibiotic, followed immediately by surgical evacuation of the abscess and cleansing the sources of infection.[6] CT-scanning is the best available diagnostic tool.[1]

Due to improvement in the surgical and anesthesia techniques, recently the advantages of eradicating the

primary focus of infection through a trans-mastoid approach along with excision of brain abscess have been reported in the literature i.e. the avoidance of two separate surgical procedures for the same pathology.[5]

METHODS

This retrospective study was carried for 10 years between 2005 to 2015. 20 patients with otogenic brain abscess were admitted to neurosurgery and ENT wards for management were included in the study. On admissions patients had ENT, neurosurgery and neurological examinations (CT scanning/MRI scanning of brain and HRCT temporal bone, microscopic examination of the ear and pus sent for culture and sensitivity). All the patients underwent craniotomy for abscess removal by neurosurgeons followed by radical mastoidectomy by an ENT surgeon consecutively one after the other under single anesthesia in a same sitting. Post operatively patients have been kept in ICU for 48 hours, later on shifted to the wards. Antibiotics were given for 4-6 weeks. Repeat CT scanning/ MRI scanning done after 1 week to check for the success of the surgery and discharged on the 10th day after suture removal. Patients were followed up for 1-2 years.

RESULTS

Twenty patients with the primary diagnosis of brain abscess were admitted to the neurosurgery and ENT wards for the management during 10 years period (2005-2015). The study included sixteen males and four females. Their age ranged between 4-32 years with mean of 18 years. Their chief complaints were severe headache, vomiting and fever with unilateral and or bilateral foul smelling discharge. The main findings were foul smelling aural discharge with cholesteatoma/granulation tissue with mastoid tenderness.

Table 1: Demographic data of the participants and outcome of the study.

Variables	Mean (%)
Age (in years)	
1-10	5 (25)
11-20	10 (50)
21-30	4 (20)
30-40	1 (5)
Sex	
Male	16 (80)
Female	4 (20)
Outcome	
Improved	18 (90)
Expired	2 (10)

Brain and HRCT temporal bone CT scanning showed equal incidence of abscess on the sides with 8 cerebellar, 6 temporal, 5 temperoparietal and 1 frontoparietal abscess. All HRCT temporal bone showed chronic otitis media with cholesteatoma. After completion of surgery, eighteen patients improved and two patents expired due to septic shock.

Table 2: Findings of brain and HRCT temporal bone CT scanning.

Site	Mean (%)
Cerebellar	8 (40%)
Temporal	6 (30%)
Temporo parietal	5 (25%)
Fronto parietal	1 (5%)
Total	20 (100)

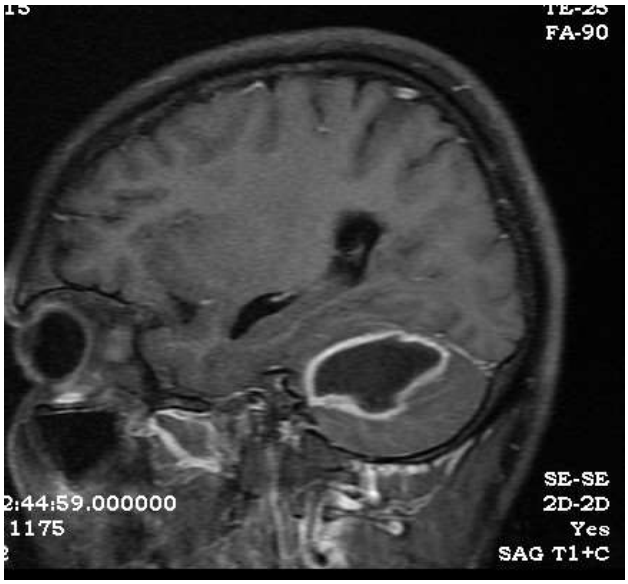

Figure 1: Preoperative MRI scan of left cerebellar abscess.

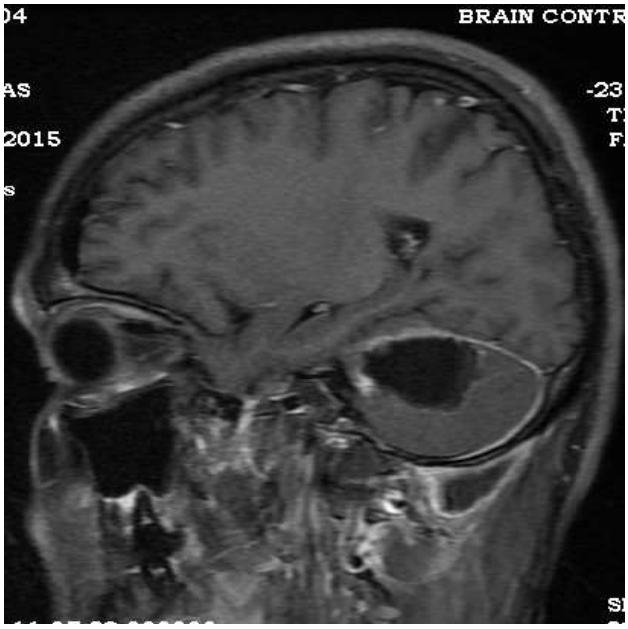

Figure 2: Postoperative MRI scan of left cerebellar abscess.

DISCUSSION

The occurrence of otogenic brain abscess peaks in the first two decades and the mean age was 18years in our series.[5,7,8] Otogenic brain abscess affects usually children more than adults.[6,9,10] Ashoor et al, Sennoroglu et al and Nesic et al found high incidence of Otogenic brain abscess in children than in adults. In our series also children are affected more than adults.

Predominantly males are affected.[2,6-8] The present study also showed male predominance with16 males and 4 females. Brain abscess are located at the same side as the diseased ear and temporal lobe (cerebral) and cerebellum are the two common locations for otogenic brain abscess.[6,10]

Deric et al found 28 cerebral and 1 cerebellar, whereby Sennoroglu et al found 54% cerebral and 44% Cerebellar, whereas in Ozkaya et al series it has been found 11 cerebella and 14 temporal.[11] In another series Borade et al found 83% temporal and 17% in cerebellar.[12] In our study it has been found to be 40% Cerebellar, 30% temporal, 25% Tempero-parietal and 5%fronto-parietal.

Cerebellar abscess comprise 6-35% of brain abscess. Despite widespread use of antibiotics, brain abscess following chronic suppurative otitis media (CSOM) remains a major problem for the paediatrician, neurologist, otologist and neurosurgeons.[13] Otogenic brain abscess may constitutes about 70% of brain abscess.[14] Middle ear suppurative disease may extend to temporal lobe or cerebellum due to destruction by cholesteatoma, through fracture lines, preformed pathways, through the Haversian system of veins or through the periarterial space of Virchow Robin.[12] Intracranial abscess follows atypical evolution in its formation and its management differs at various stages of evolution.[15,16] Antibiotics are quite effective in early and late cerebritis stage but their efficacy is reduced in the stage of capsule formation due to acidic medium in the abscess cavity and the inability to have adequate therapeutic concentration of antibiotic within the abscess. Therefore surgical intervention is essential once the capsule is formed.[17-20] Hence brain abscess following CSOM can be effectively managed if evolution pattern is known, as the treatment is mainly based on the stage of abscess formation.

Intracranial abscess should be completely excised through craniotomy. Excision of the abscess significantly reduces cerebellar oedema also relieves compression on the brainstem; simultaneously mastoidectomy should be done on urgent basis to prevent reformation of an abscess. If treated within reasonable period of time it gives an excellent prognosis.

Comparison of patients operated on in the same session with patients operated on in two separate sessions concluded that there is no apparent difference between the outcomes.[21] Many authors proposed perform neurosurgery first and ear surgery later on.[22] Many authors proposed to perform these two operations at the same session.[2,6,7,11] The outcomes of our study suggests concurrent excision of an abscess and mastoidectomy is best as it reduces the recurrence rate of an abscess, also cleanses the source of infection at the same time. Hospital stay is also shortened and under single anesthesia.

The major limitation of the study was the sample size is small; hence it is necessary to carry out further studies prospectively using larger sample population to get excellent outcome of the treatment procedure.

CONCLUSION

Otogenic brain abscess needs an emergent action, preferably in a single stage approach which offers several advantages over the conventional two stage procedure. The primary source of infection along with the secondary complication is cleared at the same sitting, reduces the recurrence rate of the disease also spares the patient from additional morbidity caused by two separate procedures. In addition to this the duration and cost of the hospital stay is markedly reduced.

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