

Content available at: <https://www.ipinnovative.com/open-access-journals>

IP Journal of Otorhinolaryngology and Allied Science

Journal homepage: <https://www.joas.co.in/>

Case Report

Brain fungus: A case report of the journey from diagnosis to recovery

Mani Mala¹, Shruti Jha¹, Richi Sinha¹, Amit Kumar¹, Rakesh Kumar Singh^{1*}

¹Dept. of ENT, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India



ARTICLE INFO

Article history:

Received 05-09-2024

Accepted 04-10-2024

Available online 25-10-2024

Keywords:

Meningoencephalocele

Transmastoid repair

Tegmen

Brain fungus

ABSTRACT

Brain fungus or temporal meningoencephalocele is a rare condition in otology. It results due to the defect in tegmen tympani or tegmen antri formed most commonly after mastoidectomy. As it could be a harbinger to serious complications like meningitis, hence it needs a prompt diagnosis and an urgent surgical intervention. we present a case of 27-year-old lady with a 2.4×1.2 cm sized defect in the tegmen tympani formed as a result of modified radical mastoidectomy which was managed surgically via trans mastoid approach and a complete closure was confirmed by HRCT scan after 6 months of surgery. we concluded the importance of early diagnosis and management of this disease along with a special emphasis over the surgical lessons learnt from our experience in this case.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](#), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Brain fungus or temporal meningoencephalocele is the herniation of dura and a part of brain into the middle ear and mastoid cavity. It was first described by Caboche in 1902, and was usually a result of abscess drainage in the old times. The incidence has gone down to less than 1% in the era of modern otology and practice of microsurgical techniques.^{1,2} There are several factors implicated in the causation like previous ear surgery(mastoidectomy), temporal bone fracture, raised intracranial pressure, spontaneous herniation etc, but the most common cause is the iatrogenic injury during mastoidectomy.^{1,3}

The defect through which herniation occurs usually lies at tegmen tympani and/or tegmen antri.^{1,2,4} A detailed history and clinical examination are essential to not misdiagnose this rare condition. HRCT(high resonance computed tomography) temporal bone and MRI scans are crucial to identify the disease and its extent.²

Management should be prompt and is mainly surgical, which consists of adequate surgical exposure, defect identification, herniated brain tissue excision, impassable intra dural closure and correction of any other implicated pathology.^{1,2,5} Surgical approaches have been classically described as otological – mainly trans mastoid(repair from below), neurosurgical – middle cranial fossa approach(repair from above) and a combined otoneurological approach which is usually reserved for very large defects.^{3,6}

Traditionally favourable approach has been the intra cranial mastoid combined approach and modern literatures recommend a trans mastoid repair for smaller defects(<1 cm).^{1,6}

We here report a case, where the tegmen defect of size 2.4×1.2 cm was corrected via trans mastoid approach and a successful surgical repair was done in a layered manner using temporalis fascia, tragal cartilage, fibrin glue reinforced with rotated flap of temporalis muscle, and the patient has been disease free since then.

* Corresponding author.

E-mail address: rkent5@gmail.com (R. Kumar Singh).

This article aims to highlight the importance of early diagnosis and meticulous closure in cases of temporal meningoencephalocele with larger defects to achieve complete remission.

2. Case Report

A 27-year-old lady presented to the ENT OPD of our tertiary care centre, with the complaint of mass in right ear for 1.5 years and progressively decreased hearing. The patient underwent right modified radical mastoidectomy at a private hospital in April 2022, a month after which she started having headache and aural fullness. She did not develop any subsequent watery discharge suggestive of CSF otorrhoea, bleeding, facial deviation, fever, neck rigidity, photophobia or any features suggestive of meningitis.

On local examination, post aural scar of previous surgery was seen. Right external auditory canal(EAC) showed presence of a pale to pink mass, smooth, pulsatile, insensitive to touch, non-tender filling the EAC completely(Figure 1). No discharge or bleeding was seen. Bilateral facial nerve and neurological examination was normal. Vision was normal. CECT(contrast enhanced computed tomography) head demonstrated a focus of size 2.4×1.2 cm in right mastoid with extension in middle ear associated with erosion of ear ossicles, scutum and tegmen tympani. MRI brain and venogram was done which showed a 1.0×3.5 cm long encysted collection in right middle ear and external ear(Figure 2).

After routine investigations and pre anaesthetic check-up, the patient was planned for trans-mastoid repair of the tegmen defect under general anaesthesia. Intra operatively, the meningocele was seen protruding through a large defect of tegmen into the tympanic cavity(Figure 3). The stalk of pedunculated mass was cauterised and the necrosed brain tissue was excised. No CSF leak was observed. The defect was closed in a layered fashion with temporalis fascia, tragal cartilage, rotated flap of temporalis muscle and fibrin glue(Figure 4).

Eustachian tube was obliterated with minced cartilage and the cavity was packed with gelfoam. The post operative period was uneventful. Intra venous antibiotics were given and the patient was discharged on post op day 7. Histopathological examination further confirmed the herniated tissue as meningoencephalocele(Figure 5). Regular follow up was done on post op day 14, day 30, day 60. A repeat HRCT(high resonance computed tomography) of temporal bone was done after 6 months of surgery and defect closure was confirmed without any recurrence(Figure 6).

3. Discussion

Although brain fungus has become a rarer entity in otology with the usage of antibiotics and microsurgery as



Figure 1: Clinical picture showing the mass in right EAC and the post aural scar.

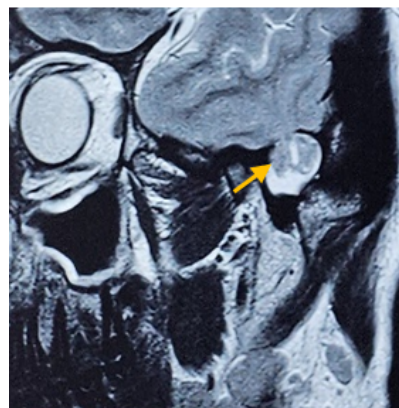


Figure 2: MRI showing the defect through which dura along with brain is herniating to the mastoid and EAC.

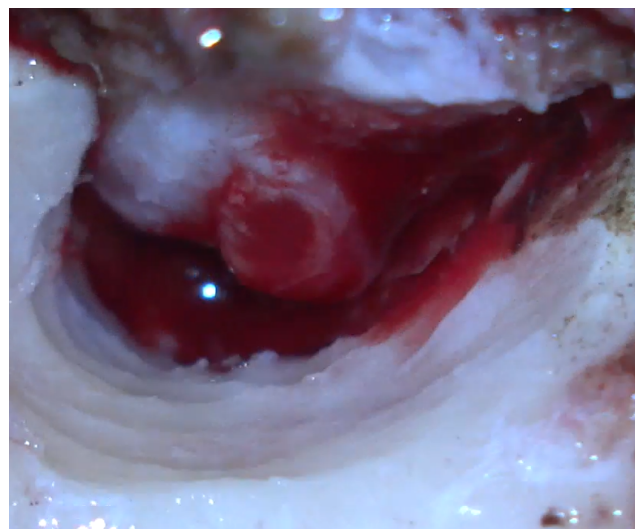


Figure 3: Intra operative image of the dural defect through which herniating mass is visible.

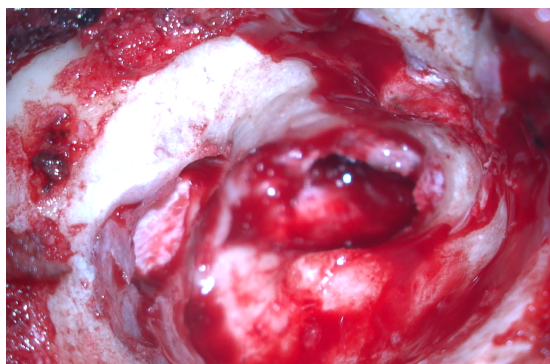


Figure 4: Intra operative picture showing tragal cartilage covering the defect.

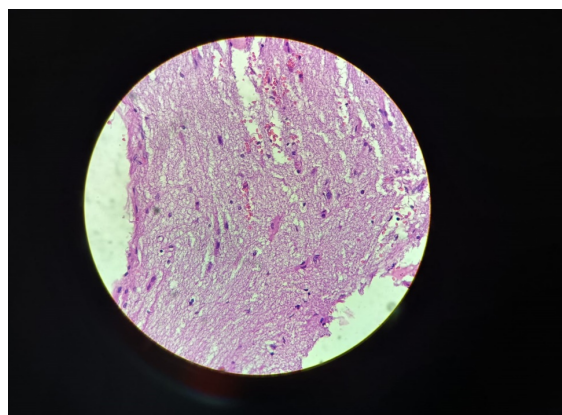


Figure 5: Histopathological findings at 40x showing neurons, fibrous tissue and astrocytes suggestive of meningoencephalocele.



Figure 6: Post operative 6 months HRCT temporal bone showing the defect repair without any recurrence.

these significantly reduce the risk of infection and dural trauma respectively, but it should be kept in mind as a probable diagnosis when evaluating a patient with history of mastoidectomy who presents with an EAC mass.^{1,6} As in our patient, who underwent modified radical mastoidectomy at some other centre and presented to us with an EAC mass, the past history was helpful to keep the differential in mind. Some literature also support the fact that the incidence is higher with canal wall up technique.⁵

The factors leading to iatrogenic injury are mainly overuse of electrocautery which damages the dura and trauma due to cutting burrs. The electrocautery should be kept at the lower settings and burr size should be properly selected for the prevention. In case of identification of dural injury or tears or CSF leak during surgery, the repair should be done then and there.^{5,7} Failing to repair these defects can lead to meningoencephalocele as in our case or sometimes patient can go through serious complications of exposed dura and brain like meningitis, encephalitis or CSF leakage.⁵

Patient presents with an EAC mass, discharge (CSF otorrhoea), hearing loss, meningitis and other neurological complications. Several case literatures have established the fact that an intact arachnoid leads to meningoencephalocele formation with a potential of CSF leak.^{1,2} In our case the patient did not have otorrhoea or any complaints pertaining to CSF leak. If the CSF leak is their, cytology should be done.

For the diagnosis, a detailed history, clinical examination are crucial as these serve as the base for suspecting the pathology, radiological investigation helps confirm the diagnosis. HRCT and MRI are really needed to get the hold of extent of disease and size of defect.^{1,2} We confirmed the diagnosis with the help of all these in our patient and MRI was helpful to differentiate the brain herniation from cholesteatoma and to plan the surgical approach.

For the repair part, there are several approaches like otologic, neurosurgical and combined, we opted for the trans mastoid approach in our patient due to availability of the desired instruments and surgical expertise.^{2,3} Old literature and the newer ones to support the fact that herniated tissue is necrosed part of the brain and should be amputated.^{2,8} In our patient the pedunculated herniating part was meticulously identified and excised after cauterisation. Surrounding granulation tissue, remnant of cartilage from previous surgery was removed totally, as these could become foci of infection during recovery.

Defect closure is the most important part and should never be rushed. Previous literatures have advocated the importance of intradural closure as it decreases the chances of re herniation by decreasing the pressure of brain against the defect.⁸ Several materials could be used like, temporalis fascia, fascia lata, tragal cartilage, conchal cartilage, muscle, fibrin glue etc.¹⁻³ We used a multilayered closure as the

defect was larger, primary closure was done with the tragal cartilage in intra dural fashion and subsequent layering was done with the temporalis fascia, fibrin glue and at last a thinned out rotated flap of temporalis muscle was used to cover the defect. Eustachian tube was blocked with minced cartilage placement and the cavity was packed with gel foam.

Repeat HRCT was only done after 6 months of surgery and the scan confirmed the successful repair of defect and a recovered patient.

There are several surgical takeaway points of this case like - the herniated tissue has been reported to be inactive brain tissue in several literatures, hence it should be excised. Adequate exposure is the key to localise the defect, so the surgical approach should be modified as required intra operatively and neurosurgical team should be ready for the transcranial approach. A multi layered intradural closure with the help of tragal cartilage being the primary closure material can be done. Further layering can be done with temporalis fascia, if available to harvest as it could be missing in revision cases where fascia has been used for graft. Fibrin glue is a good sealant and should be properly used to cover the defect margins and the temporalis muscle could be easily thinned out and rotated to cover the defect ultimately. Eustachian tube blockage with minced cartilage helps to prevent natural ascent of infection to the middle ear. Trans mastoid approach can be used for defects larger than 1 cm, and the defect closure should be confirmed and checked with a radiological scan in post operative period.

4. Conclusion

Brain fungus has become rare with modern microsurgical otology practices but due to serious complications, this disease needs a prompt diagnosis where clinical examination is utmost important. Previous history of ear surgery should be alerting and a HRCT temporal bone scan should be done, MRI is crucial to differentiate the encephalocele from cholesteatoma. Urgent surgical management should be done with the excision of herniated tissue, a tight layered closure of the defect and a trans mastoid repair can be used successfully in defects larger than 1 cm by experienced surgeons.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Das S, Sekar R, A A. An Uncommon Differential for Mass in the Middle Ear Cleft-Temporal Meningoencephalocele. *Indian J Otolaryngol Head Neck Surg.* 2022;74(3):4325–8.
2. Kumar KK, Bharathi VJN. Fungus Cerebri - A Case Report. *Acta Sci Otolaryngology Spec Issue.* 2021;1:22–4.
3. Iurato S, Ettorre GC, Selvini C. Brain herniation into the middle ear: two idiopathic cases treated by a combined intracranial-mastoid approach. *Laryngoscope.* 1989;99(9):950–4.
4. Varshney S, Mishra S, Bist SS, Bhagat S, Agarwal V, Kabdiwal N. Fungus cerebri (brain fungus): a rare complication of mastoidectomy. *Indian J Otolaryngol Head Neck Surg.* 2013;65(1):48–51.
5. 3rd MG, Dickins JR, Jackson CG, Wiet RJ, Feenstra L. Surgical management of brain tissue herniation into the middle ear and mastoid. *Laryngoscope.* 1979;89(11):1743–54.
6. Ozturk M, Topdag DO, Mutlu A, Bayraktar H, Erdogan S, Iseri M. Postoperative Radiologic Assessment and Long-Term Clinical Results of Tegmen Mastoideum Defects. *Medeni Med J.* 2021;36(3):249–56.
7. Kizilay A, Aladağ I, Cokkeser Y, Ozturan O. Kronik otit veya cerrahisi sonrasında oluşan dural kemik defektleri ve ensefalosel [Dural bone defects and encephalocele associated with chronic otitis media or its surgery]. *Turk J of Ear Nose and Throat.* 2002;9(6):403–9.
8. Gluckman J. Fungus cerebri—an unusual complication of mastoidectomy. *S Afr Med J.* 1975;49(6):1933–7.

Author's biography

Mani Mala, Junior Resident

Shruti Jha, Senior Resident

Richi Sinha, Associate Professor

Amit Kumar, Junior Resident

Rakesh Kumar Singh, Professor and Head  <https://orcid.org/0000-0002-8411-2194>

Cite this article: Mala M, Jha S, Sinha R, Kumar A, Kumar Singh R. Brain fungus: A case report of the journey from diagnosis to recovery. *IP J Otorhinolaryngol Allied Sci* 2024;7(3):56-59.