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CASE REPORT

Endoscopic endonasal trans-cribriform approach for drainage of frontal lobe abscess in invasive mucormycosis – A case report

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Abstract

Introduction: Mucormycosis is a belligerent fungal infection that can cause fatal complications. Patients at risk are those with poorly controlled diabetes mellitus, and similar immunosuppressed states. Tissue invasion and infarction secondary to angioinvasion are the pathognomonic features of the disease. The management of brain abscesses has become increasingly complicated requiring close collaboration between various departments encompassing infectious disease specialists, neurologists, radiologists and neurosurgeons. ENT surgeons are seldom involved in the management of brain abscesses, but with the advancements in Endoscopic Sinus Surgery techniques, ENT surgeons are now treating the skull base, meningeal and brain pathologies.

Methods: A case report of a 36-year-old male with complaints of headache, left-sided facial pain, difficulty in opening left eye for 10 days, with a history of one episode of generalized seizure that lasted for 4 min, recently detected type 2 diabetic mellitus. Local examination revealed left-sided nasal crusting and an old palatal defect. KOH mount was positive for mucorales. CT scan PNS revealed left-sided maxillary, ethmoidal, sphenoidal frontal sinusitis with erosion of left lamina papyracea, left extraconal and intraconal involvement with erosion of left cribriform plate. MRI brain revealed additional hyperdensities in both medial frontal, and parietal lobe with diffusion restriction. The patient underwent left-sided endoscopic sinus surgery with endoscopic endo- nasal trans-cribriform drainage of frontal lobe abscess, with retro bulbar Amphotericin B injection, with a neurosurgical team on standby in the event of unexpected complications. The eschar and pus drained from the frontal lobe abscess was sent for histopathological examination, culture and sensitivity. The patient was extubated, and the postoperative period was uneventful.

Results: The follow-up post-operative CT brain revealed a pneumatocele and minimal residual lesion which was managed medically with Inj. Liposomal Amphotericin B, IV antibiotics, glycemic control, phenytoin. On the 20th post-operative day, the patient started to talk, while on the 28th post-operative day, the patient was able to walk without any support. He is on regular follow up ENT and Neurology departments and has no deficits or residual complaints.

Discussion: This was the first case of frontal lobe abscess drainage done successfully through an endoscopic endo-nasal approach in our institution. In our case open neurosurgical approach was avoided because of the poor general condition of the patient, moreover, it may lead to abscess rupture and fulminant meningitis. The minimally invasive technique of endoscopic endo-nasal trans-cribriform approach was done as the infection tract extended from the nose into the frontal lobe. The defect in the cribriform plate was identified and the frontal abscess drained per nasally. Multiple sittings of aggressive surgical debridement often involving orbital exenteration and concurrent medical management with antifungal agents like Amphotericin B remains the mainstay.

Keywords: mucormycosis, trans-cribriform approach, endoscopic endonasal approach, Amphotericin B, pneumatocele

Mucormycosis is a belligerent fungal infection that can cause fatal complications (1). The term 'mucormycosis' refers to an invasive infection caused by a group of filamentous fungi belonging to the order Mucorales. Patients at risk are those with poorly controlled diabetes mellitus, and similar immunosuppressed states (2).

Tissue invasion and infarction secondary to angioinvasion are the pathognomonic features of the disease. (3–5).

The management of brain abscesses has become increasingly complicated requiring close collaboration between various departments encompassing infectious disease specialists, neurologists, radiologists, and neurosurgeons. ENT surgeons are seldom involved in the management of brain abscesses, but with the advancements in Endoscopic Sinus Surgery techniques, ENT surgeons are now treating the skull base, meningeal, and brain pathologies (6). This is a case report of draining a Frontal lobe abscess successfully through an endoscopic endo-nasal trans-cribriform approach for a case of rhino-orbito-cerebral mucormycosis.

A 36-year-old male with complaints of headache, left-sided facial pain, difficulty in opening left eye for 10 days, with a history of one episode of generalized seizure that lasted for 4 min, recently detected type 2 diabetic mellitus. On generalized examination, the patient was drowsy with GCS [E2V2M5], responding to pain stimuli. Local examination revealed left-sided nasal crusts, old palatal defect, vision was bilateral greater than 3/60, and extraocular movement full. KOH was positive for mucorales. CT scan PNS revealed left-sided maxillary, ethmoidal, sphenoidal frontal sinusitis with erosion of left lamina papyreceae, left extraconal and intraconal involvement with erosion of left cribriform plate (**Figure 1**). MRI brain revealed additional hyperdensities noted in bilateral medial frontal, and parietal lobe with diffusion restriction (**Figure 2**).

After discussing with the Neurosurgical team, an endoscopic trans-nasal approach to the frontal lobe abscess was preferred as frontal craniotomy is associated with higher morbidity especially taking into account the poor general condition of the patient.

The patient underwent left-sided endoscopic sinus surgery with endoscopic endo-nasal trans-cribriform drainage of frontal lobe abscess, with retro bulbar Amphotericin B injection, with a neurosurgical team on standby in the event of unexpected complications. The mild CSF leak was managed with surgical and gelfoam sandwiched in between and fibrin glue applied with continuous lumbar drain and Acetazolamide. The eschar and pus drained from the frontal lobe abscess was sent for histopathological examination and culture and sensitivity. The patient was extubated, and the postoperative period was uneventful with improvement in the general condition gaining consciousness, and obeying oral commands. The follow-up post-operative CT brain (**Figure 3**) suggested of pneumatocele and minimal residual lesion, which was managed medically with Inj. Liposomal Amphotericin B, IV antibiotics, glycemic control, phenytoin. The lumbar drain was removed on third post-operative day and no CSF leak was noted.

Therapy with anti-fungals was continued till a cumulative dose of 2 grams was reached along with resolution of signs and symptoms of infection. IV antibiotics were added to provide coverage against bacterial infections. On the 20th post-operative day, the patient started to talk, while on the 28th post-operative day, the patient was able to walk without any support.

Pre Op:

FIGURE 1 | CT PNS.

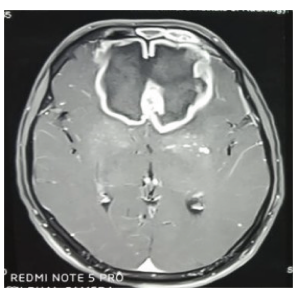

FIGURE 2 | MRI Brain.

Post Op:

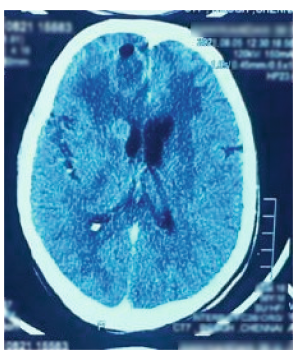

FIGURE 3 | CT Brain.

Discussion

This was the first case of frontal lobe abscess drainage done through an endoscopic endonasal approach successfully in our institution. In our case, open neurosurgical approach was avoided because of the poor general condition of the patient; moreover, it may lead to abscess rupture and fulminant meningitis. The minimally invasive technique of endoscopic endo-nasal trans- cribriform approach was done as the infection tract extended from the nose into the frontal lobe. The defect in the cribriform plate was identified and the frontal abscess drained per nasally.

Multiple sittings of aggressive surgical debridement often involving orbital exenteration and concurrent medical management with anti-fungal agents like Amphotericin B remains the mainstay (7, 8). In our case the frontal lobe abscess drainage was feasible due to its continuity with the cribriform plate, which made it easily accessible endoscopically without causing any complications.

Conclusion

The drainage of frontal abscesses that are in continuity with the skull base can be effortlessly performed by an endoscopic endo-nasal approach with minimal morbidity and complications. It is a minimally invasive technique that achieves effective and complete drainage of the abscess without the morbidities of a trans-cranial approach and brain retraction. The decision-making process must involve a multidisciplinary team of infectious disease specialists, neurosurgeons, and ENT surgeons. Early diagnosis and aggressive treatment can significantly curb mortality while providing better outcomes (9), with this endoscopic endonasal approach for draining frontal lobe abscesses.

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