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Endoscopic Transethmoid Drainage of Frontal Lobe Brain Abscess: Rare Case Report

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Abstract **Case Report**

A frontal lobe abscess is a common life-threatening brain emergency, with critical treatment relying on a combination of drainage and parenteral antibiotic medication. A 14-year-old female with type 1 diabetes mellitus was referred from the Department of Neurosurgery with a history of right-sided facial twitching repeating every 5 minutes and accompanied with pyrexia. An MRI scan revealed a 2 x 2 cm abscess in the frontal lobe, attached to skull base. Intravenous antibiotics were started, but after 12 hours, her consciousness deteriorated, therefore the abscess was urgently drained successfully via endoscopic transnasal transethmoid route. The skull base window was repaired using fat, tensor fascia lata and duraseal. The postoperative recovery was uneventful, with no cerebrospinal fluid leakage or meningitis, and patient's condition was satisfactory. Follow-up with an immediate CT scan MRI scan 3 months later showed no manifest of abscess returning. It was concluded that the transnasal transethmoid approach has the advantage of allowing the abscess to be identified and drained definitively without intra-cerebral penetration.

Keywords: Brain Abscesses, Endoscopic, Transnasal, Transethmoid, Facial Twitching.

INTRODUCTION

Despite the advent of modern neurosurgical techniques, new antibiotics, and advanced imaging technologies, brain abscess a potentially fatal infection of the central nervous system [1, 2]. The etiology of this infection varies depending on several factors, including time, geographic location, age group, medical and surgical circumstances, and path of infection [3, 4]. In the current era, the declining extent of otogenic brain abscesses and their increasing prevalence following trauma or surgery have varied the epidemiology and clinical presentation of brain abscesses [5, 6]. Therefore, brain abscess treatment has become increasingly complex, requiring close collaboration among multiple specialists, including neurosurgeons [7]. Ironically, otorhinolaryngology are rarely contributes to the managing of these conditions, even though most brain abscesses arise from ear and sinus infections [8].

In general, the requirements for surgical procedures and endoscopic surgery in particular, have increased significantly in the current era [9-11]. Endoscopy has become the standard in the diagnosis and treatment of most otolaryngological diseases [12, 13]. Indications for endoscopic surgery are determined based on the patient's medical history and complaints, as well as appropriate imaging such as computed tomography and magnetic resonance imaging [14-16]. Recent advances in skull base surgery techniques have enabled otolaryngologists to better understand and treat diseases of the skull base, meninges, and brain pathologies, expanding the scope of traditional endonasal endoscopic surgery [17]. Thus, draining brain abscesses has become a new challenge for otolaryngologists [18, 19]. Based on the extent of the disease and the pathological factors associated with each case, an individual surgical strategy is determined [20-22]. In this article, we present a case report demonstrating the feasibility of frontal abscesses drainage by endoscopic transnasal transethmoidal approach.

CASE PRESENTATION

A 14-year-old female with type 1 insulin-dependent diabetes mellitus (IDDM) presented to the Neurosurgery Department upon referral from a neurologist with repeated facial twitching occurring every 5 minutes (Figure 1) accompanied by pyrexia. Her neurological examination was normal, and there was no history of trauma or previous surgery. However, she had poorly controlled type 1 IDDM. Furthermore, a magnetic resonance imaging (MRI) showed a frontal lobe abscess measuring approximately 2 x 2 cm relative to the anterior skull base (Figure 2). A CT scan showed no defect in the skull base, with opacification of ethmoid cells. She was admitted to the Neurosurgery Department. Intravenous antibiotics were initiated, but after 12 hours, her level of consciousness deteriorated. A discussion was held with the Neurosurgery Department, and the decision was made to drain the abscess exclusively via the endoscopic transnasal transethmoid approach.

Figure 1: Twitching of right side of face

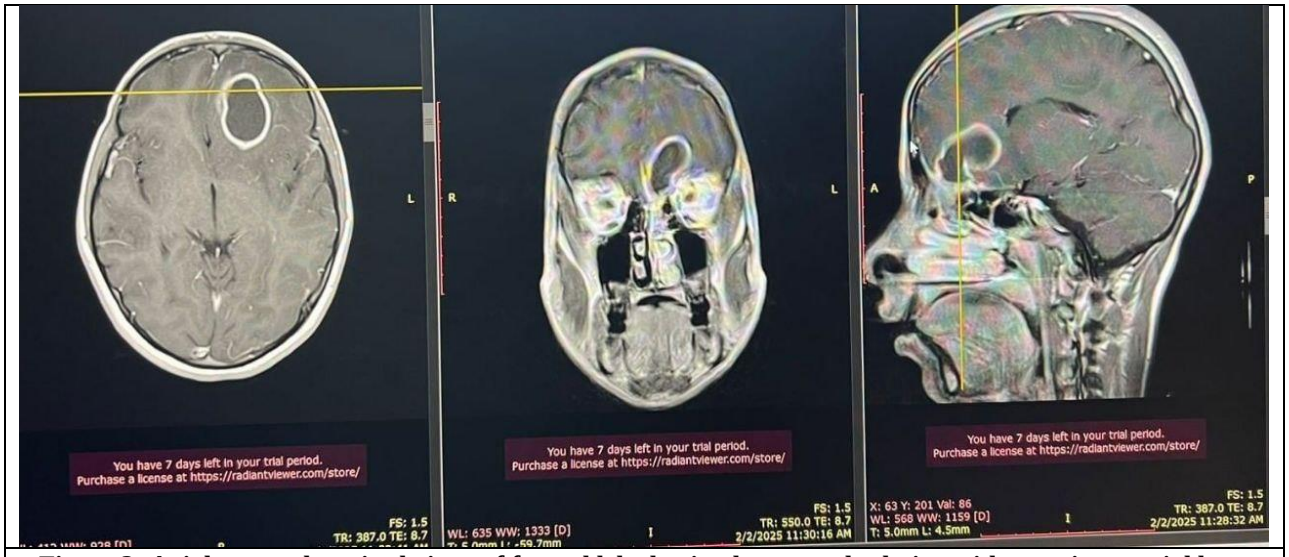

Figure 2: Axial, coronal, sagittal views of frontal lobe brain abscess and relation with anterior cranial base and no penetration to nasal cavity

Steps of Surgery

The patient was placed under general anesthesia, endotracheal intubation done, sterilized, and draped. After applying decongestant, we first used the number zero telescope. The surgical steps (Figure 3) were begun with performing uncinectomy with left middle meatus antrostomy, and then the frontal recess was identified using the intact bulla technique, followed by a partial trimming of the middle turbinate to create a more free space for delineation and reconstruction. After completing the anterior ethmoidectomy and removing the air cells, the cribform bone was positioned and

elevated approximately 1 cm behind the posterior wall of the frontal cell, according to CT and MRI scans. Initially, a needle aspiration was performed, and pus began to flow profusely. The pus was then completely evacuated using a G-curate device and sent for culture and sensitivity analysis.

A multilayered reconstruction was performed using a surgicel, and then fat and tensor facialata were taken from the thigh. No cerebrospinal fluid (CSF) noticed during the surgery. Post-operative twitching of the face stopped, and the fever began to subside. No CSF noticed after the surgery. A microbial culture revealed a Staphylococcus aureus infection. The patient was receiving intravenous antibiotics and good glycemic control with insulin. Immediate postoperative CT scan demonstrated complete resolution of the abscess (Figure 4). The patient was discharged on day 7 without complications.

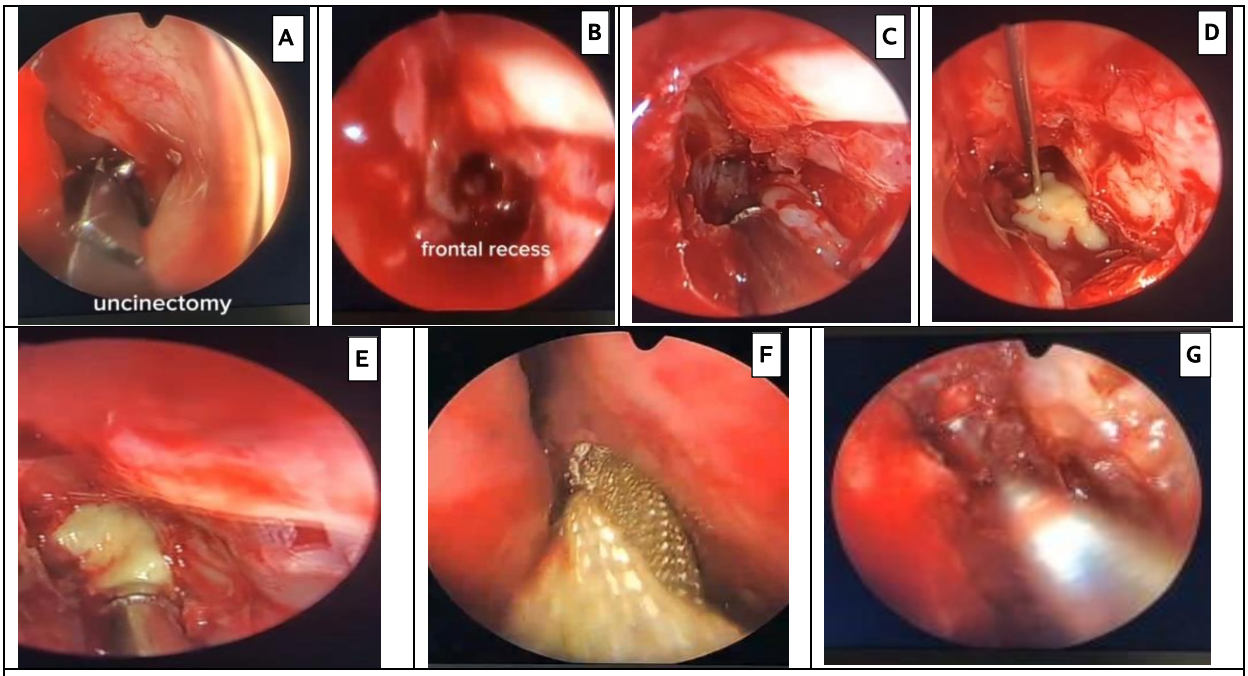

Figure 3:A) Uncinectomy, B) Identification of frontal recess, C) Exposing cribriform plate and roof of the ethmoid, D) Elevation of 2mm of bone and aspiration of pus, E) Complete evacuation, F) Reconstruction by surgicel as first layer, and G) Reconstraction by fat, tensor facialata and duraceel as second, third and fourth layer

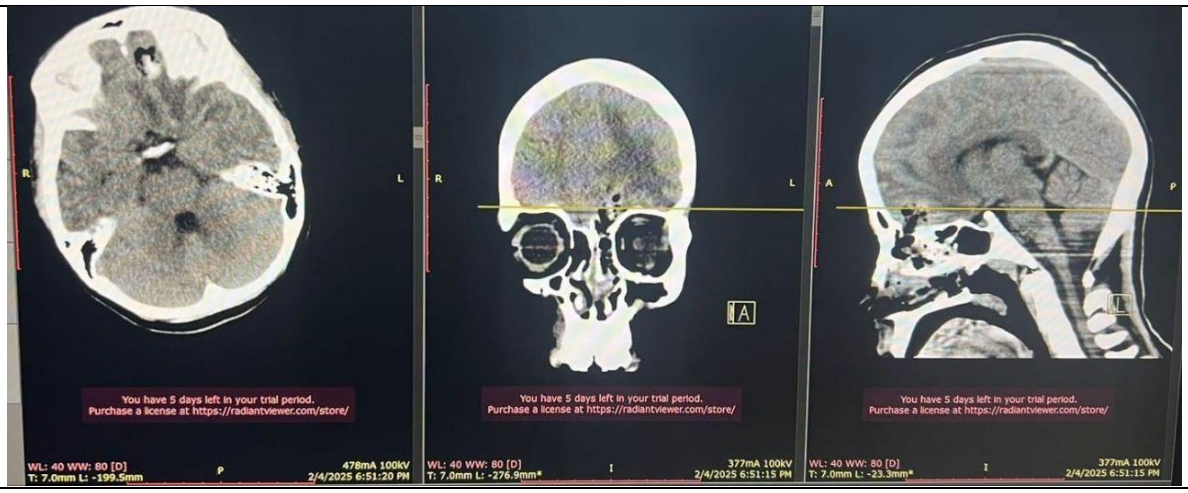

Figure 4: Immediate post-operative CT scan axial, coronal and sagittal view with complete resolution of the abscess

DISCUSSION

It is worth noting that three forms of cerebral abscess have been outlined: an intra-cerebral, a subdural, and an extradural abscesses [23, 24]. This case illustrates the possibility of endoscopic drainage of brain abscesses. Most of these abscesses arise from otologic and sinus

infections; a definitive diagnosis is generally done using computed tomography (CT) or magnetic resonance imaging (MRI). Although the beneficial information supplied by CT or MRI, tissue identification is often necessary to determine the appropriate antibiotic [25, 26].

Besides, MRI has long been considered the distinguished imaging manner for diagnosis and monitoring of patient recovery with therapy. Before the era of CT scanning; most brain abscesses were diagnosed intra-operatively and completely excised. However, effortless and unscathed diagnostic technicality make stereotactic aspiration a recognized therapy choice, particularly for multiple, non-cortical lesions [27, 28]. The annual incidence of brain abscesses is estimated at 0.3 to 1.3 per 100,000, but it may be significantly higher in certain risk groups [29].

According previous report, medical treating alone needs to be reconsidered in several cases, including if the patient is not a candidate for surgery due to health reasons, or lesions are multiple and sited in conspicuous areas, or presence other co-infections like meningitis [30]. However, there is currently no consensus on a specific technical approach to treating brain abscesses, and the necessity of surgical treatment remains unquestioned.

Although intracranial complications following ENT infection have been recorded in a high percentage of hospitalized patients [31], we did not observe record any data specifying the proportion of brain abscesses touching the anterior skull base. In this case, no complications or recurrence reported after three months of follow-up.

According to the above, we believe that endoscopic transnasal transethmoid drainage of frontal abscesses should constantly be contemplated. This method may be appropriate and feasible in cases of brain abscesses, especially if the abscess touches the base of the skull.

CONCLUSION

A frontal lobe brain abscess can be easily drained using endoscopic transnasal transethmoid route without any complications. We concluded that it is a less intrusive approach, relatively feasible, and safe, allowing for effective abscess drainage. It is preferable to collaborate with neurosurgeons and otolaryngologists when deciding on surgical treatment for such cases.

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