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Case report

Endoscopic endonasal repair of a temporal lobe meningoencephalocele in the pterygoid fossa: A case report and literature review

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ABSTRACT

Introduction: Meningoceles are defined as herniation of the meninges through a skull base defect. If brain tissue is herniated as well, then it is called meningoencephalocele. The most common locations of meningoceles are the cribriform plate and the lateral recess of the sphenoid sinus, with the most common presentation being CSF leakage. We present a case of temporal lobe meningocele that herniated through a defect in the greater wing of the sphenoid bone to the pterygoid fossa and that was diagnosed incidentally while evaluating the patient for seizures.

Methodology: Case report and literature review.

Conclusion: The endonasal endoscopic approach is a suitable minimally invasive approach for the management of pterygoid fossa lesions, including meningoceles. In this case, the patient had epilepsy with the surgery resulting in the resolution of the seizures.

1. Introduction

Sinonasal meningoencephaloceles may be the result of congenital or acquired defects in the skull base. Acquired skull base defects may follow spontaneous, traumatic, or tumorigenic causes [1,2]. The most common presenting complaints of meningoencephaloceles include nasal obstruction, cerebrospinal fluid (CSF) rhinorrhea, recurrent meningitis, and seizures [2]. Other less common presentations include facial pain, numbness, and headache [3,4].

The importance of identifying and managing meningoencephaloceles comes from its association with serious complications such as meningitis, pneumocephalus, and brain abscess [1]. The approach and management of meningoencephaloceles depend on the site and size of the lesion [1,5]. Surgical repair should be considered in most cases, especially if the patient is symptomatic [1].

Meningoceles can occur in any location in the skull base. However, spontaneous meningoceles are most commonly seen in the cribriform plate and the lateral recess of the sphenoid sinus [5]. It is uncommon for spontaneous meningoceles to herniate through the greater wing of the sphenoid bone to the pterygoid fossa. We report a rare case of pterygoid fossa meningoencephalocele that was diagnosed incidentally in an epileptic patient and was treated successfully through an endoscopic endonasal transpterygoid approach with skull base repair with resulting resolution of the seizures after the surgery. The work has been reported in line with the SCARE criteria [6].

2. Case report

A 31-year-old woman who was known to have epilepsy that was managed with antiepileptic medications was found to have an incidental lobulated lesion in the lateral middle cranial fossa abutting the anterior aspect of the left temporal lobe upon routine magnetic resonance imaging (MRI) (Fig. 1). Computed tomography (CT) of the paranasal sinuses with contrast showed a well-defined lytic lesion involving the left greater wing of the sphenoid bone and the pterygoid bone with no enhancement, causing a defect in the base of the left middle cranial fossa. It was associated with mild cortical destruction and a scattered ossified matrix that raised the suspension of a fibro-osseous lesion (Fig. 2A,b). At this point, the patient was referred to the otolaryngology department for further evaluation. Upon history-taking, the patient

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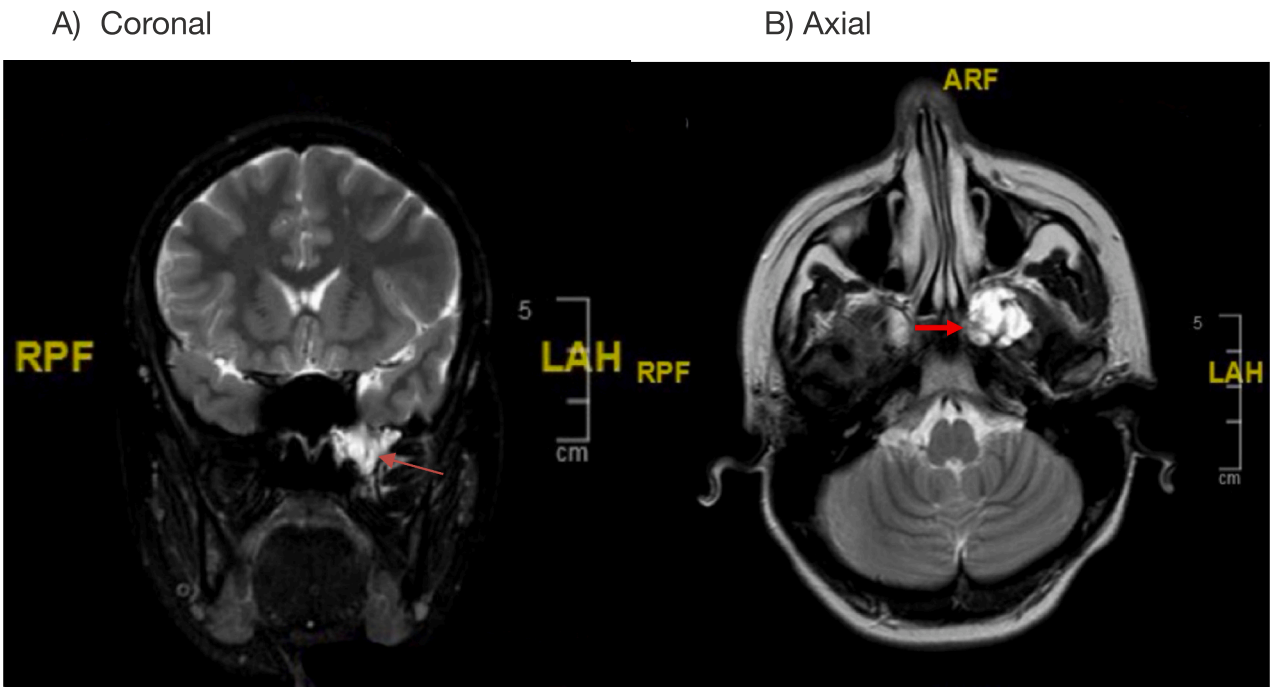


Fig. 1. T2 weighted (T2W) MRI image showing a hyper-intense lesion in the left skull base involving the left greater wing of sphenoid and pterygoid causing a defect in the base of the left middle cranial fossa toward the cavernous sinus.

denied the presence of rhinorrhea, facial pain, facial numbness, headache, nasal obstruction or visual changes. The examination, including nasal endoscopy, was unremarkable.

The patient underwent endoscopic exploration of the pterygoid lesion on April 2017. A left pterygoid fossa meningocele was identified. The meningocele was resected and the skull base defect was repaired through an endonasal approach. The patient has been following up in our clinic for 2 years; she has stopped her antiepileptic drugs with no more convulsions since the time of surgery. MRI was repeated post-surgery and showed only inflammatory changes at the surgical bed. (Fig. 3).

3. Surgical technique

The surgical approach shares multiple steps with the transpterygoid approach to the lateral recess of the sphenoid sinus that is known to most skull base surgeons [7] The approach to the base of the pterygoid starts with a wide maxillary antrostomy or medial maxillectomy. The sphenopalatine artery is identified as it exits the sphenopalatine foramen and is cauterized. Using a Kerrison bone rongeur or a diamond drill, the bony posterior wall of the maxillary sinus is removed and the pterygopalatine fossa is exposed. The fossa contains fat, the internal maxillary artery and its branches as well as the pterygopalatine ganglion and maxillary division of the trigeminal nerve. The internal maxillary artery can be cauterized and all fossa contents may be reflected laterally in order to expose the base of the pterygoid bone and foramen rotundum. Care should be taken to avoid injury to the infraorbital nerve and the pterygopalatine ganglion. The inferior head of the lateral pterygoid muscle is elevated at its attachment to the lateral pterygoid plate to fully expose the base of the pterygoid bone, and the lateral aspect of the base of the pterygoid bone may be drilled down to maximize exposure and provide access to the infratemporal fossa and to the floor of the middle cranial fossa (MCF).

At this point, the meningocele is identified. The herniated part is then cauterized and excised.

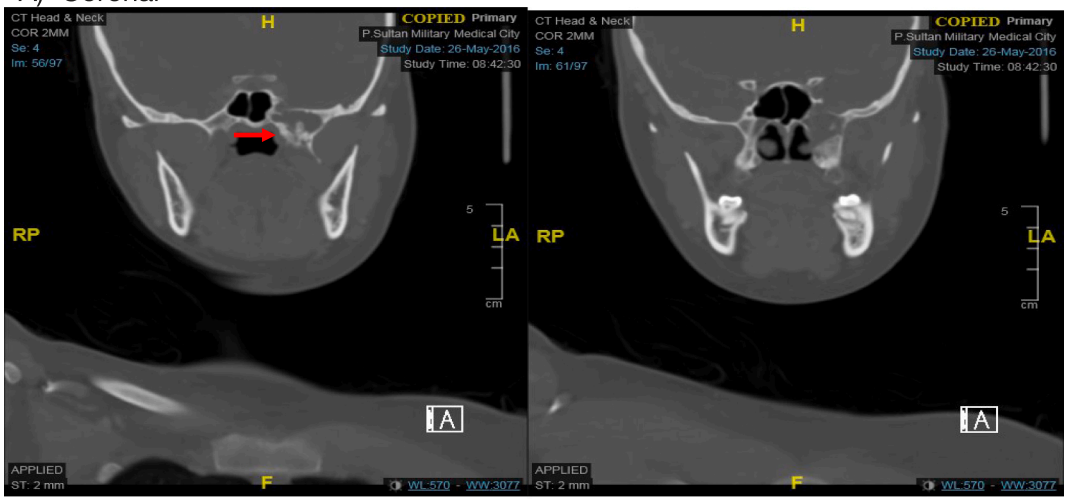
After adequate exposure of the skull base defect, the dura overlying the defect is circumferentially dissected and elevated off the defect edges, creating a small dead space for inlay graft insertion.

The skull base defect repair can then be achieved with free grafts in an on-lay, in-lay or multilayer fashion as dictated by the defect. If a nasoseptal flap is deemed necessary, it would have to be harvested from the contralateral side, since the sphenopalatine artery supplying the ipsilateral side of the septum is sacrificed during the exposure, and to avoid compromising the pedicle while positioning the flap. In this case, a Duraform (Codman & Shurtleff, Inc. Raynham, MA USA) graft was applied in an overlay fashion and reinforced by using the nasoseptal flap. The repair would be covered with multiple layers of Gelfoam (Pfizer, New York, New York) and supported with a merocel pack that is compressed against it to keep it in place. The merocel pack should be removed in the clinic after 1 week.

4. Discussion

Meningoencephaloceles may present at various sites in the skull base. Commonly, they occur from preformed anatomical pathways in the cribriform plate or lateral sphenoid recess in adults and may be associated with abnormalities in the intracranial cerebrospinal fluid circulation. [5] Spontaneous sphenoid meningoencephaloceles are mostly related to a congenital anomaly at the lateral craniopharyngeal canal, due to incomplete fusion of parts of the sphenoid bone. [8] Chronic increase of intracranial pressure might lead to a gradual erosion of the lateral wall of the sphenoid with the development of meningoencephaloceles and CSF leaks [9,10]. A second common location for middle cranial fossa meningoencephaloceles is the middle ear cavity, as meningoceles are known to herniate through the temporal bone into the middle ear through the tegmen tympani. [11] However, there are few reports of MCF meningoencephaloceles herniating through the greater wing of the sphenoid in the infratemporal or pterygopalatine fossae, with seizures being the most common presentation (Table 1) [3,4,11–19]. This could be the result of herniation of the meninges at the same anatomical location as the previously published meningoceles presenting at the lateral recess of the sphenoid but given that the absence of a lateral recess in her sphenoid sinus, the meningocele herniates to the base of the pterygoid and to the infratemporal fossa. It is

A) Coronal



B) Axial

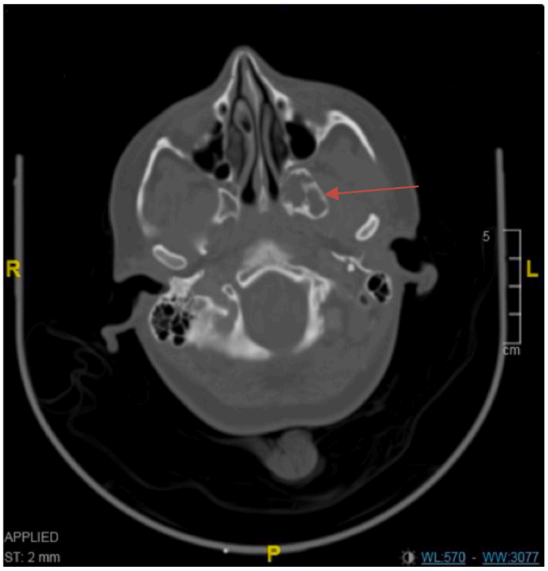


Fig. 2. Contrast CT brain bone window, showing a left pterygoid expansile lesion causing erosion in the base of the pterygoid in the left side.

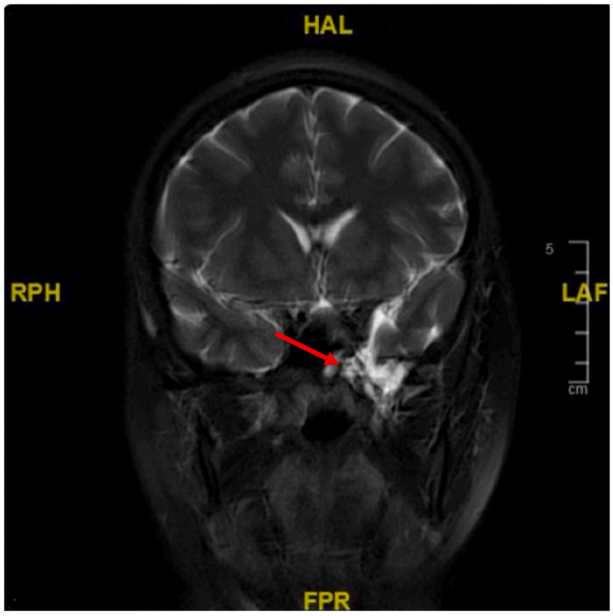


Fig. 3. Postoperative T2W MRI Brain, Coronal section, showing inflammatory changes at the surgical bed with resolution of the meningocele.

noted that none of the reviewed cases from the literature that developed transpterygoid meningocele had a lateral recess of the sphenoid sinus at the site of the herniation, which supports this theory (Table 1).

Until recent years, an open craniotomy approach has been the standard approach used to reach lesions in the infratemporal fossa and the base of the pterygoid plate [13,20]. Although direct visualization of the lesion is achieved by an open approach, significant morbidity has been documented in many cases, including anosmia, memory deficits, epilepsy, intracranial hemorrhage, and prolonged hospitalization [1,7,21]. The endoscopic approach is a less invasive technique that can be utilized in appropriately selected cases of meningoencephalocele for resection of the lesion and reconstruction of the defect. This method has a higher success rate with lower morbidity compared to an open craniotomy approach [22].

There is no consensus in the literature regarding the repair of asymptomatic meningoencephaloceles, as the risk of complications may outweigh the benefits in certain cases. If an observation is preferred, then patients are to be instructed about the signs of meningitis and CSF rhinorrhea and the importance of seeking medical attention if symptoms develop. [7,21] In our case, the patient only had a history of epilepsy. The surgical outcome was successful without intraoperative or post-operative complications and with the resolution of epilepsy for 2 years during follow-up. Notably, the repair of the defect has been reported to aid in the management of drug resistance seizures. [23–26]

5. Conclusion

In this report, we describe a rare case of pterygoid meningoencephalocele that was diagnosed incidentally in an epileptic patient. The endoscopic endonasal trans-pterygoid approach was used to reconstruct the defect. This intervention is minimally invasive and resulted in a successful outcome with the absence of serious complications compared to the open surgical approach.

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Table 1
Cases of pterygoid fossa meningocele reported in the literature.

Note	Outcome	Approach	Side	Presentation	Study
With meninangiomatosis	Resolution of epilepsy. Persistent aura	Craniotomy	Right	Epilepsy	Whiting et al. [11]
	Not mentioned	Not mentioned	Right	Paresthesia in the distribution of the trigeminal nerve	Soyer et al. [3]
	Resolution of seizures in 18 months follow up	Temporal Craniotomy	Right	Epilepsy	Wilkins et al. [19]
	Epilepsy resolved following surgery	Open craniotomy	Left [3]	Epilepsy (3 cases)	Leblanc et al. [12]
Associated with neurofibromatosis type 1	No further meningitis in 18 months follow up	anterior subtemporal craniotomy	Left	Recurrent meningitis	Chapman et al. [13]
		Endoscopic transnasal transpterygoid	Left	Headache	Bolger et al. [10]
	Symptoms controlled	Biopsy by sublabial transantral. Patient refused surgery and managed by antiepileptic medications	left	seizures	Nishikawa et al. [14]
No LR	Not mentioned	Not mentioned		Incidental in imaging to evaluate for chronic sinusitis	Short et al. [15]
	Epilepsy resolved following surgery	Temporal craniotomy	Left [2] Right [1]	Seizures (3 cases)	Byrne et al. [16]
		Craniotomy	Right	Headache	Petridis et al. [4]
	Seizures resolved (mean follow up for 4.5 months)	Craniotomy	Left [2]	Seizures (2 cases)	Morone et al. [17]
	Case 1: Recurrent meningitis after 14 months revision of the closure	Craniotomy	Left [1] Right [1]	Recurrent meningitis	Zoghlami A et al. [18]
	Case 2: managed with transnasal endoscopic approach with recurrent meningitis and revision with craniotomy				

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Declaration of competing interest

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