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CLINICAL REPORT

A Rare Case and Literature Review of Endoscopic Endonasal

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Abstract
We report a rare case of localized anterior clinoid mucocele (ACM) with acute visual loss and a literature review of the endoscopic endonasal surgery. We advocate that endoscopic endonasal approach is the best choice. To our knowledge there a limited report on localized ACM that treated via endoscopic endonasal approach.

Keywords Mucocele · Optic neuropathy · Skull base · Endoscopy

Introduction

Mucocele is a benign cystic lesion lined by trapped respiratory epithelium that develops within the paranasal sinus when its ostium becomes obstructed. As mucoid secretion by the epithelium accumulates, the mucocele grows to fill the sinus cavity and erodes its bony margin which leads to compression and compromises the adjacent structures [1]. Formation of the Localized Anterior Clinoid Mucocele (ACM) is extremely unusual, about 1% of the paranasal sinus mucocele [2]. The clinical presentation of ACM is usually late due to the slow growth of cystic lesion, on an average of two years after first onset of clinical [3]. In our case, the ACM presented with acute visual loss which is exceptionally rare. We are reporting a case of a sudden vision loss due to localized ACM that was treated successfully with minimally invasive endoscopic endonasal approach. There are limited cases reported in the English literature on the endoscopic endonasal approach in localized ACM mucocele with vision impairment.

Case Report

A 39-year-old Bidayuh gentleman with underlying hypertension had a painless blurring of vision in his right eye for 1 week that rapidly deteriorated within a day. There was no headache, visual field defect, diplopia, or eye redness. An ophthalmological assessment revealed hand movement perception only in the right eye with positive afferent pupillary defect. Extraocular movement was full and no ophthalmoplegia. High Resolution Computer Tomography (HRCT) and Magnetic Resonance Imaging (MRI) brain revealed a non-enhancing expansile soft tissue density within the right anterior clinoid process causing right optic canal compression. Based on imaging features, a possible diagnosis of ACM was made. He underwent an image guided right endoscopic endonasal resection of anterior clinoid lesion with decompression of the right optic nerve. During endoscopic endonasal, noted presence of a mucocele mass within the right pneumatized anterior clinoid bone. It ruptured with mucoid discharge during resection. Upon resection of mucocele, dehiscence of right optic bony canal was noted. Optic nerve decompression achieved upon complete resection. The anterior clinoid region covered with absorbable hemostat followed by anterior nasal packing. Post- operation was

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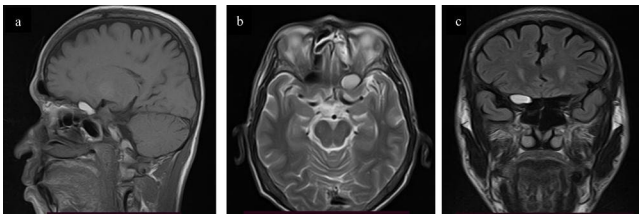

Fig. 1 Pre-operative MRI s the anterior clinoid mass mucocele. (a), (b) There is hyperintense T1 and FLAIR lesion located in the expected region of the right anterior clinoid process. The contralateral anterior clinoid process is pneumatized and hypointense in T1. (c) The lesion is hyperintense in T2WI, not suppressed on Flair - possibly due to proteinaceous fluid content of mucocele

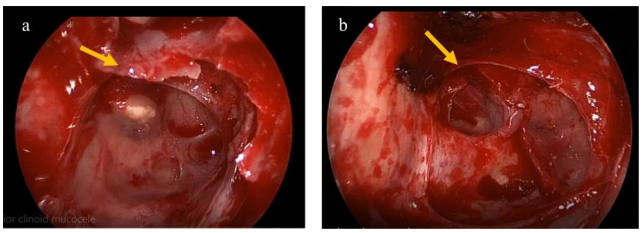

Fig. 2 Interoperative Photographs Taken During Endoscopic Trans nasal Approach. (a) The mucocele – the cyst wall containing yellowish mucoid material seen (pointed by yellow arrow). (b) Post excision- Bony defect was noted supero medial aspect of anterior clinoid (pointed by yellow arrow)

uneventful. On post- op day 1, the patient's visual acuity of the right eye significantly improved to 6/12. He was discharged home on post op day 4. Histopathology of the resected mass confirmed the diagnosis of the mucocele.

Discussion

The anterior clinoid process is a bony projection on the superolateral aspect of the sphenoid sinus. It is sandwiched between the internal carotid artery and the optic nerve [4]. During the development of the skull base, this clinoid process may become pneumatized and forms an air pocket with a narrow ostium. Blockage of this ostium by mucosal thickening may form a localized clinoid mucocele [4]. The prevalence of ACM is more in males than females with a ratio of 7:4 (Table 1).

As the mucocele gradually enlarges, it compresses and thins out the bony optic canal creating a dehiscence. Then, this growing mucocele compresses directly on the exposed optic nerve causes optic neuropathy. Proximity of the ACM to the superior orbital fissure often cause impairment of the third, fourth, fifth or sixth cranial nerves [5]. Hence, ophthalmic manifestations are vision loss, visual field defects, diplopia, and unilateral exophthalmos [3]. If not treated, there will be ischemia of the vasa nervorum resulting in permanent visual impairment [3]. Other symptoms included headache, retrobulbar pain and facial pain.

The devastating complication of the mucocele is infection. This leads to formation of pus (mucopyocele) which may spontaneously drain the pus into the ethmoid maxillary spaces [3]. The spread of infection to meningeal and cerebral cause septic complications like meningitis or intracranial abscesses [3]. It could also spread into the orbit causing subperiosteal abscess and cerebral cellulitis [3].

The combination of HRCT and MRI are synergistic for accurate diagnosis, in localization of the lesion and surgical guidance. The ACM in scans mostly present as a rounded homogenous expansible lesion and sometimes as a dumbbell- shaped lesion between the optic nerve and the carotid artery (Table 1). The HRCT is useful in assessing the destruction of the bony optic canal by the ACM and detect any communication of the ACM with the sphenoid sinus or the intracranial [6].

The MRI can distinguish the mucocele from other differential diagnoses like demyelinating disease or parasellar expansive pathology such as meningiomas, meningocele, schwannoma and aneurysmal expansive malformation [4]. It can assess the relationship of the mucocele with its adjacent important soft tissues (dura mater, pituitary gland, and neurovascular structures). Foremost, MRI is mandatory in intraoperative imaging and the navigation system in the endoscopic approach.

Medical management like empirical antibiotics and anti-inflammatory has been used concurrently with surgery in some cases to reduce edema [3]. Medical therapy alone may not be effective in cases with visual impairment due to optic nerve compression by ACM (Table 1). Surgical resection of the ACM is the primary treatment. An urgent surgical decompression of the compressive natured cystic lesion is essential in saving patient's vision. The Johnson et al. suggested operation within 7–10 days from the onset of visual symptoms to prevent permanent impairment [7].

The surgical approaches of ACM can be divided into rhinologic or neurosurgical. The rhinologic approaches are divided into endonasal, trans-septal,trans sphenoidal and trans-ethmoido-maxillary routes [1]. Also, types of transcranial approaches include subtemporal, supraoribital subfrontal and pterional [1]. The transcranial approach is not recommended due to the risk of intracranial spread of infection [7]. The endoscopic endonasal approach may have limited visualization and surgical access to the anterior clinoid and the surrounding intracranial structures. Nevertheless, the recent advances in endoscopic instruments and modern surgical techniques have provided good accessibility and clearance. Moreover, morbidity or mortality with endoscopic endonasal surgery is almost none (Table 1).

Table 1 Review of the literature: Endoscopic endonasal approach of Anterior Clinoid Mucocele (ACM)

Case	Author (year)	Age (y/o)/Sex	Sex	Presentation	Imaging findings	Surgical approach	Cx	Outcome
1	Dunya et al. (1996). [5, 6]	32/M	L	Transient vertical diplopia for 2weeks; progressive VL (20/400 OS). RAPD	MRI: A homogenous mass extending under ON into SS; hyperintense on T2 and hypointense on T1	Endoscopic Trans-sphenoidal	None	Subjective improvement at POD 1. Complete recovery (20/20 OS) at 2 weeks
2	Garaventa et al. (1997) [3]	29/F	R	Retro-orbital headache and VL	CT: Expansile erosive hypodense non enhancing lesion MRI: Homogenous lesion at ACP; hypointense on T1 and hyperintense on T2.	Endoscopic endonasal	None	Headache resolved post op. Complete recovery at 2 months
3	Righini et al. (2006) [5]	18/F	R	Fluctuating monocular VL for 2 days; Periorbital headache	CT: A soft tissue mass with fibrous dysplasia of anterior skull base. MRI: Non enhancing mass in SS with ON compression	Endoscopic endonasal	None	Complete recovery after 4 months
4	Vaphiades et al. (2007) [5, 6]	36/M	L	Acute painless VL (20/80 OS)	CT: Mass in ACP causing destruction of optic canal MRI: A non-enhancing mass in sphenoid sinus extending to ACP abutting optic canal.	Endoscopic endonasal	None	Vision improvement (20/25 OS) at 2 weeks
5	Kwon et al. (2009) [5, 6]	52/M	R	Acute painless VL	CT: A soft tissue mass in SS with expansion to the ACP MRI: ON compressed between SS and ACP - Isointense on T1 and hyperintense on T2.	Endoscopic endonasal	None	Vision improvement at POD 2 with stable vision at 4 years
6	Arnavielle et al. (2010) [5, 6]	37/M	R	Painful compressive optic neuropathy for 1week.RAPD	CT: Compressive and erosive soft tissue in ACP MRI: ON compression; hyperintense on both T1 and T2	Endoscopic endonasal	None	Complete recovery on POD3
7	Forer et al. (2010) [4]	50/M	L	Rapid progressive unilateral opthalmoparesis, redness, and pain for 2 days.	CT- Soft tissue lesion in ACP causing bone destruction with protrusion into SS MRI- Dumbbell shaped mass in between ON and CA -hyperintense on T1 and T2	Endoscopic endonasal	None	Complete recovery within 1 week; stable at 8 months
8	Nundkumar et al. (2011) [5]	32/M	L	Sudden painless VL (HM). RAPD	CT- Expansile erosive soft tissue in ACP; compression of ON MRI-Well defined ACP	Endoscopic endonasal	None	Complete recovery at 6 months
9	Kuruvath et al. 2013 [1]	28/F	R	Temporal Headache 8months; Orbital pain, VL (6/60 OD). RAPD	CT and MRI- A mass lesion in ACP compressing ON	Endoscopic endonasal	-	Complete recovery at 2 months
11	Kuruvath et al. (2013) [1]	44/F	L	Retroorbital pain and headache for 5 months. Intermittent VL (60/6 OS). RAPD	CT and MRI -A mass lesion in spheno ethmoidal recess, erosion of ACP and compressing ON	Endoscopic endonasal	-	Complete recovery (6/6 OS)
12	Mittal et al. (2020) [6]	58/M	L	Progressive VL (Light perception). Frontal headache for 5 months. RAPD	CT- Expansile lesion eroding ACP,compressing left ON and orbital apex. MRI- Well defined para-sellar lesion hyperintense on T1 and T2	Endoscopic endonasal	-	Vision improvement (2/60 OS) at 1 month

Abbreviations: Cx: complication; F:female; M:male; VL:visual loss; OD:right eye; OS:left eye; VA:visual acuity; CT:computer tomography; MRI:magnetic resonance imaging; ACP: Anterior clinoid Process; SS:sphenoid sinus, ON:optic nerve; POD:post operation day

Conclusion

The ACM remains as an unusual cause of optic neuropathy. It is wise to choose a minimal invasive surgical approach like endoscopic endonasal, especially in such benign pathology like ACM. Also, advances in endoscopic instrumentation, intraoperative imaging, navigation system, surgeon's precise techniques and endoscopic approach are more reasonable and safer than open surgery for ACM.

Declarations

Conflict of Interest Authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from patient for publication.

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