ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 04 | April - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

MUCOCELES IN PARANASAL SINUSES: RADIOLOGICALPERSPECTIVES

Radio-Diagnosis

Dr. Mallikarjunappa B	Head of Department and Professor, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka.
Dr. Chandrahas Annamaneni	Post Graduate, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka.
Dr. Krushik T R*	Post Graduate, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka. *Corresponding Author
Dr. Mirza Sanaulla	Post Graduate, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka.
Dr. Sugavasi Gitesh Kumar	Post Graduate, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka.
Dr. Tushar Mallik	Post Graduate, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka.
Dr. Manasa Prakash	Post Graduate, Department of Radiodiagnosis, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore – 560090, Karnataka.

ABSTRACT

Paranasal sinus mucoceles, although rare, manifest as benign, gradual-growth cystic masses, typically stemming from sinus ostia obstruction. Predominantly, the frontal and ethmoid sinuses serve as their primary sites, with a lesser incidence observed in the maxillary and sphenoid sinuses. Computed tomography delineates a homogenous, non-enhancing mass, exerting pressure on bony walls, while magnetic resonance imaging portrays varying intensity on T1-weighted images and a hyperintense appearance on T2-weighted images. Histopathologically, mucoceles exhibit respiratory mucosa features, characterized by areas of reactive bone formation, hemorrhage, fibrosis, and granulation tissue. Our case series highlights a singular instance of sphenoid sinus mucocele and two cases of fronto-ethmoidal sinus mucocele, including one complex scenario involving the fronto-ethmoidal and maxillary sinuses.

KEYWORDS

Case Reports

Case - 1:

An eight year old male child presented with a protrusion of the right eyeball and a one-year history of swelling over the right eye. MRI revealed*[Figure – 1]* a well-defined, T2 hyperintense, and T1 hyperintense lesion completely filling and expanding the right frontal sinus, extending into the right anterior and middle ethmoidal air cells. Remodeling and thinning of the anterior and posterior walls of the frontal sinus and lamina papyracea were observed. The right orbit was displaced outward and inferiorly, resulting in proptosis. CT findingsconfirmed these observations. Endoscopic sinus surgery was performed, and histopathological examination confirmed the diagnosis of fronto-ethmoidalmucocele.

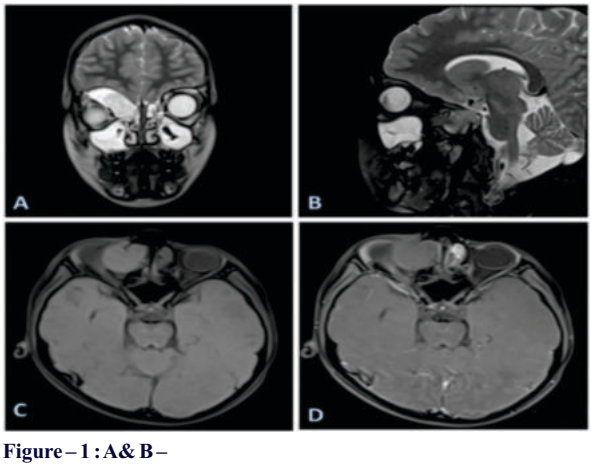

Figure – 1 : A& B –

MRI images show a well-defined with T2 hyperintensity completely fills the right frontal sinus, extending into the anterior and middle ethmoidal air cells. This causes mass effects, remodeling, and thinning of the frontal sinus walls, as well as rarefaction of the right lamina papyracea. The right orbit is displaced outward and inferiorly, resulting in proptosis and inferio-lateral displacement of the superior oblique, superior rectus, and medial rectus muscles. **C&D –** MRI images,pre and post-contrast, reveal peripheral rim enhancement in the lesion following contrast administration.

Case-2:

A 20-year-old female presented with a year-long headache. MRI[Figure – 2] of the paranasal sinuses revealed an expansile hypodense mass centered in the sphenoid sinus, without apparent intracranial extension. Deviated nasal septum to the right and mild maxillary sinusitis were observed. Endoscopic sinus surgery was performed, including sinus drainage, bilateral sphenoidectomy, bilateral postethmoidectomy, and left middle turbinectomy. Histopathological examination confirmed the diagnosis.

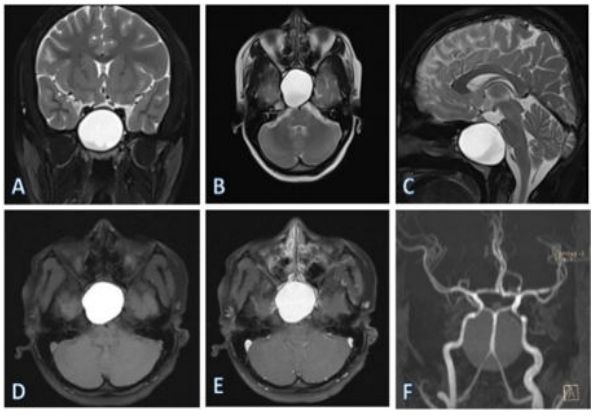

Figure - 2:A, B & C-

Well-defined lesion demonstrates high signal intensity on T2-weighted imaging (T2WI). Within the lesion, hypo intensities are observed - likely attributed to proteinaceous material. This distinct lesion is

centrally located within the sphenoid sinus. **D& E-**The lesion, as observed on MRI pre and post contrast administration, exhibits no enhancement on post-contrast imaging.**F-**On Maximum Intensity Projection (MIP) images, the lesion is evident, causing displacement of the cavernous part of the Internal Carotid Artery (ICA) on both sides. However, it is of note that the both vessels exhibit normal flow and enhancement

Case 3:
A 40-year-old female presented with swelling of the left eye. CT scans revealed deviated nasal septum to the left with a septal spur. In the left maxilla-ethmoid-frontal region, there were polyposis formations invading the osteomeatal unit and frontoethmoidal recess. Additionally, hyperdensity was observed in the left maxillary sinus with mild erosion of the uncinate process and middle turbinate. Histopathological examination confirmed the diagnosis of a left fronto-ethmoid-maxillarymucocele.

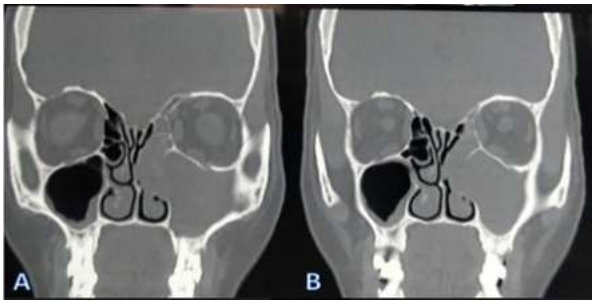

Figure- 3: A&B -Coronal NCCT shows a deviated nasal septum to the left with a septal spur, left maxilla-ethmoid-frontal polyposis invading the osteomeatal unit and frontoethmoidal recess, hyperdensity in the left maxillary sinus, and mild erosion of the uncinate process and middle turbinate.

DISCUSSION:
Paranasal sinus mucoceles, characterized by epithelium-lined cystic masses filled with mucus, arise from sinus ostia obstruction. Generally benign and slow-growing, these lesions have the potential to cause local morbidity in neighboring structures due to their mass effect[1,2].

Paranasal sinus mucoceles typically manifest in the third or fourth decades of life, with a slight male predilection. The frontal sinus is the most commonly affected, followed by the ethmoid sinuses (70–90%), with the maxillary sinus and sphenoid sinus being affected in 10% of cases. Primary causes include inflammation, trauma, or tumor-induced distortion of sinus outflow tracts, along with cystic dilation of mucosal glands or polyp degeneration. Additionally, prior surgery or facial trauma may contribute. Predisposing factors encompass cranial dysplasias, chronic sinusitis, and sinonasal manifestations of systemic disease. In cases of cystic fibrosis, 16% of patients with chronic rhinosinusitis also exhibit mucoceles[3,4].

In cases of fronto-ethmoidal involvement, there is a consequential mass effect on the orbit, leading to symptoms such as proptosis, hypophthalmos, diplopia, and periorbital swelling. Conversely, when mucoceles affect the posterior ethmoid and sphenoid regions, visual compromise is more common. This is attributed to the thin-walled lamina papyracea potentially being displaced into the optic canal by an expanding mucocele. Optic neuropathy may result from direct mechanical compression, ischemia, or optic neuritis secondary to inflammation[3]. Other cranial nerves, including the third, fourth, fifth, and sixth, and on rare occasions, the pituitary, may also be involved. Sphenoid sinus mucoceles constitute 1–2% of all paranasal sinus mucoceles. Despite their benign pathology, these mucoceles may engage vital structures such as the dura, pituitary gland, optic nerve, cavernous sinus, and internal carotid artery, potentially causing serious complications.

Sphenoidal mucoceles are commonly associated with headaches[5].The expansion of a sphenoid sinus mucocele may exert pressure on the optic nerve or the cavernous sinus, housing the III, IV, and VI cranial nerves. Therefore, considerations for sphenoid sinus mucoceles should be forefront in cases presenting with visual disturbances or palsy of the III, IV, and VI cranial nerves. Painful ophthalmoplegia can be a presenting symptom of a sphenoid sinus mucocele. The differential diagnosis for lesions causing painful ophthalmoplegia includes pituitary apoplexy, ruptured intracranial berry aneurysms involving the posterior communicating artery or the cavernous segment of the internal carotid artery, caroticocavernous fistula, nasopharyngeal carcinoma, metastatic carcinoma, herpes zoster ophthalmicus, Tolosa-Hunt syndrome, and ophthalmoplegic migraine. The diagnosis of a sphenoid sinus mucocele is confirmed through CT scans of the nose and paranasal sinuses, revealing a hypodense cystic lesion in the sphenoid sinus with or without extension to adjacent regions such as the sellar, suprasellar, parasellar, and retrosellar areas. Additionally, MRI scans are crucial for detecting the extension of the mucocele.Maxillary sinus issues often arise from chronic inflammation, scarring, or surgical interventions leading to the obstruction of sinus ostia or a segment of a septated sinus. This condition may present with symptoms such as nasal obstruction, facial pressure, periorbital swelling or pain, visual disturbances, diplopia, exophthalmos, meningitis, CSF leak, extraocular motility restriction, recurrent acute or chronic sinusitis, and decreased visual acuity. Additionally, a relative afferent pupillary defect (RAPD) or visual field deficits may be observed.

CT scans offer fundamental anatomical details of mucoceles, outlining their interaction with adjacent bony structures and facilitating surgical planning. Findings typically reveal an expansile, homogeneous sinus mass without rim enhancement, unless associated with an acute mucopylocele. While bony destruction is uncommon, expansion and remodeling of bone can be observed in connection with the mucocele[6].

MRI, on the other hand, provides superior insights into the mucocele's relationship with adjacent soft tissues and aids in distinguishing it from other soft tissue neoplasms. The signal intensity on T1-weighted imaging (T1WI) and T2-weighted imaging (T2WI) depends on the cyst's viscosity and fluid content. Mucoceles appear hyperintense on T2WI due to their high water content. Over time, this intensity may decrease due to chronic inspissations. Conversely, T1WIs initially show low signal intensity, but with water absorption and increased protein concentration, a more viscous mucocele transforms from an isointense to hyperintense structure[6]. Endoscopic surgical excision stands as the treatment of choice, and early intervention is recommended. This approach is particularly crucial to prevent visual compromise or in cases where there is a risk of pyelocele.

We express our gratitude to our Dr Mallikarjunappa B, Professor and HOD department of radiodiagnosis and Dr. Naveen, Professor of ENT, for their unwavering support.

Conflicts Of Interest: The authors declare that they have no conflicts of interest.

Consent : Obtained

REFERENCES
1. Loo JL, Looi AL, Seah LL. Visual outcomes in patients with paranasal mucoceles. Ophthalmic Plastic & Reconstructive Surgery. 2009 Mar 1;25(2):126-9.
2. Thompson LD, Wenig BM. Mucocele of paranasal sinus. Diagnostic pathology: head and neck. Salt Lake City: Amirsys. 2011:45.
3. Tsitouridis I, Michaelides M, Bintoudi A, Kyriakou V. Frontoethmoidalmucoceles: CT and MRI evaluation. The Neuroradiology Journal. 2007 Oct;20(5):586-96.
4. Kim YS, Kim K, Lee JG, Yoon JH, Kim CH. Paranasal sinus mucoceles with ophthalmologic manifestations: a 17-year review of 96 cases. American Journal Of Rhinology & Allergy. 2011 Jul;25(4):272-5.
5. Capra GG, Carbone PN, Mullin DP. Paranasal sinus mucocele. Head and neck pathology. 2012 Sep;6:369-72.
6. Kao HW, Lo CP, Hsu YC, Chiu YC, Hsiao CH, Chen CY. Sphenoid sinus mucocele presenting with optic canal syndrome. Journal of Medical Sciences. 2006 Apr 1;26(2):61-3.