Case Series

Versatility of maxillary antrum: Insights from clinical practice and radiological evidence

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ABSTRACT

Knowledge about neighbors is essential to have a peaceful existence, that's about antrum pathology. The maxillary sinus impacts most on the work of maxillofacial surgeons, as it often requires making a diagnosis in relation to orofacial pain that may be sinogenic in origin. This case series aimed to analyze diverse maxillary sinus diseases, identify diagnostic challenges, and distinguish sinogenic conditions from dental and other pathologies through clinical and radiological assessment. Various cases of suspected maxillary sinus pathology presenting to the Oral and Maxillofacial Surgery Outpatient Department, Bokaro General Hospital, Jharkhand, were reviewed. Detailed history and clinical examination were supplemented with radiological investigations, including occipitomental radiographs and orthopantomograms. Computed tomography and magnetic resonance imaging were performed selectively to determine disease extent. Histopathological examination was undertaken when indicated. Cases comprised inflammatory, cystic, fungal, traumatic, fibro-osseous, and neoplastic lesions. The series underscores the importance of comprehensive evaluation and appropriate imaging for accurate diagnosis and effective treatment planning.

Key words: Computed tomography scan, Maxillary sinus, Odontogenic, Radiographs, Sinogenic

Maxillofacial surgery encompasses both the maxilla and mandible, balancing function, strength, and facial esthetics. Among the paranasal sinuses, the maxillary sinus is of particular importance because of its close anatomical relationship with the oral cavity, dentition, nasal cavity, orbit, and surrounding facial structures. Consequently, maxillary sinus diseases frequently present with overlapping dental and sinonasal symptoms, making the accurate diagnosis of orofacial pain and swelling challenging. Distinguishing odontogenic from sinogenic pathology is essential for appropriate treatment planning and successful clinical outcomes. The maxillary sinus may be affected by a wide range of pathological conditions, including inflammatory, odontogenic, traumatic, allergic, fungal, fibro-osseous, cystic, and neoplastic lesions involving the Schneiderian membrane. Odontogenic infections account for approximately 11–12% of cases of maxillary sinusitis. Early diagnosis through clinical examination and radiological imaging is fundamental for identifying underlying pathology, planning minimally invasive or surgical management, and preventing complications [1].

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Appropriate nomenclature and classification of sinus diseases also assist oral and maxillofacial surgeons in differentiating dental, sinonasal, and other pathological origins.

This case series illustrates the broad spectrum of maxillary sinus pathologies encountered in clinical practice, emphasizing their varied clinical presentations, diagnostic challenges, radiological characteristics, and management strategies. The cases highlight the importance of integrating clinical examination, advanced imaging, and histopathological evaluation to establish accurate diagnoses and optimize patient outcomes.

CASE SERIES

This case series analyses patients with suspected maxillary sinus pathology who presented to the outpatient department of Bokaro General Hospital, Jharkhand, over 4 years. Each patient underwent a comprehensive clinical and radiological evaluation to determine whether the lesion was odontogenic, sinogenic, or due to another pathological process. Histopathological examination was performed whenever required to exclude neoplastic disease. Representative 12 cases of each category demonstrating the diversity of maxillary sinus pathology

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are presented following written informed consent obtained in the patients' native language (Table 1).

Among 12 cases, 32.4% of patients had odontogenic pathology, 35.1% had lesions of sinogenic origin, and the remaining 32.4% had other pathological conditions, including fibro-osseous lesions, mucoceles, neoplasms, fungal infections, and traumatic injuries.

Case 1

A 58-year-old female presented with a progressively enlarging swelling on the left side of the face for 6 months. Intraoral examination revealed a 3 × 5 cm swelling causing occlusal obstruction with medial displacement of teeth 24 and 25 (Fig. 1a and b). Fine-needle aspiration yielded clear brownish fluid containing inflammatory cells and cystic macrophages. Contrast-enhanced computed tomography (CECT) demonstrated a homogeneous expansile lesion occupying the left maxillary sinus with scalloping and resorption of its posteroinferior, medial, and superolateral walls (Fig. 1c). A diagnosis of maxillary sinus mucocele was established. The lesion was successfully treated by enucleation through the Caldwell-Luc approach, with no recurrence during 5 months of follow-up.

Case 2

A 65-year-old male with uncontrolled diabetes mellitus presented with right facial swelling, nasal obstruction, and purulent nasal discharge of more than 20 days' duration (Fig. 2a). Clinical examination revealed foul odor and a palatal fistula covered with necrotic slough (Fig. 2b and c). Fungal growth was identified on nasal swab culture, while biopsy confirmed mucormycosis. Computed tomography (CT) imaging demonstrated complete soft-tissue opacification of the paranasal sinuses with erosion of the superior alveolar ridge and posteroinferior wall of the maxillary sinus (Fig. 2d and e). Management included intravenous Amphotericin B (50 mg/day for 14 days), followed by partial maxillectomy and prosthetic rehabilitation using a palatal obturator (Fig. 2f and g).

Case 3

A 54-year-old female presented 3 months after the extraction of left maxillary teeth with progressive facial swelling (Fig. 3a). Bone destruction had been evident on pre-extraction radiographs but remained unrecognized (Fig. 3b). Clinical examination demonstrated swelling of the hard palate, enlargement of the left nostril, tender left submandibular lymphadenopathy, and an intraoral mass causing occlusal obliteration. CECT revealed a well-defined expansile infiltrative lesion measuring 4.6 × 5.68 × 6.1 cm centered within the left maxillary sinus (Fig. 3c). Incisional biopsy confirmed adenoid cystic carcinoma (cribriform pattern). The patient underwent a subtotal maxillectomy followed by rehabilitation with an obturator.

Case 4

A 23-year-old male presented with facial pain, headache, nasal obstruction, and tenderness over the maxillary region. Radiographic examination confirmed chronic maxillary sinusitis. Conservative therapy failed to relieve symptoms, necessitating functional endoscopic sinus surgery. This case emphasized the diagnostic challenge of differentiating sinus-related pain from odontogenic pain because of the intimate relationship between posterior maxillary teeth and the sinus floor.

Case 5

A 34-year-old male reported persistent pain and discharge from the left maxillary vestibule for 1 year following traumatic extraction of tooth 26 3 years earlier. A gutta-percha tracing on intraoral periapical radiography extended into the maxillary sinus (Fig. 4a). Orthopantomography demonstrated a small ovoid radiolucent defect with a corticated margin, while CECT revealed bilateral polypoidal soft-tissue masses with breach of the anterior sinus wall (Fig. 4b). Bilateral Caldwell-Luc surgery was performed (Fig. 4c). Histopathological examination of the cyst lining containing cheesy material confirmed a keratocystic odontogenic tumor involving the maxillary sinus.

Case 6

A 20-year-old male presented with left facial pain of 1 month's duration and a history of untreated facial trauma 10 years earlier. Clinical examination revealed

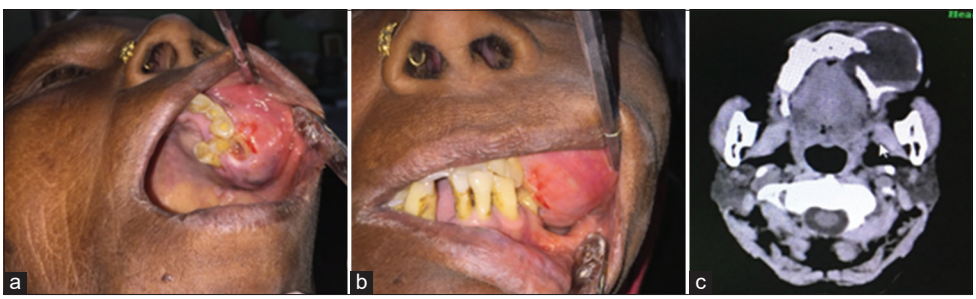


Figure 1: (a) Intraoral presentation of mucocele, (b) Pathology obstructing occlusion, and (c) Contrast-enhanced computed tomography scan showing expansile homogeneous mass with scalloping and resorption of maxillary antrum walls (Case)

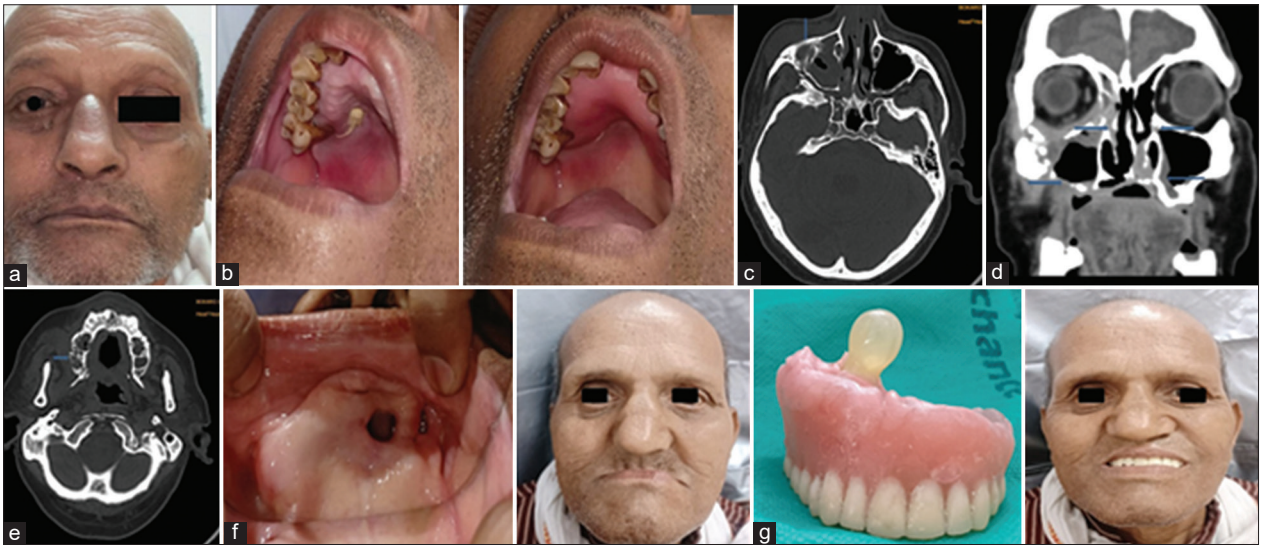


Figure 2: (a) Swelling of right upper half of face, redness around eyes and right side proptosis, (b) Intraoral palatal fistula covered with necrotic slough with Palatal obturator to prevent nasal regurgitation, (c) Computed tomography (CT) scan coronal section showing inhomogeneous soft tissue densities, (d) CT scan coronal section showing mild proptosis, (e) CT scan axial section showing bony erosion and destruction of the right superior alveolar ridge, (f) Post-operative clinical image intraoral and extraoral of patient, (g) Post-operative rehabilitation done with removable partial denture with obturator (Case 2)

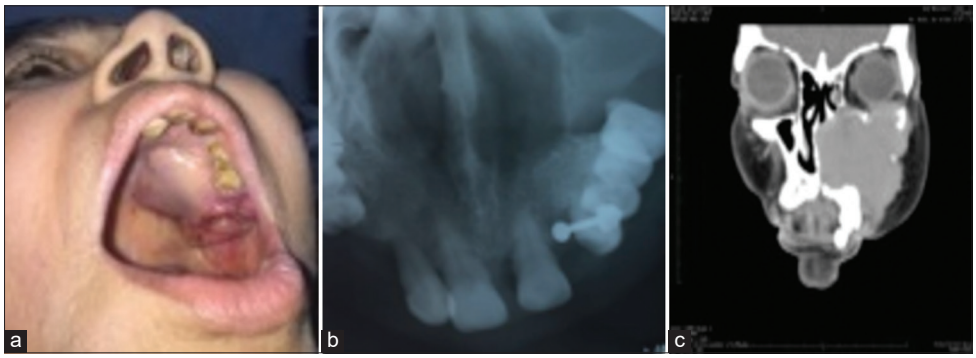


Figure 3: (a) Intra-oral picture showing swelling extending from left central incisor to hard palate not crossing midline, (b) Occlusal before extraction showed destructive lesion, (c) Section of contrast-enhanced computed tomography scan showing extent of swelling (Case 3)

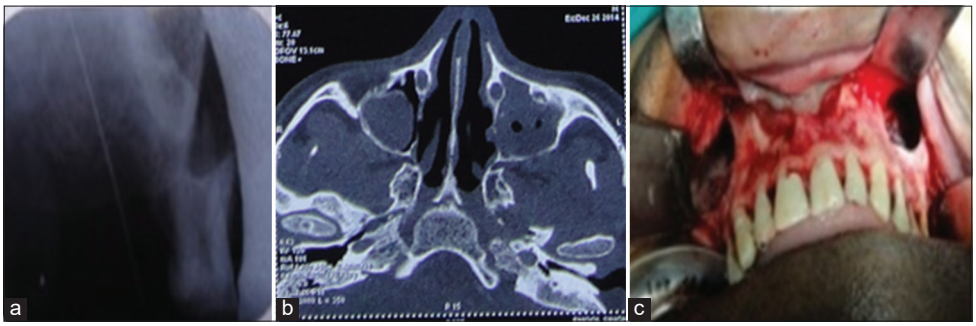


Figure 4: (a) Intraoral periapical with gutta-percha point, (b) Computed tomography scan showing obliteration of maxillary sinus, (c) Intraoperative image of sinus after excavation of keratocystic odontogenic tumor (Case 5)

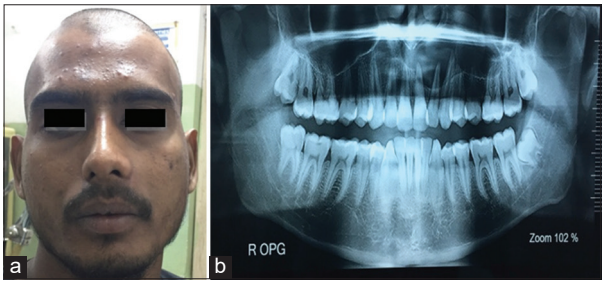


Figure 5: (a) Clinical picture showing obliterated nasolabial fold on the left side, (b) Orthopantomogram depicting radicular cyst margin engulfing maxillary sinus (Case 6)

obliteration of the left nasolabial fold (Fig. 5a) and tenderness involving teeth 11–25. Teeth 21–23 were non-vital, and aspiration yielded purulent material. Orthopantomography demonstrated a large cystic lesion extending from teeth 11 to 26, occupying approximately three-fourths of the left maxillary sinus (Fig. 5b). Treatment included the extraction of tooth 21, root canal therapy for teeth 22 and 23, and cyst enucleation through the Caldwell-Luc approach. Histopathological examination confirmed a radicular cyst.

Case 7

A 62-year-old female presented with a 6-month history of watery discharge from the left cheek. Intraoral examination revealed a small ditch-like depression on the buccal aspect of the alveolar crest in the region of tooth 16 (Fig. 6a). Orthopantomography demonstrated a radiolucent lesion in the maxillary region corresponding to a previously extracted tooth. Fine-needle aspiration yielded 5 mL of inflammatory fluid. CECT revealed a cystic lesion involving the maxillary antrum (Fig. 6b). The lesion was managed by Caldwell-Luc surgery under general anesthesia. Histopathological examination of both the aspirate and surgical specimen confirmed the diagnosis of a residual cyst.

Case 8

A 63-year-old male developed pain in the upper jaw and nasal discharge 5 days after extraction of tooth 26. Clinical examination demonstrated an unhealed extraction socket (Fig. 7a), a positive Valsalva test, and gutta-percha entering the maxillary sinus, consistent with oroantral communication. CT imaging confirmed discontinuity of the sinus floor with maxillary sinus opacification (Fig. 7b). The defect was treated by de-epithelialization of the tract followed by closure with a double-pedicle flap. The patient remained symptom-free at 1-month follow-up.

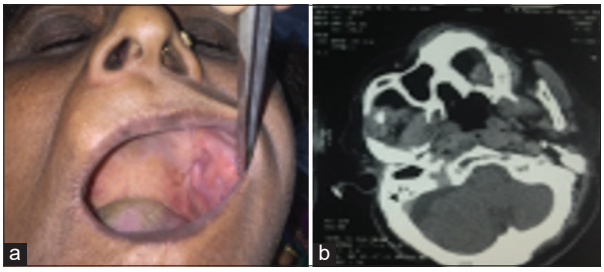


Figure 6: (a) Intraoral picture showing small opening in the left poster-back teeth region, (b) Computed tomography scan with residual cyst in the maxillary sinus (Case 7)

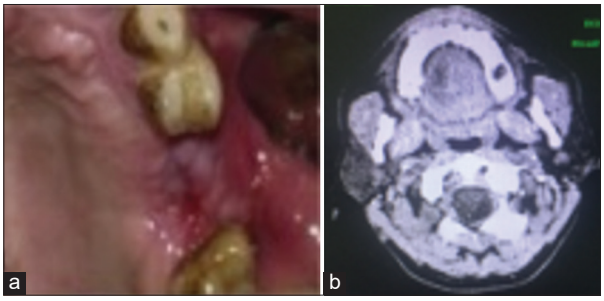


Figure 7: (a) Intraoral image with unhealed socket of tooth 26, (b) Computed tomography scan showing an opacity and a discontinuity in the floor of the maxillary sinus measuring 7 mm (Case 8)

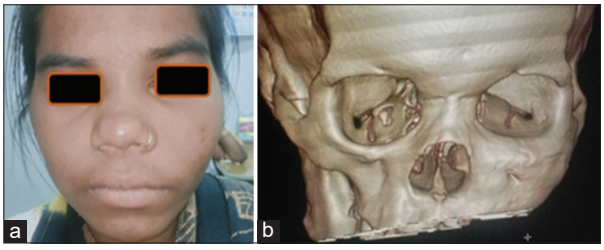


Figure 8: (a) Facial asymmetry, with volumetric enlargement in the zygomatic region and right maxilla, and obliteration of the nasolabial fold, (b) 3D computed tomography scan showing increased bony mass increase (Case 10)

Case 9

Another patient presented with an impacted maxillary canine displaced into the sinus cavity and associated with a large cyst occupying the entire maxillary sinus. Surgical removal of the impacted tooth and complete cyst enucleation resulted in satisfactory recovery.

Case 10

A 19-year-old female presented with longstanding facial asymmetry involving the left zygomatic and maxillary regions (Fig. 8a). Clinical examination demonstrated obliteration of the buccal vestibule with a hard, non-ulcerated swelling. CT imaging showed a hyperdense expansile lesion with a characteristic ground-glass appearance involving the maxilla, zygomatic bone, and maxillary sinus extending to the orbital floor, consistent with fibrous dysplasia (Fig. 8b). Conservative surgical contouring was performed with satisfactory cosmetic improvement.

Case 11

A 10-year-old boy presented with progressive swelling of the right posterior maxilla following tooth extraction.

Table 1: Illustrating diverse maxillary sinus pathologies

S. No.	Pathology	Cases	Treatment
1.	Mucocele	4	Enucleation
2.	Mucormycosis	6	Debridement and anterior maxillectomy
3.	Adenoid cystic carcinoma	1	Surgical resection and reconstruction
4.	Sinusitis	13	Medicinal/ sinusectomy
5.	Impacted tooth in maxillary sinus	4	Grafting removal of tooth along with sinus tissue
6.	Radicular cyst	5	Enucleation
7.	Residual cyst	4	Enucleation
8.	Keratocystic odontogenic tumor	2	Enucleation
9.	Oroantral fistula	11	De-epithelialization and flap closure
10.	Fibrous dysplasia	2	Bone remodeling
11.	Ossifying fibroma	3	Tumor resection
12.	Trauma	19	Surgical or medicinal treatment as per requirement

Table 2: Illustrating representative maxillary sinus pathologies

Case	Age/ sex	Clinical presentation	Radiological findings	Final diagnosis	Management	Outcome
1	58/F	Progressive left facial swelling (6 months), intraoral swelling causing occlusal obstruction	CECT: Homogeneous expansile lesion occupying left maxillary sinus with scalloping and bony wall resorption	Maxillary sinus Mucocele	Caldwell-Luc enucleation	No recurrence at 5 months
2	65/M	Right facial swelling, nasal obstruction, purulent discharge, palatal fistula with necrotic slough; uncontrolled diabetes	CT: Complete sinus opacification with erosion of superior alveolar ridge and maxillary sinus wall	Rino-orbital cerebro Mucormycosis	IV Amphotericin B followed by partial maxillectomy and palatal obturator	Successful rehabilitation
3	54/F	Progressive facial swelling after extraction, palatal mass, lymphadenopathy	CECT: 4.6×5.68×6.1 cm infiltrative lesion involving left maxillary sinus	Adenoid cystic carcinoma	Subtotal maxillectomy with obturator rehabilitation	Postoperative recovery achieved
4	23/M	Facial pain, headache, nasal obstruction, maxillary tenderness	Radiographic evidence of chronic maxillary sinusitis	Chronic maxillary Sinusitis	Caldwell-Luc surgery	Symptom resolution
5	34/M	Persistent vestibular pain and discharge following traumatic extraction	CECT: Bilateral polypoidal masses with anterior sinus involvement	Keratocystic odontogenic tumor	Bilateral Caldwell-Luc surgery	Histopathological confirmation; uneventful recovery
6	20/M	Facial pain following previous facial trauma; non-vital anterior teeth	Large cystic lesion occupying three-fourths of left maxillary sinus	Radicular cyst	Extraction, root canal therapy, and Caldwell-Luc cyst enucleation	Successful recovery after extraction, root canal therapy, and Caldwell-Luc surgery
7	62/F	Watery discharge from left cheek, alveolar depression	CECT demonstrated cystic lesion involving maxillary antrum	Residual cyst	Caldwell-Luc surgery	Uneventful postoperative recovery
8	63/M	Pain and nasal discharge following tooth extraction; positive Valsalva test	CT confirmed oroantral communication with sinus opacification	Oroantral fistula	Double-pedicle flap closure	Symptom-free at 1 month
9	17/M	Impacted canine associated with large maxillary cyst	Impacted canine displaced into maxillary sinus with extensive cystic lesion	Cyst with impacted canine	Surgical removal of tooth and cyst enucleation	Satisfactory recovery
10	19/F	Long-standing facial asymmetry and hard maxillary swelling	CT showed expansile ground- glass lesion involving maxilla, zygoma and maxillary sinus	Fibrous dysplasia	Conservative surgical contouring	Good cosmetic outcome
11	10/M	Progressive posterior maxillary swelling with occlusal disturbance	CT revealed 8×7 cm expansile fibro osseous lesion with internal calcifications	Ossifying Fibroma	Intralesional triamcinolone followed by staged surgical resection	No recurrence at 2 years
12	23/M	Road traffic accident	Fractures involving zygomatic arch, orbital floor, and maxillary sinus walls with displaced impacted canine	Traumatic maxillary sinus injury	Open reduction, sinus clearance and fracture management	Successful postoperative recovery

M: Male, F: Female, CECT: Contrast-enhanced computed tomography, CT: Computed tomography, IV: Intravenous



Figure 9: (a) Intraoral presentation of ossifying fibroma, (b) Outpatient department showing displacement of teeth 21, 22, and 23 with increased opacity at the dental roots, (c) Intraoperative multiple resected segments (Case 11)

Clinical examination revealed a firm swelling causing occlusal disturbance (Fig. 9a). Orthopantomography demonstrated displacement of adjacent teeth with preserved vitality (Fig. 9b), while CT revealed an 8 × 7 cm expansile lesion containing internal calcifications involving the anterolateral wall of the maxillary sinus, suggestive of a fibro-osseous lesion. Considering the patient's age, intralesional triamcinolone acetonide injections were administered initially, followed by staged surgical resection after reduction in lesion size (Fig. 9c). No recurrence occurred during the 2 years of follow-up.

Case 12

Traumatic injuries involving the maxillary sinus were also encountered. One patient involved in a road traffic accident sustained fractures of the zygomatic arch, orbital floor, and walls of the maxillary sinus. Surgical exploration revealed blood clots within the sinus and displacement of an impacted canine tooth, requiring simultaneous fracture management and sinus clearance.

DISCUSSION

The maxillary sinus (antrum of Highmore), the largest paranasal sinus, is of considerable importance in oral and maxillofacial surgery because of its close anatomical relationship with the dentition, nasal cavity, orbit, and surrounding facial structures. Consequently, a wide range of pathological conditions may involve the sinus, producing overlapping symptoms such as facial pain, swelling, nasal obstruction, headache, and dental discomfort, which often complicate diagnosis.

In the present series of suspected maxillary sinus pathologies, 32.4% of cases were odontogenic, 35.1% were sinogenic, and the remaining 32.4% comprised traumatic, fibro-osseous, cystic, fungal, and neoplastic lesions. Radiological imaging, particularly CT, played a pivotal role in diagnosis by accurately demonstrating sinus opacification, mucosal thickening, bony erosion, cystic expansion, and tumor extension, thereby facilitating appropriate treatment planning (Table 2).

Recent literature has emphasized the growing recognition of odontogenic maxillary sinusitis and the need for multidisciplinary management involving oral and maxillofacial surgeons, otolaryngologists, radiologists, and pathologists [2,3]. Maxillary sinus mucoceles, although relatively uncommon, account for approximately 18% of paranasal sinus mucoceles and may cause progressive expansion with displacement of adjacent structures [4,5]. Other important lesions include keratocystic odontogenic tumor, adenoid cystic carcinoma, fibrous dysplasia, ossifying fibroma, and radicular cysts, many of which can clinically mimic chronic sinusitis [6-9]. Because of the large size and thin walls of the maxillary sinus, these lesions may attain considerable dimensions before diagnosis. Therefore, integration of clinical findings with radiological imaging is essential for differentiating odontogenic, sinogenic, cystic, and neoplastic diseases, ensuring accurate diagnosis and optimal management [10,11].

CONCLUSION

Accurate diagnosis of maxillary sinus pathology requires meticulous history-taking, comprehensive clinical examination, appropriate radiological investigations, and histopathological confirmation whenever indicated. The cases presented demonstrate the broad spectrum of inflammatory, odontogenic, fungal, cystic, fibro-osseous, traumatic, and neoplastic lesions affecting the maxillary sinus and highlight the overlapping clinical features that often complicate diagnosis. Integration of clinical, radiological, and pathological findings allows differentiation between odontogenic and sinogenic disease, facilitates appropriate treatment planning, and ultimately improves patient outcomes.

REFERENCES

1. Whyte A, Boeddinghaus R. The maxillary sinus: Physiology, development and imaging anatomy. Dentomaxillofac Radiol 2019;48:20190205.
2. Zhu J, Lin W, Yuan W, Chen L. New insight on pathophysiology, diagnosis, and treatment of odontogenic maxillary sinusitis. J Nanomater 2021;2021:9997180.
3. Zhao Y, Huang S, Xu M, Wang Y, Zhang X, Wang K, *et al*. Characteristics and risk factors in odontogenic maxillary sinusitis from different dental infections: A retrospective study based on sinus CT imaging. BMC Oral Health 2025;25:308.
4. Zhang H, Hock LE, Robinson R, Simmons B, Walsh J, Shriver EM. Maxillary Sinus Mucocele; 2020. Available from: https://eyerounds.org/cases/294-Maxillary-Sinus-Mucocele.pdf [Last accessed on 2026 Jan 12].
5. Menezes JD, Moura LB, Pereira-Filho VA, Hochuli-Vieira E. Maxillary sinus mucocele as a late complication in zygomatic-orbital complex fracture. Craniomaxillofac Trauma Reconstr 2016;9:342-4.
6. Sheethal HS, Rao K, Umadevi HS, Chauhan K. Odontogenic keratocyst arising in the maxillary sinus: A rare case report. J Oral Maxillofac Pathol 2019; 23 Suppl 1:74-7.
7. Unsal AA, Chung SY, Zhou AH, Baredes S, Eloy JA. Wiley Online Library; 2017. Sinonasal adenoid cystic carcinoma: A population-based analysis of 694 cases. Int Forum Allergy Rhinol 2017;7:312-20.
8. Watkinson J, Gilbert RW. Stell and Maran's Textbook of Head and Neck Surgery and Oncology. 5th ed. Florida: CRC Press; 2012.
9. Markov P, Syed AZ, Markova C, Mendes RA. Maxillofacial fibrous dysplasia: A diagnostic challenge. BMJ Case Reports 2016;2016:bcr2016215874.
10. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral and Maxillofacial Pathology. 2nd ed. Amsterdam: Saunders, Elsevier; 2005.
11. Quadri A, Keerthi R, Khan TA. Unusual aggressive large radicular cyst invading maxillary sinus: A case report. Int J Sci Stud 2016;4:180-3.

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