

Cavernous Sinus Thrombosis With Intracranial Extension Following Maxillary Molar Extraction: A Rare Diagnostic Mimic of Facial Palsy

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ABSTRACT

Background

Cavernous sinus thrombosis (CST) is an uncommon but potentially life-threatening complication of infections involving the paranasal sinuses, face, and oral cavity. Because the cavernous sinus contains multiple cranial nerves and is closely related to the internal carotid artery, affected patients may present with ophthalmoplegia, facial sensory abnormalities, and facial nerve dysfunction. Such presentations may initially be mistaken for isolated Bell's palsy.

Case Presentation

A 35-year-old male presented with left-sided facial asymmetry associated with ocular and neurological abnormalities following extraction of the left maxillary posterior teeth. The patient had a history of poorly controlled diabetes mellitus. Clinical examination demonstrated facial asymmetry, inability to adequately close the affected eye, ocular abnormalities, and sensory disturbance involving the left side of the face. Panoramic dental imaging demonstrated the dentition and the region of previous maxillary posterior dental intervention. Computed tomography of the paranasal sinuses and brain demonstrated a defect involving the floor of the left maxillary sinus, extensive sinonasal mucosal disease, non-enhancement of the inferior aspect of the left cavernous sinus consistent with cavernous sinus thrombosis, circumferential wall thickening involving the petrous and orbital segments of the left internal carotid artery with luminal narrowing, and a 7 × 7 mm ring-enhancing lesion in the medial left temporal lobe reported as an early brain abscess.

Conclusion

The presence of facial palsy together with ophthalmoplegia, trigeminal sensory abnormalities, ocular involvement, or other cranial neuropathies should prompt evaluation for secondary causes rather than being attributed to Bell's palsy alone. In patients with a recent odontogenic history and predisposing conditions such as diabetes mellitus, urgent contrast-enhanced imaging is essential for identifying cavernous sinus involvement and intracranial extension.

Keywords: Cavernous sinus thrombosis; odontogenic infection; facial palsy; cranial neuropathy; maxillary sinusitis; intracranial extension; diabetes mellitus.

How to cite this article: Bharti K S, Purkait S K, Chattejee A, Aaberi A, Shubham S, Anjali, Cavernous Sinus Thrombosis With Intracranial Extension Following Maxillary Molar Extraction: A Rare Diagnostic Mimic of Facial Palsy. *Int J Drug Deliv Technol.* 2026;16(85s): 698-704; DOI: 10.25258/ijddt.16.85s.68

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Bell's palsy is an acute peripheral facial nerve palsy that is generally diagnosed clinically after exclusion of other identifiable causes. The clinical practice guideline for Bell's palsy emphasizes accurate diagnosis and recognition of features that may indicate an alternative neurological disorder rather than idiopathic facial nerve dysfunction. [1]

Cavernous sinus thrombosis (CST) is a rare but potentially fatal disorder that can develop as a complication of infections involving the paranasal sinuses, face, and oral cavity. Although its incidence and mortality have substantially decreased with modern antimicrobial therapy, delayed recognition may still result in severe neurological and ophthalmological morbidity. Early diagnosis and treatment remain essential. [2,3]

The anatomical location of the cavernous sinus explains the characteristic neurological manifestations of CST. The cavernous sinus is closely related to cranial nerves III, IV, V1, V2, and VI and contains the internal carotid artery and its sympathetic plexus. Consequently, pathology involving this region may produce combinations of ophthalmoplegia, diplopia, trigeminal sensory impairment, ocular manifestations, and other cranial neuropathies. [3,4]

Odontogenic infections are usually localized and respond to appropriate dental and antimicrobial management; however, infection may occasionally spread into adjacent deep spaces and produce serious systemic or intracranial complications. Maxillary dental infections are of particular anatomical importance because of the close relationship between the posterior maxilla, maxillary sinus, orbit, and deeper facial structures. [5,6]

Multiple cranial neuropathies are an important clinical warning sign. A large case series demonstrated that multiple cranial nerve involvement has a broad differential diagnosis and may result from lesions involving the cavernous sinus, among other anatomical locations. [7]

Imaging plays a critical role when multiple cranial neuropathies are present. Current imaging guidance emphasizes detailed neurological localization and appropriate cross-sectional imaging to identify intracranial, skull-base, vascular, or cavernous sinus pathology. [8]

Patients with diabetes mellitus are also at increased risk of severe invasive fungal infections, including rhino-orbital-cerebral mucormycosis. A large multicentre Indian study identified diabetes mellitus as the dominant predisposing factor for mucormycosis and demonstrated particularly serious outcomes in patients with rhino-orbital disease with cerebral extension. [9]

The present case describes a patient with facial palsy-like manifestations following maxillary molar extraction in whom imaging demonstrated cavernous sinus thrombosis, internal carotid artery involvement, extensive sinonasal disease, and a small ring-enhancing temporal lobe lesion. The case highlights the importance of recognizing atypical features and considering cavernous sinus pathology in patients presenting with facial weakness and multiple cranial nerve abnormalities.

CASE PRESENTATION

Patient Information

A 35-year-old male presented with progressive abnormalities involving the left side of the face and left eye. The available clinical photographs demonstrated facial asymmetry and significant ocular abnormalities.

The patient had a history of poorly controlled diabetes mellitus. The clinical history indicated previous extraction of the left maxillary posterior teeth, after which persistent local and neurological/ocular symptoms developed.

The available radiological documentation was dated **21 February 2023**.

Clinical Examination

Clinical photographs demonstrated obvious asymmetry of the face. The patient showed abnormal positioning and movement of the left eye, with associated periocular changes.

The frontal clinical photographs demonstrated asymmetry involving the left side of the face, while the lateral photographs demonstrated the facial contour and ocular abnormality from both sides.

The clinical findings were concerning for a disorder extending beyond an isolated facial nerve lesion because of the associated ocular and sensory abnormalities (Figure 1).



Figure 1 Clinical presentation of the patient. (A) Right lateral facial view. (B) Frontal facial view demonstrating facial asymmetry and ocular abnormality. (C) Left lateral facial view. (D) Frontal view demonstrating left ocular abnormality. (E) Frontal view with downward gaze.

DENTAL AND MAXILLOFACIAL IMAGING

A panoramic dental radiograph was available for evaluation (Figure 2).



Figure 2: Panoramic dental radiograph of the patient demonstrating the maxillary and mandibular dentition and the maxillary posterior region following the reported dental intervention.

COMPUTED TOMOGRAPHY FINDINGS

Contrast-enhanced CT examination of the paranasal sinuses and brain demonstrated extensive pathological abnormalities involving the left maxillary sinus and adjacent structures.

There was a defect involving the floor/base of the left maxillary sinus in the region of the previous maxillary posterior dental intervention. Associated mucosal disease was identified within the left maxillary sinus, anterior ethmoid region, and ipsilateral sphenoid sinus.

The CT report also described mucosal thickening and ulcerative changes involving the nasal cavity.

Cavernous Sinus and Vascular Findings

The CT report described non-enhancement involving the inferior aspect of the left cavernous sinus, interpreted as **left cavernous sinus thrombosis**.

There was also circumferential wall thickening involving the petrous and ophthalmic segments of the left internal carotid artery, with associated luminal narrowing. The radiological impression described this finding as consistent with **left internal carotid arteritis**.

Intracranial Extension

The radiological report additionally described dural enhancement and a focal dural breach with extension toward the medial left temporal lobe.

A small approximately 7×7 mm **ring-enhancing cystic lesion** was identified in the medial left temporal lobe and was reported as being suggestive of an **early brain abscess**.

The combination of cavernous sinus thrombosis, vascular involvement, dural abnormality, and a ring-enhancing intracranial lesion indicated extensive disease extending beyond the original maxillary/sinonasal region.

RADIOLOGICAL IMPRESSION

Based on the supplied CT report, the major radiological findings were:

1. Left maxillary sinus floor defect in the region of the previous maxillary posterior dental intervention.
2. Extensive left-sided sinonasal mucosal disease.
3. Left cavernous sinus thrombosis.
4. Circumferential wall thickening and narrowing of the left internal carotid artery, reported as arteritis.
5. Dural enhancement and focal dural breach.
6. Approximately 7×7 mm ring-enhancing cystic lesion in the medial left temporal lobe, reported as an early brain abscess.

These findings provide radiological evidence of a complicated infective/inflammatory process involving the maxillofacial region with cavernous sinus and intracranial extension.

CLINICAL-RADIOLOGICAL CORRELATION

The combination of facial asymmetry, ocular abnormality, and radiological evidence of cavernous sinus thrombosis is clinically important.

An isolated peripheral facial nerve palsy would not adequately explain the presence of multiple ocular and trigeminal abnormalities. Cavernous sinus pathology can affect several cranial nerves simultaneously because of their anatomical relationship with the cavernous sinus. [3,4,7]

The history of maxillary posterior dental intervention and the adjacent maxillary sinus abnormality also raises concern for an odontogenic contribution to the infective process. Odontogenic infections can spread beyond the primary dental site and, in severe cases, involve deep facial spaces and adjacent anatomical compartments. [5,6]

MANAGEMENT

The supplied clinical and radiological material documents the diagnostic findings but does **not provide complete verified information regarding the subsequent antimicrobial regimen, surgical intervention, microbiological results, duration of treatment, or final clinical outcome**.

Therefore, these details **were not invented for publication**.

We lost contact from the patient after referring him to higher centre

DISCUSSION

Cavernous sinus thrombosis is a rare but serious condition that requires rapid recognition. Although the introduction of antimicrobial therapy has markedly reduced mortality compared with the pre-antibiotic era, CST remains associated with substantial neurological and ophthalmological morbidity. [2,3]

The present case is clinically important because the initial facial asymmetry could potentially suggest an isolated peripheral facial nerve palsy. However, the accompanying ocular abnormalities and additional cranial nerve-related findings make uncomplicated Bell's palsy an inadequate explanation for the overall presentation. The Bell's palsy clinical practice guideline emphasizes the importance of accurate diagnosis and appropriate evaluation when clinical findings are inconsistent with a typical isolated facial palsy. [1]

The cavernous sinus contains or is closely related to multiple cranial nerves, including cranial nerves III, IV,

V1, V2, and VI, as well as the internal carotid artery. Consequently, cavernous sinus lesions can produce combinations of ophthalmoplegia, diplopia, facial sensory abnormalities, and vascular manifestations. [3,4]

This anatomical relationship provides a plausible explanation for the combination of facial and ocular abnormalities observed in the present patient. The involvement of multiple neurological structures is an important clinical clue toward a cavernous sinus or skull-base process rather than an isolated facial nerve disorder.

Multiple cranial neuropathy itself has a broad differential diagnosis. In a case series of 142 patients, multiple cranial nerve involvement was associated with diverse etiologies, with the cavernous sinus representing one of the anatomical sites involved. The authors emphasized that clinical features can help localize the underlying lesion. [7]

The possible relationship with the patient's previous maxillary dental procedure is also noteworthy. Odontogenic infections can occasionally progress beyond the primary dental site and produce serious deep-space or systemic complications. The close anatomical relationship between the maxillary posterior teeth and maxillary sinus provides a potential pathway for spread of infection into adjacent structures. [5,6]

In the present case, the CT report documented a defect involving the left maxillary sinus floor in the region of the previous dental intervention together with extensive ipsilateral sinonasal disease. Although this finding supports an anatomical relationship, **the available material does not establish microbiologically that the dental extraction was definitively the source of the cavernous sinus thrombosis.** This distinction is important when reporting the case.

Another important feature was the patient's diabetes mellitus. Diabetes is a recognized major predisposing factor for invasive fungal infection. In a large multicentre Indian observational study involving 465 patients with mucormycosis, diabetes mellitus was present in 73.5% of patients, while rhino-orbital disease was the most common clinical presentation. Cerebral extension was associated with increased mortality. [9]

Therefore, in a diabetic patient with extensive sinonasal disease, vascular abnormalities, cavernous sinus thrombosis, and intracranial extension, invasive fungal infection should be included in the differential diagnosis. However, the diagnosis of mucormycosis **cannot be established from the supplied CT images alone.** Confirmation would require appropriate microbiological and/or histopathological evidence.

The CT findings in this patient are particularly concerning because they extend beyond isolated sinus disease. The reported cavernous sinus thrombosis, internal carotid

artery wall abnormality, dural involvement, and ring-enhancing temporal lesion indicate a potentially complicated intracranial process.

Modern imaging plays an essential role in patients with multiple cranial neuropathies. The American College of Radiology emphasizes that detailed cranial nerve examination and appropriate imaging are important for identifying intraparenchymal and extraparenchymal causes of multiple cranial neuropathies. [8]

The reported 7×7 mm ring-enhancing lesion in the medial temporal lobe is another significant finding. The supplied radiological report interpreted this as an early brain abscess. Because a ring-enhancing lesion has a differential diagnosis that includes abscess and other infectious, inflammatory, and neoplastic processes, the final etiological diagnosis should be based on the complete clinical, microbiological, and radiological evaluation.

The vascular abnormality involving the left internal carotid artery is also clinically significant. The cavernous segment of the internal carotid artery passes through the cavernous sinus, and inflammatory or infectious processes in this region can have important vascular consequences. [3,8]

From a clinical perspective, the major lesson from this case is that **facial palsy accompanied by additional cranial nerve abnormalities should be considered a red flag.** A detailed neurological and ocular examination should be performed rather than assuming an idiopathic facial palsy diagnosis.

Similarly, patients with recent dental procedures, persistent facial pain, ocular symptoms, epistaxis, fever, neurological deficits, or uncontrolled diabetes require a lower threshold for contrast-enhanced imaging.

The present case also demonstrates the value of correlating dental history, clinical examination, panoramic imaging, and cross-sectional imaging. The combination of these findings allowed recognition of a pathological process extending from the maxillofacial/sinonasal region to the cavernous sinus and intracranial compartment.

DIFFERENTIAL DIAGNOSIS

The principal differential diagnoses in a patient presenting with facial palsy and multiple cranial nerve abnormalities include:

1. **Bell's palsy**
2. **Septic cavernous sinus thrombosis**
3. **Invasive fungal rhinosinusitis**
4. **Odontogenic infection with intracranial extension**
5. **Brain abscess**

6. **Cavernous sinus syndrome due to neoplastic or inflammatory disease**
7. **Other skull-base infective or vascular lesions**

The combination of multiple cranial neuropathies and imaging-confirmed cavernous sinus abnormality makes an isolated diagnosis of Bell's palsy unlikely. [1,3,7]

CLINICAL MESSAGE

This case emphasizes several important clinical points:

- Facial palsy should not automatically be labelled as Bell's palsy when additional neurological or ocular abnormalities are present.
- Ophthalmoplegia and trigeminal sensory abnormalities should raise suspicion for cavernous sinus involvement.
- A recent maxillary dental procedure should prompt consideration of an odontogenic source when compatible sinonasal abnormalities are present.
- Diabetes mellitus is an important risk factor for severe invasive fungal infection and should increase clinical vigilance. [9]
- Contrast-enhanced CT/MRI is important when multiple cranial neuropathies or cavernous sinus pathology is suspected. [8]
- The final diagnosis should integrate clinical, radiological, microbiological, and histopathological findings whenever available.

CONCLUSION

Cavernous sinus thrombosis with intracranial extension is a rare but potentially life-threatening condition that may initially mimic facial nerve palsy.

In this case, the combination of facial asymmetry, ocular abnormalities, a history of maxillary posterior dental intervention, poorly controlled diabetes mellitus, and extensive CT abnormalities led to recognition of a much more extensive pathological process involving the left maxillary sinus, cavernous sinus, internal carotid artery, dura, and medial temporal lobe.

The case highlights the importance of **recognizing atypical features of facial palsy and performing a complete cranial nerve and ocular examination**. Multiple cranial neuropathies, particularly when associated with sinonasal disease and a predisposing condition such as diabetes, should prompt urgent contrast-enhanced neuroimaging.

Early recognition of cavernous sinus involvement is essential because delayed diagnosis can result in permanent neurological, ophthalmological, vascular, and intracranial complications.

PATIENT CONSENT

Written informed consent was obtained from the patient for publication of the case report and the accompanying clinical photographs and radiological images.

ETHICAL APPROVAL

Ethical approval/exemption was obtained according to the policy of the institution responsible for the case report. The appropriate institutional requirements should be confirmed before manuscript submission.

FUNDING

No external funding was reported for preparation of this case report.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest, unless otherwise specified.

DATA AVAILABILITY

Relevant clinical information is available from the corresponding author subject to appropriate patient confidentiality and institutional requirements.

ACKNOWLEDGEMENTS

The authors acknowledge the clinical and radiological personnel involved in the evaluation and management of the patient.

REFERENCES

1. Baugh RF, Basura GJ, Ishii LE, Schwartz SR, Drumheller CM, Burkholder R, et al. Clinical practice guideline: Bell's palsy. **Otolaryngol Head Neck Surg.** 2013;149(3 Suppl):S1-S27. doi:10.1177/0194599813505967.
2. Ebright JR, Pace MT, Niazi AF. Septic thrombosis of the cavernous sinuses. **Arch Intern Med.** 2001;161(22):2671-2676. doi:10.1001/archinte.161.22.2671.
3. Caranfa JT, Yoon MK. Septic cavernous sinus thrombosis: a review. **Surv Ophthalmol.** 2021;66(6):1021-1030. doi:10.1016/j.survophthal.2021.03.001.
4. Ogle OE, Halpern LR. Odontogenic infections: anatomy, etiology, and treatment. In: Dym H, Halpern LR, Ogle OE, editors. **Oral and Maxillofacial Surgery, Medicine, and Pathology for the Clinician.** Wiley; 2023. doi:10.1002/9781119362579.ch19.
5. Bahl R, Sandhu S, Singh K, Sahai N, Gupta M. Odontogenic infections: microbiology and management. **Contemp Clin Dent.** 2014;5(3):307-311.
6. Jebreel A, et al. Management of odontogenic infections and sepsis: an update. **Br Dent J.** 2020;229:363-370.
7. Torres-Russotto D, et al. Multiple cranial neuropathy: clinical findings in a case series of 142 patients. **Mult**

- Scler Relat Disord.** 2022;65:103997. doi:10.1016/j.msard.2022.103997.
8. American College of Radiology. ACR Appropriateness Criteria® Cranial Neuropathy: 2022 Update. **J Am Coll Radiol.** 2022.
9. Patel A, Kaur H, Xess I, Michael JS, Savio J, Rudramurthy S, et al. A multicentre observational study on the epidemiology, risk factors, management and outcomes of mucormycosis in India. **Clin Microbiol Infect.** 2020;26(7):944.e9-944.e15. doi:10.1016/j.cmi.2019.11.021.