



**Endodontic Management of a Maxillary Molar with Sinus Communication: CBCT
Evidence of Complete Healing and Schneiderian Membrane Regeneration**

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Received: 01 April 2026

Published: 14 April 2026

DOI: <https://doi.org/10.5281/zenodo.19567601>

Abstract

Background: Odontogenic infections originating from maxillary posterior teeth can extend into the maxillary sinus, leading to membrane disruption and sinus pathology.

Case Presentation: This report describes a maxillary molar with a periapical lesion associated with the mesial root and direct communication with the maxillary sinus, confirmed by Cone Beam Computed Tomography (CBCT). Imaging revealed cortical bone loss and Schneiderian membrane destruction.

Intervention: Non-surgical root canal treatment was performed following strict endodontic protocols.

Outcome: A 6-month follow-up CBCT demonstrated complete resolution of the lesion, full bone regeneration, and complete reformation of the sinus membrane.

Conclusion: Properly executed endodontic therapy can lead to predictable healing even in cases involving sinus communication and membrane destruction, highlighting the regenerative potential of both periapical bone and sinus tissues.

Keywords: CBCT; Maxillary sinus; Endodontic treatment; Periapical lesion; Bone regeneration; Schneiderian membrane.

Introduction

The close anatomical relationship between maxillary posterior teeth and the maxillary sinus often allows periapical infections to extend into the sinus cavity. Such cases may result in sinus membrane thickening, perforation, or odontogenic sinusitis.

Cone Beam Computed Tomography (CBCT) has become an essential diagnostic tool in endodontics, enabling three-dimensional assessment of periapical lesions and their proximity to the sinus. While surgical intervention is sometimes considered in cases with sinus involvement, conservative endodontic treatment alone can often resolve the pathology if the source of infection is eliminated.

This report demonstrates complete healing of a lesion with sinus communication and membrane destruction through non-surgical endodontic therapy alone.

Case Presentation

A patient presented with symptoms consistent with apical periodontitis in a maxillary first molar. Clinical findings included:

- Sensitivity to percussion
- No periodontal pocketing
- No mobility

Pre-operative CBCT Findings

CBCT imaging revealed:

- A radiolucent lesion associated with the mesial root apex
- Discontinuity of the sinus floor cortical plate
- Direct communication between the lesion and the maxillary sinus
- Localized destruction and thickening of the Schneiderian membrane

These findings confirmed an endodontic lesion of odontogenic origin with sinus involvement.

Treatment Protocol

Non-surgical root canal treatment was carried out under aseptic conditions:

1. Rubber dam isolation
2. Access cavity preparation
3. Working length determination using an apex locator and radiographic confirmation
4. Chemo-mechanical preparation using rotary instruments

5. Irrigation protocol:

- a. Sodium hypochlorite (NaOCl)
- b. EDTA for smear layer removal

6. Obturation:

- Warm vertical compaction technique
- Definitive coronal restoration to ensure an adequate seal

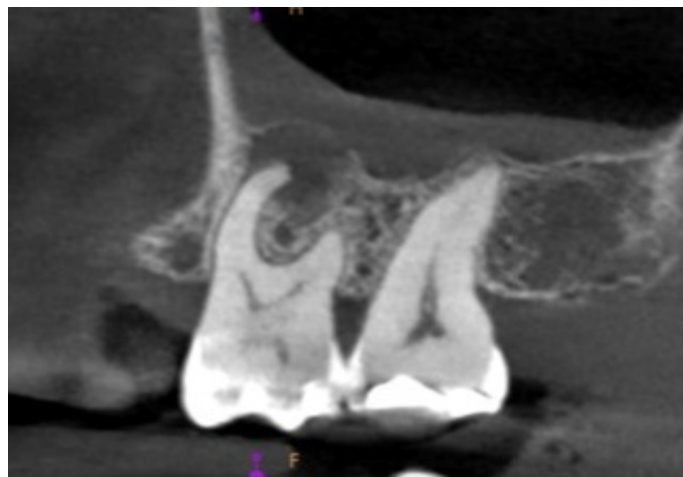


Figure 1: Pre-operative CBCT sagittal view showing periapical radiolucency associated with the mesial root and disruption of the sinus floor

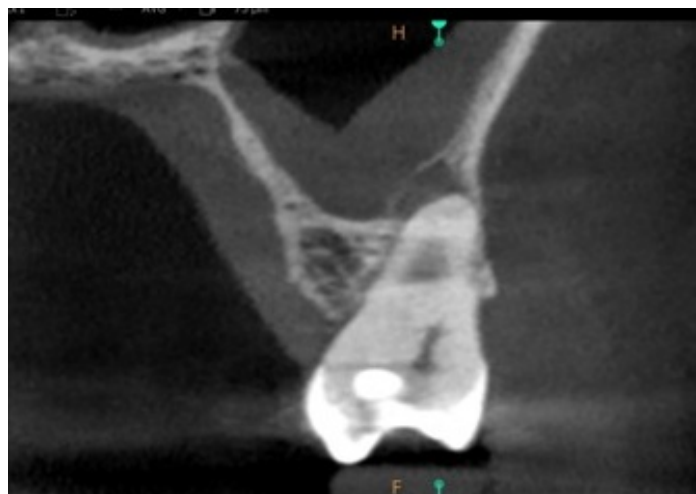


Figure 2: Pre-operative CBCT coronal view demonstrating direct communication between the lesion and the maxillary sinus with Schneiderian membrane destruction

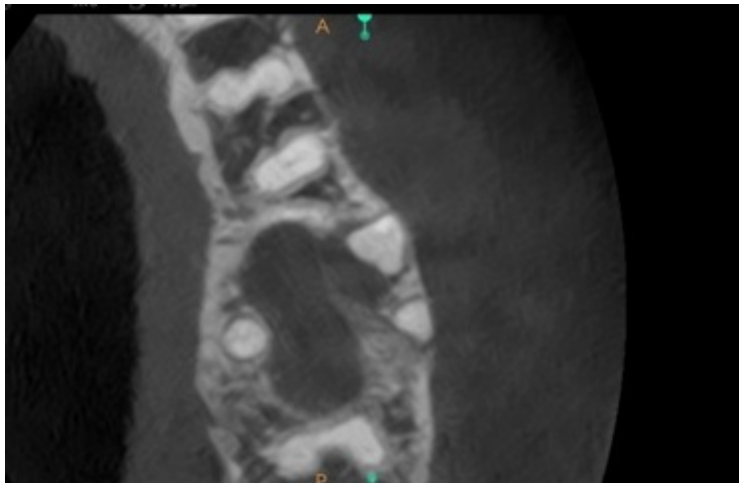


Figure 3: Pre-operative CBCT axial slice illustrating the extent of the lesion around the mesial root



Figure 4: 6-month follow-up CBCT sagittal view showing complete bone regeneration and reformation of the sinus floor

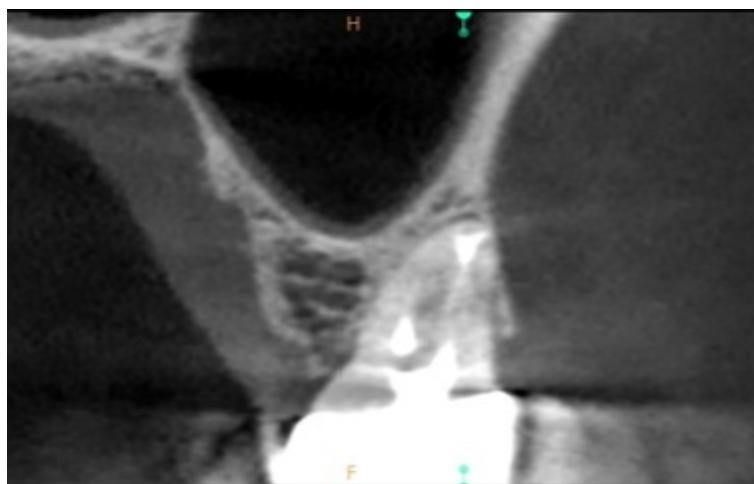


Figure 5: 6-month follow-up CBCT coronal view demonstrating complete restoration of the Schneiderian membrane.



Figure 6: 6-month follow-up CBCT axial view confirming complete resolution of the lesion

Results

6-Month Follow-Up (CBCT Evaluation)

CBCT imaging at 6 months demonstrated:

- Complete resolution of the periapical radiolucency
- Significant bone regeneration with re-establishment of normal trabecular architecture
- Reconstruction of the sinus floor cortical boundary
- Complete repair and normalization of the Schneiderian membrane

Clinically, the patient was asymptomatic with normal function.

Discussion

This case highlights the remarkable healing potential of periapical tissues and the maxillary sinus following elimination of the infectious source.

Despite initial presentation with:

- Sinus floor perforation
- Membrane destruction
- Direct lesion-sinus communication

Complete healing was achieved without surgical intervention.

The success can be attributed to:

- Accurate diagnosis using CBCT
- Thorough disinfection of the root canal system
- Hermetic obturation and coronal seal

The Schneiderian membrane possesses significant regenerative capacity. Once the inflammatory stimulus is removed, rapid re-epithelialization and functional restoration can occur. Similarly, periapical bone regeneration follows predictable biological pathways when infection is eliminated.

This case supports the concept that even advanced lesions involving the sinus should initially be managed conservatively through endodontic treatment before considering surgical approaches.

Conclusion

This report demonstrates that properly executed endodontic treatment can result in complete healing of extensive periapical lesions with sinus communication. CBCT evidence confirms full bone regeneration and Schneiderian membrane repair within six months.

Such outcomes reinforce the biological principles of endodontics and highlight the importance of conservative treatment in managing complex cases.

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