

DOI: 10.58240/1829006X-2025.21.7-20



ORIGINAL RESEARCH

MIRROR PATHOLOGIES: PERIAPICAL LESIONS INDUCED BY OCCLUSAL TRAUMA IN IDENTICAL TWINS – A CASE REPORT

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Received: Jul 6 2025; Accepted: Aug 29;2025; Published: Aug.6,2025

Abstract

Background: Trauma from occlusion is a significant etiological factor in dental conditions requiring endodontic intervention. As originally defined by Stillman in 1917, trauma from occlusion refers to damage to the supporting structures of the teeth resulting from occlusal forces generated during jaw closure. The periodontium attempts to adapt to these forces; however, this adaptive capacity varies among individuals. When the occlusal load exceeds the periodontium threshold, tissue injury ensues.

Key factors influencing the traumatic impact include the magnitude, direction, and duration of occlusal forces. Increased force magnitude leads to periodontal ligament (PDL) space widening, an increase in PDL fiber density, and changes in alveolar bone density. Continuous forces tend to cause more severe damage than intermittent ones, though the frequency of intermittent force application can also elevate injury risk.

This case report presents a rare occurrence of monozygotic twin sisters, aged 9 years, exhibiting periapical pathological lesions in the mandibular anterior region, attributed to trauma from occlusion. The presence of similar occlusal patterns and lesion localization in identical twins is an uncommon finding. Clinical and radiographic evaluations revealed non-vital teeth and well-defined periapical radiolucencies in the same region for twins, despite the absence of carious lesions. These findings suggest that occlusal factors, possibly influenced by hereditary traits, played a significant role in the etiology of the lesions. This case underscores the potential genetic basis of occlusal morphology and its implications in the development of traumatic occlusal lesions in pediatric patients

KEYWORDS: Identical twins, Trauma from occlusion, Cyst, Mandibular anterior

INTRODUCTION

Trauma from occlusion (TFO) in pediatric population is a frequently overlooked condition that can have significant implications on the developing dentition and surrounding periodontal structures. It is characterized by injury resulting from abnormal or excessive occlusal forces that surpass the adaptive limits of the periodontium. In children, these forces may stem from parafunctional habits like bruxism and thumb sucking, high occlusal contacts from restorations, eruptive tooth movements, or malocclusion.^{6,7}

Although the periodontal tissues in children exhibit greater resilience and regenerative potential compared to adults, sustained or improperly directed occlusal forces can overwhelm these defenses. Clinically, this manifest as increased tooth mobility, widened periodontal ligament space on radiographs, localized gingival inflammation, or in rare cases, early periodontal attachment loss. Persistent occlusal trauma can compromise the natural healing process of periapical tissues, especially when left

unaddressed. If the cause is left untreated it may lead to pulpal necrosis ultimately resulting in formation of periapical lesions. Timely diagnosis and management are crucial to ensure the healthy progression of the occlusion.^{6,)}

Studies involving dental anomalies in identical twins hold particular significance, as they offer valuable insights into the complex interplay between genetic predisposition and environmental influences on craniofacial and dental development. The presence of similar periapical pathologies in monozygotic twins is rare, and when observed, may highlight the extent of shared etiological factors.^{1,3}

This case report presents a rare instance of identical twins who developed similar periapical lesions secondary to trauma from occlusion. This report aims to discuss the clinical findings, diagnosis, and successful management of these lesions, while emphasizing the potential genetic and environmental components contributing to their presentation

Case Report

This case report describes a pair of 9-year-old monozygotic (identical) twin sisters, one of whom presented to the Department of Paediatric and

Preventive Dentistry at Sree Balaji Dental College and Hospital, Chennai, with a chief complaint of pain and swelling in the mandibular anterior region for the past one month. The patient was accompanied by her mother, who confirmed that the twins are monozygotic.

Twin 1: The elder twin presented with a progressively enlarging swelling in the lower anterior region. Initially small, the swelling had gradually increased to its current size. On extraoral examination, there was no lymphadenopathy. Intraoral examination revealed a diffuse, ill-defined swelling in the labial vestibule extending from mesial aspect of tooth 42 to the distal aspect of tooth 32. The swelling was non-tender, soft, and fluctuant on palpation with a smooth surface. A sinus tract with purulent discharge was evident at the summit of the swelling near tooth 31.(fig 1) Mild attrition was observed in tooth 31.(fig 2) Patients parent was enquired about any abnormal habits like bruxism, but there were no such habits. Pulp vitality testing showed no response, indicating pulpal necrosis. Grade II mobility was noted in 31. On obtaining a detailed medical and family history, the mother reported that the other twin had also been experiencing pain in the same region. Upon examination of the second twin, there was no evident swelling. However, mild attrition was present in relation to tooth 41(fig 3),



Figure 1. Tract with purulent discharge was evident at the summit of the swelling near tooth 31



Figure 2. Attrition of 31



Figure 3. Attrition of 41

Pulp vitality testing yielded a negative result for 41, suggesting non-vitality. No mobility was observed in this tooth Both twins demonstrated a similar occlusal pattern, with bilateral Angle's Class I molar relationship and a pronounced deep bite (fig 4).



Figure 4. Intraoral picture of twin 1



Figure 5. Intraoral picture of twin 2

Radiographic Findings:

Twin 1: Intraoral periapical radiograph revealed a well-defined periapical radiolucency involving teeth 31, 32, and 41, measuring approximately 3 × 3 cm. Pathological root resorption was noted in 31.(fig 6)

Twin 2: A well-defined periapical radiolucency was seen in relation to tooth 41.(Fig 7) No carious lesions were identified in either of the twin.

Treatment Plan and Procedure:

Given the age of the patients and the need for a conservative approach:

- **Twin 1:**
 - **First Visit:** Access opening was performed in tooth 31. An open dressing was placed to facilitate drainage and reduce the extraoral swelling.
 - **Second Visit (Next Day):** Local anesthesia was administered, and complete biomechanical preparation of the root canal system in 31 was carried out with K files and prepared till 60 size file (Mani K files, Inc, India). Triple antibiotic paste (ciprofloxacin 500mg, Metronidazole 200mg, Doxycycline 100mg) mixed in 1:1:1ratio with isotonic saline as a vehicle was placed as an intracanal medicament, and the access cavity was sealed with temporary restorative material.
 - **Follow-Up (2 Weeks):** Clinical examination revealed complete resolution of extraoral swelling. The patient was asymptomatic. Radiographically, the periapical lesion persisted. Calcium hydroxide (Prime Dental RC Cal, Prime dental products, pvt, ltd, India) was placed as the next intracanal medicament.
 - **Subsequent Visits:** The calcium hydroxide dressing was replaced biweekly. After two months, with the patient remaining asymptomatic and showing clinical improvement, obturation of tooth 31 was completed using gutta-percha.
- **Twin 2:**
 - A similar conservative approach was followed. Calcium hydroxide was placed as an intracanal medicament in tooth 41 over two visits. On the third visit, following the resolution of symptoms and radiographic improvement, obturation was carried out using gutta-percha.

Follow-Up: Both patients were recalled monthly. At a 3- month follow-up:

- **Twin 1:** Radiographic evaluation revealed a reduction in the size of the periapical lesion (Fig 8).
- **Twin 2:** Radiographic healing was evident with complete resolution of the lesion (Fig 9).



Figure 6. Preoperative radiograph of twin 1



Figure 7. Preoperative radiograph of twin 2



Figure 8. 3 month follow up radiograph of twin 1



Figure 9. 3month follow up radiograph of twin 2

DISCUSSION

The study of dental anomalies and pathologies in identical twins provides a unique opportunity to explore the relative contributions of genetic and environmental factors in craniofacial development and dental health. Monozygotic (identical) twins share nearly identical genetic material, and yet variations in clinical presentation can still occur, often due to environmental, epigenetic, or behavioral influences.^{1,3} When twins present with similar dental pathologies- such as periapical lesions arising from trauma-induced occlusal issues- it raises important questions about the

influence of shared genetic predispositions and environmental exposures.¹

Trauma from occlusion is often an overlooked etiological factor in the development of apical periodontitis and subsequent periapical cyst formation. The repetitive and chronic mechanical forces transmitted through the periodontium can disrupt pulpal vitality, especially in teeth already compromised by other factors such as deep caries, restorations, or periodontal disease. In the absence of early intervention, the inflammation progresses to periapical pathology, characterized by bone resorption, osteoclastic activity, and in some cases, cyst formation.²

The presence of nearly identical periapical lesions in twins—as observed in this case—suggests, not only shared environmental factors such as diet, parafunctional habits and similar occlusal schemes, but also possibly a genetic susceptibility to inflammatory responses or pulp degeneration under stress. Literature on twins has shown that traits such as tooth morphology, eruption patterns, root canal morphology, and susceptibility to dental caries show higher concordance in monozygotic twins compared to dizygotic twins, emphasizing a strong genetic influence.^{1,3} However, when it comes to acquired conditions like trauma-induced lesions, the interplay becomes more complex. While trauma itself is an environmental factor, the tissue response—including the degree of inflammation, immune reactivity, and healing potential—can be modulated by genetic factors. Studies have also indicated that cytokine expression profiles, particularly involving interleukins like IL-1 and IL-17, may vary between individuals and influence the severity and progression of apical periodontitis.^{1,3}

This case, thus highlights the importance of early diagnosis and management of occlusal discrepancies, particularly in patients presenting with signs of trauma or parafunctional habits.² Moreover, it underscores the clinical relevance of twin studies in dental research, not only for understanding developmental anomalies but also for evaluating the influence of genetic and shared environmental factors on disease progression.^{1,3}

The choice of treatment for periapical lesions is influenced by several factors, including the size and extent of the lesion, its clinical characteristics, proximity to vital anatomical structures, as well as the patient's systemic health and age. In many cases, conventional non-surgical root canal therapy is sufficient to resolve such big lesions without the need for surgical intervention.⁴

Further studies involving larger samples of twins with similar dental anomalies can help delineate the genetic markers and risk factors associated with endodontic and periodontal pathologies. Incorporating twin studies into routine dental research may open avenues for personalized preventive strategies and improved treatment outcomes based on genetic susceptibility.

CONCLUSION

This case report presents a rare occurrence of similar periapical lesions in monozygotic twins, likely attributed to shared occlusal trauma and potential genetic predisposition. The successful resolution of both cases through non-surgical endodontic treatment underscores the significance of early value of genetic insights in advancing personalized dental care.

DECLARATIONS

Acknowledgements

None

Ethical Approval

None

Informed consent

Verbal and written informed consent were obtained from the all patients.

Financial support and sponsorship

None

Conflict of Interest

None declared

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