

Accidental Lodgment of Orthodontic Bracket in Extraction Site: A Case Report on Periodontal Management and Bone Recovery

Dr. Fadi Chenar^{1*}

¹Periodontist Specialist, BDS, Diploma in Periodontics, Periodontics Dental Department, Al-Waab Health Center, Primary Health Care Corporation, Sports City St, Doha, Qatar

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*Corresponding author: Dr. Fadi Chenar

Periodontist Specialist, BDS, Diploma in Periodontics, Periodontics Dental Department, Al-Waab Health Center, Primary Health Care Corporation, Sports City St, Doha, Qatar

Abstract

Case Report

This case study documents the management of a 17-year-old male patient who encountered an uncommon complication during orthodontic treatment: the accidental lodgment of an orthodontic bracket into the extraction site of tooth 34. This event resulted in localized gingival inflammation and vertical bone loss between the adjacent teeth 33 and 35, complicating the orthodontic process. Immediate periodontal intervention was employed, involving a combination of flap surgery, meticulous debridement, and the local application of antibiotics. The timely response led to successful removal of the foreign body, resolution of the inflammation, and restoration of bone levels. The patient's orthodontic treatment was subsequently continued. A follow-up period of two years demonstrated complete bone recovery without further complications. This study case demonstrates the importance of interdisciplinary collaboration in managing unexpected challenges during orthodontic care and highlights the potential for successful outcomes through prompt and appropriate periodontal management during orthodontic therapy.

Keywords: Bracket Lodgment, Bone Loss, Periodontal Management, Orthodontic Complications, Flap Surgery.

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INTRODUCTION

Orthodontic treatment often involves the extraction of teeth to create sufficient space to align crowded or malaligned dentition [1]. The process is relatively safe, with well-recognized and accepted procedures existing to prevent any potential harm to patients. However, complications can arise, especially if foreign objects, for instance, get lodged in extraction sites. Such complications can lead to periodontal issues such as inflammation and loss of bone, potentially prolonging treatment times [2]. This case study presents a unique instance of an orthodontic bracket accidentally falling into the extraction site of tooth 34, of a 17-year-old male, leading to localized periodontal complications.

A 17-year-old male patient presented with tightness, minor swelling and discomfort of the lower left quadrant. He is currently undergoing orthodontic treatment & had his first premolars extracted one year and 8 months ago. At that time, the patient was fully compliant with all instructions during his orthodontic visit. After the premolars extractions, he reported losing an orthodontic bracket, though he could not recall when or how it happened. Upon examination, the gingiva

between teeth 33 and 35 appeared visibly inflamed. Periodontal probing revealed deep pockets between these teeth. A radiograph revealed an impacted object between the teeth 33 and 35 which turned out to be the missing orthodontic bracket, further causing vertical bone loss in the area. 13 days later, the object was surgically removed. On his follow up visit, the gingiva between teeth 33 and 35 was healthy. Two years later, x-ray showed bone recovery between the teeth.

The relationship between orthodontics and periodontics is crucial for addressing complications that can arise during orthodontic treatment [3]. While orthodontics primarily focuses on the alignment of teeth using appliances, periodontics is concerned with the health and maintenance of the supporting structures, such as the gums and bone. In cases like this, where an orthodontic bracket was accidentally lodged in an extraction site, a coordinated approach between the orthodontist and periodontist was essential. The periodontist's intervention to remove the foreign object and treat the affected gingiva with a locally delivered antibiotic therapy allowed the patient to continue orthodontic treatment without further complications.

This case highlights that while orthodontic treatment typically poses minimal periodontal risks, effective communication and timely intervention are key to mitigating these risks and ensuring successful outcomes.

CASE REPORT

Patient history

A 17-year-old male patient presented to the orthodontic clinic with a chief complaint of misaligned teeth and difficulty in chewing. The patient has a Class II division 1 malocclusion with a pronounced overjet, moderate crowding in both the maxillary and mandibular arches, and a high dental midline discrepancy. The patient was a healthy individual with no significant medical history. He reported a normal childhood development with no history of trauma or systemic disease. An orthodontic treatment plan was formulated to address the malocclusion. The plan was to extract four first premolars to create space for alignment of the teeth. The extractions were carried out in September 2015, and full mouth bonding of brackets was initiated. The patient was put on active orthodontic treatment using fixed appliances and followed up every 4-6 weeks. The first year of treatment progressed without any complications as planned.

Intraoral Examination and Findings

In April 2017, the patient came to the clinic complaining of swelling and discomfort on the lower left quadrant. Clinical examination revealed a deep periodontal pocket 6 mm, accompanied by significant gingival inflammation localized between teeth 33 and 35. The periodontal tissues were erythematous and edematous, with profuse bleeding on probing. The space between the teeth 33 and 35 had not closed as expected, and there was a mild mobility of the teeth. A periapical radiograph was taken, and revealed an orthodontic bracket which was lodged between the two teeth, impinging on the periodontal ligament space causing localized vertical bone loss (2-3 mm). There was a slight widening of the periodontal ligament space around the roots of the teeth [4]. The patient's complaint and the clinical findings of inflammation could be attributed to the foreign body [5]. The lodgment of the bracket was unusual, and the long-term effect of this foreign body is not known. The complication needed an interdisciplinary approach to manage since it also damaged the periodontal tissues and the long-term prognosis of the teeth.

TREATMENT PLAN

The treatment plan aimed to address the immediate periodontal issue and enable the patient to continue orthodontic treatment without further complications [6]. The plan involved the following stages:

Pre-surgical Preparation

- **Patient education and consent:** The orthodontist informed the child and his parents about the

complication, the proposed surgery, and possible outcomes and risks. Informed consent was obtained.

- **Antimicrobial rinse:** This stage was intended to help minimize the risk of surgical site infection. The patient was instructed to use a 1% Betadine solution for a pre-surgical rinse to reduce microbial load at the surgical site.
- **Local anesthesia:** The patient was anesthetized with 4% Articaine with 1:100,000 adrenaline using an inferior alveolar nerve block and buccal infiltration near teeth 33 and 35.

Surgical Procedure

- **Incision and flap:** A sulcular incision was made around the gingival margin of teeth 32, 33, and 34, extending mesially and distally. A full-thickness mucoperiosteal flap was carefully reflected using a periosteal elevator to expose the underlying bone and the area between teeth 33 and 35.
- **Removal of the foreign body:** The orthodontic bracket was gently removed using fine forceps.
- **Debridement and Cleaning:** The surgical site was thoroughly debrided to remove any remaining debris, granulation tissue, and inflammatory exudate. The bone was evaluated, revealing mild vertical bone loss in the interdental area between teeth 33 and 35.
- **Application of local antibiotic therapy:** Dentomycin Periodontal Gel, containing Minocycline HCL, was applied directly to the periodontal pocket and the exposed root surfaces to reduce bacterial load and promote periodontal tissue regeneration [7],[8].
- **Flap repositioning and achieving primary closure:** The flap was carefully repositioned and sutured in place using 4/0 Vicryl sutures, ensuring proper adaptation to the mucogingival junction.

Post-Surgical Care

- **Monitoring and Hemostasis:** The surgical site was monitored for 15 minutes post-operatively to ensure no immediate complications. Hemostasis was achieved.
- **Post-Operative Instructions:** The patient was advised to use an antiseptic rinse (Chlorhexidine) for three days post-operatively, avoid brushing the surgical site, and refrain from eating irritating foods.
- **Medications:** The patient was prescribed Augmentin (Amoxicillin and clavulanic acid) 1000 mg twice daily for one week and Voltfast (Diclofenac Potassium) 50 mg three times daily for five days to manage pain and prevent infection.
- **Follow-Up:** The patient was scheduled for suture removal one week later and additional follow-up visits to monitor healing [9].

Follow-Up and Outcomes

The patient returned for a follow-up examination one week after the surgery. During this visit,

clinical examination revealed significant improvement in gingival health. The gingival tissues appeared less inflamed, with no signs of infection, and the patient reported only minimal discomfort, which was well managed with the prescribed medication. The healing of the soft tissues was progressing as expected, with no signs of complications or adverse reactions.

Approximately four weeks post-surgery, the patient returned for another follow-up visit. During this visit, clinical examination showed a notable reduction in the periodontal pocket depth, from the initial 6 mm to 3 mm. This reduction indicated that the inflammation had subsided and the gingival tissues were healing effectively. The periodontal tissues continued to show signs of stabilization, with improved firmness and reduced bleeding on probing, suggesting a successful healing response [10].

Over the subsequent months, the patient continued to attend regular follow-up appointments to monitor the ongoing healing process and ensure that the periodontal health remained stable. The patient's adherence to oral hygiene instructions contributed significantly to the positive outcomes observed during these follow-up visits [11].

Radiographic imaging was scheduled two years after the surgical procedure to evaluate the long-term

success of the treatment. This radiograph provided clear evidence of bone regeneration in the area where the bracket had been lodged. The vertical bone loss between teeth 33 and 35, which was evident prior to the surgery, had been largely restored. The regenerated bone demonstrated that the periodontal tissues had not only healed but had also undergone successful regeneration, ensuring the stability of the teeth and the surrounding structures [12].

Throughout the follow-up period, the interdisciplinary collaboration between the orthodontist and periodontist was maintained, allowing the patient to safely resume orthodontic treatment. With the periodontal health restored and stabilized, the orthodontic treatment was completed without further complications, achieving the desired alignment of the teeth.

This case highlights the importance of addressing both immediate and long-term periodontal concerns in patients undergoing orthodontic treatment. The timely intervention, thorough post-operative care, and regular follow-up visits were crucial to the successful outcome of this complex case. The patient's compliance with treatment recommendations and the coordinated efforts of the orthodontic and periodontal teams were key factors in achieving a favorable result.



Figure 1: Initial radiograph taken at the start of orthodontic treatment, showing the decision to extract all first premolars including tooth 34 as part of the treatment plan



Figure 2: Radiograph taken approximately 1 year and 8 months after the start of orthodontic treatment, revealing the presence of the missing orthodontic bracket lodged between the teeth 33 and 35



Figure 3: Periapical radiograph showing the orthodontic bracket lodged between teeth 33 and 35

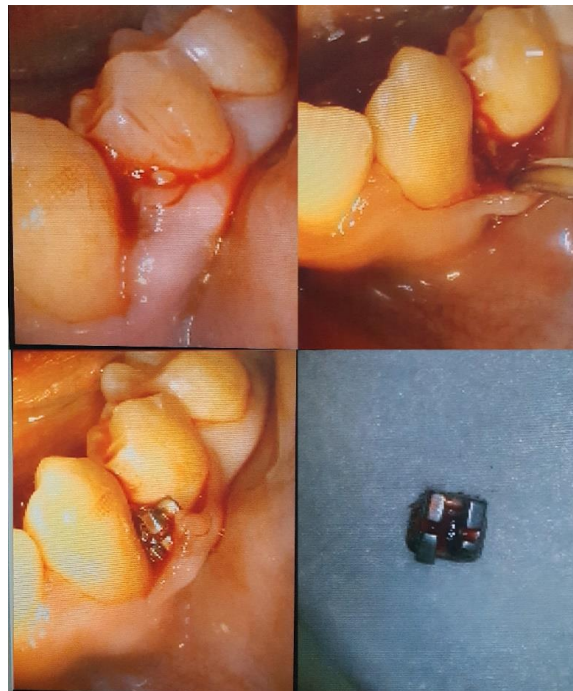
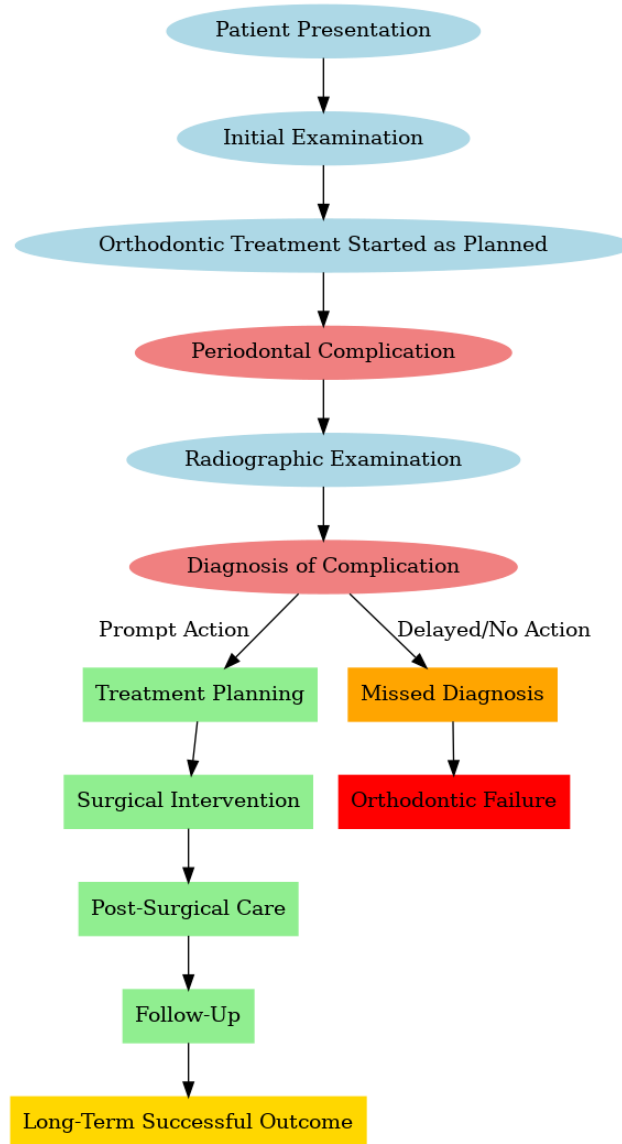


Figure 4: Intraoral operative images showing the periodontal procedure to extract the lodged orthodontic bracket



Figure 5: Patient's OPG taken two years after periodontal surgery and orthodontic debonding. The X-ray shows restored bone levels with no further bone loss between teeth 35 and 33



Flow chart

DISCUSSION

The present case of the accidental lodgment of an orthodontic bracket into an extraction site represents a rare but significant complication that can disrupt orthodontic treatment and cause localized periodontal damage, including bone loss. This case highlights the complexity of providing orthodontic care, particularly when it involves managing patients with extraction-based treatment plans. The presence of potentially severe complications, such as the one presented here, underscores the need for meticulous monitoring of overall treatment progress and timely intervention when necessary. This case specifically illustrates how orthodontic appliances, such as brackets, can accidentally become dislodged and fall into extraction sites, leading to complications over time.

One of the critical challenges in orthodontic treatment is the sensitivity to potential complications,

especially in cases involving extractions. In this case, the orthodontic bracket did not migrate independently but rather accidentally fell into the extraction site post-extraction. Over time, the bracket became embedded in the healing tissue, leading to a cascade of periodontal issues, including localized inflammation and vertical bone loss. The concurrent migration of soft tissue around the orthodontic bracket exacerbated the periodontal condition, highlighting the unique challenge presented by this foreign body within the extraction site.

The necessity of regular monitoring during orthodontic treatment cannot be overstated, particularly in cases involving extractions. The failure of space closure between teeth 33 and 35, which was noted during follow-up visits, was a clear indication that the expected healing processes were not occurring as anticipated. This prompted further investigation through radiographic examination, which revealed the presence of the lodged

bracket and the associated periodontal damage. Without the use of radiographic imaging, this complication might have gone undetected, potentially leading to further damage to the periodontium, including the destruction of additional alveolar bone and compromised orthodontic outcomes.

Once the complication was identified, a coordinated periodontal intervention was crucial to manage the situation and preserve the alveolar bone. The interdisciplinary approach between the orthodontist and the periodontist was essential in developing a treatment plan that addressed both the mechanical disruption caused by the foreign body and the biological needs for periodontal healing. The removal of the bracket was a necessary step to prevent permanent periodontal inflammation and further deterioration of the site. Clinical improvement was observed following thorough debridement and the application of local antibiotic therapy, which played a significant role in promoting successful bone regeneration. In this case, Dentomycin Periodontal Gel, containing Minocycline HCL, was used to provide localized antibiotic therapy. This approach aligns with existing literature that supports the use of local antibiotics in reducing bacterial load and effectively treating periodontal infections.

The decision to use Dentomycin (Minocycline HCL) as a local delivery antibiotic was based on several key factors:

1. **Targeted Antibacterial Action:** Minocycline is a broad-spectrum tetracycline antibiotic that is highly effective against the bacterial species commonly associated with periodontal infections, such as *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans*. Its targeted action makes it particularly suitable for treating localized periodontal issues.
2. **Sustained Release Mechanism:** Dentomycin allows for the sustained release of minocycline directly at the site of infection. This ensures a consistent therapeutic level of the antibiotic over an extended period, which is critical for effective management of periodontal pockets and for promoting optimal healing conditions.
3. **Minimized Systemic Exposure:** By applying the antibiotic locally, systemic exposure is minimized. This approach reduces the risk of systemic side effects and helps prevent the development of antibiotic resistance, which is particularly important in the context of chronic periodontal disease management.
4. **Promotion of Healing:** Minocycline has demonstrated efficacy not only in reducing bacterial load but also in mitigating inflammation and promoting the healing of periodontal tissues. This dual benefit made it an excellent choice for addressing the complications observed in this case.

5. **Proven Clinical Efficacy:** Minocycline, particularly in the form of Dentomycin, has a well-documented history of successful outcomes in clinical trials for the treatment of periodontal diseases. Its effectiveness in reducing pocket depth, controlling infection, and improving overall periodontal health has been consistently supported by clinical evidence, making it a reliable choice over other local delivery antibiotics.

Several key factors contributed to the successful outcome of this case: early detection, immediate intervention, and adequate periodontal management. The early detection of the complication was possible due to the careful monitoring of the patient's orthodontic progress. The timely removal of the foreign body, coupled with targeted periodontal management, ensured that the infection was controlled, and that healing could proceed without further complications. The combination of localized antibiotic therapy with surgical intervention was instrumental in addressing the periodontal issues and facilitating bone regeneration.

A critical aspect of this case was the interdisciplinary collaboration between the orthodontist and the periodontist [13]. The combination of an orthodontic appliance and a periodontal foreign body presents a significant risk of infection and potential complications if not managed appropriately. The joint efforts of these specialists ensured that the problem was addressed holistically, with both the mechanical removal of the foreign body and the protection of periodontal tissues being prioritized. This collaboration not only led to the successful management of the immediate complication but also ensured that the patient's periodontal health was maintained throughout the continuation of orthodontic treatment.

This case also underscores the importance of patient education and informed consent in the treatment process. The patient and his parents were thoroughly informed about the nature of the complication, the proposed treatment plan, and the associated risks and benefits. This level of communication was crucial in securing the patient's cooperation and ensuring that the treatment recommendations were followed correctly [14]. Detailed postoperative care instructions were provided, and the patient's adherence to these instructions contributed to the successful outcome of the case. The case demonstrates that patient education and postoperative care are essential components of effective orthodontic and periodontal management [15].

CONCLUSION

This case study illustrates that even highly unusual complications associated with orthodontic care can be effectively managed through prompt recognition, regular monitoring, and coordinated interdisciplinary care. The recovery in this case serves as a reminder to

orthodontists of the importance of vigilance in monitoring patient responses to treatment, both expected and unexpected. The case also highlights the paramount importance of maintaining periodontal health to achieve successful orthodontic outcomes. Additionally, it shows that with proper medical intervention and care, even significant bone tissue loss can be addressed and potentially regenerated, leading to favorable long-term results.

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