

CASE SERIES



Management of reactive tissue overgrowth due to the placement of orthodontic miniscrew implant: A case series

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Abstract

Miniscrews have been introduced in orthodontic treatment planning for the correction of severe dental and skeletal discrepancies by predictable anchorage control. However, as with other techniques, case selection should be based on thorough evaluation of the patient by factoring in several variables during miniscrew placement. This paper presents three cases of reactive overgrowth associated with miniscrew placement and the subsequent treatment protocol.

Introduction

Adequate anchorage for orthodontic treatment and dentofacial orthopedics is a challenge. Patient compliance and maximizing anchorage have been the reason for the development of various reinforcing anchorage techniques.^[1] Orthodontic treatment modalities that increase anchorage and reduce patient discomfort have led to the development of implant-assisted orthodontics based on miniscrew implants that provide precise and reliable skeletal anchorage.^[2]

Nowadays, miniscrew implants are being used commonly by practitioners as temporary anchorage device because of its advantage of low cost and simple placement and removal. As the implants are small, this convenient size allows them to be placed in many osseous regions, including the interdental areas. However, proper protocol needs to be followed during miniscrew placement to ensure osseointegration and prevent complications or failure.^[3]

The key criterion for stability of mini-implants is the quality and quantity of bone in the area as it affects the long-term stability and anchorage of the implant. As the implants are small, the thickness of the cortical bone plays a decisive role in the success of miniscrew implants. Insufficient or thin cortical plates cause inadequate primary stability and often lead to failure of stationary anchorage.^[4]

Miniscrew implants though widely used as a skeletal anchorage tool can cause soft-tissue morbidity leading to patient discomfort. Improper oral hygiene measures taken by the patient, improper implant placement, trauma to the soft tissues, and anatomical position of the placement are some of the reasons that can cause soft-tissue changes such as gingival overgrowth and pyogenic granuloma.

Pyogenic granuloma, a non-infectious inflammatory hyperplasia of the oral cavity, occurs as a response to local trauma or irritation, iatrogenic, and hormonal factors. Due to its affinity to estrogen and progesterone, it has a high incidence in young females, especially in the second decade.^[5] The clinical presentation of PG is as a smooth or lobulated overgrowth which is relatively painless.^[6] It is a vascular structure and is classified as a hemorrhagic lesion with a color range from pink to dark red. It bleeds easily when palpated and may have a pseudomembrane and secondary ulcerations.^[7]

Miniscrews when placed in the alveolar mucosa may cause soft-tissue overgrowth due to the irritation caused by the movement of loose alveolar tissue that can cover the head and attachments, that is, coil spring, elastic chain of the miniscrew implant in a day, or couple of days after placing the implant.^[8] It can be minimized by placing an elastic separator, wax pellet, or a healing abutment cap.^[9] Chemical agents in the form of

mouthwashes like chlorhexidine may also help in reducing overgrowth by their anti-inflammatory, antibacterial, and the ability to slow down epithelialization.^[10]

This paper highlights a few rare cases of pyogenic granuloma and soft-tissue overgrowth associated with faulty placement of orthodontic miniscrew implant placement and their treatment.

Case 1

An 18-year-old female patient undergoing orthodontic treatment reported to the department of periodontology with a complaint of swelling and pain in upper right cheek region of face extraorally. Pain was dull, intermittent, and radiating to the forehead and neck region. Intraoral examination revealed a reddish overgrowth involving the attached gingiva near the mucogingival junction in relation to maxillary right 1st and 2nd premolars.

The swelling was reddish-pink with areas of ulceration, roughly ovoid in shape, soft on palpation with bleeding on manipulation. It extended apically up to base of buccovestibular region and coronally it covered most of the crown of upper right first molar. Based on these observations, a provisional diagnosis of pyogenic granuloma was made. On consultation with the orthodontic department, it was found that miniscrew was implanted in the region for retraction, as per the anchorage requirements. A 1.3 × 9 mm stainless steel size miniscrew was used.

Radiographic findings did not show alveolar bone loss which distinguished it from peripheral giant cell granuloma which radiographically shows underlying alveolar bone loss [Figure 1a].

Accordingly, in the first visit, thorough scaling and root planing were performed, blood investigations were carried out which revealed all values within the normal limits. The patient was recalled after 2 weeks for excisional biopsy. After administering local anesthesia, the lesion was excised with diode laser at wavelength 980 nm and 2 watts power in a continuous wave mode [Figure 1b]. The specimen was sent for histopathological analysis [Figure 1c].

Post-surgical antibiotic (amoxicillin 500 mg thrice daily for 5 days) and analgesic (ibuprofen with paracetamol), thrice daily for 3 days and chlorhexidine mouthwash were prescribed. The patient was reviewed after 1 week during which a healthy tissue with no signs of inflammation was observed and the patient did not report any discomfort [Figure 1d]. The patients were asked to continue the chlorhexidine mouthwash for another week. The patient was followed up over a period of 1 month and the healing was found be satisfactory [Figure 1e].

Histopathological examination

On histopathological examination, the H and E stained tissue section showed a parakeratinized stratified squamous epithelium associated with fibrovascular connective tissue. The overlying epithelium was of variable thickness and detached from the underlying connective tissue at intervals. The connective

tissue exhibited blood capillaries lined with endothelial cells and numerous inflammatory cells mainly microphages such as neutrophils, lymphocytes, and plasma cells [Figure 1f].

Case 2

A 23-year-old female patient reported to the department of periodontology. The patient complained of swelling of the upper left back region of the mouth. The patient had noticed the swelling 10 days prior and reported that it has been increasing in size since then. He also complained of bleeding from the gums while brushing [Figure 2a]. The patient revealed that he had undergone orthodontic treatment which was initiated 1 year prior. There was no other relevant medical, dental, or family history. Intraoral examination revealed a reddish overgrowth involving the attached gingiva near the mucogingival junction in relation to maxillary left 2nd premolar and 1st molar. The swelling was reddish-pink with areas of ulceration, roughly ovoid in shape, soft on palpation with bleeding on manipulation. It extended apically up to base of buccal vestibular region and coronally it covered most of the crown of upper right first molar. On consulting with orthodontic department, it was found that miniscrew was placed 15 days before which was used for retraction, as per the anchorage requirements.

Radiographic findings revealed that miniscrew was placed too apically and close to root of tooth #26, radiograph also revealed no signs of bone loss. It was possible that the miniscrew was placed in the alveolar mucosa, which is not the actual position

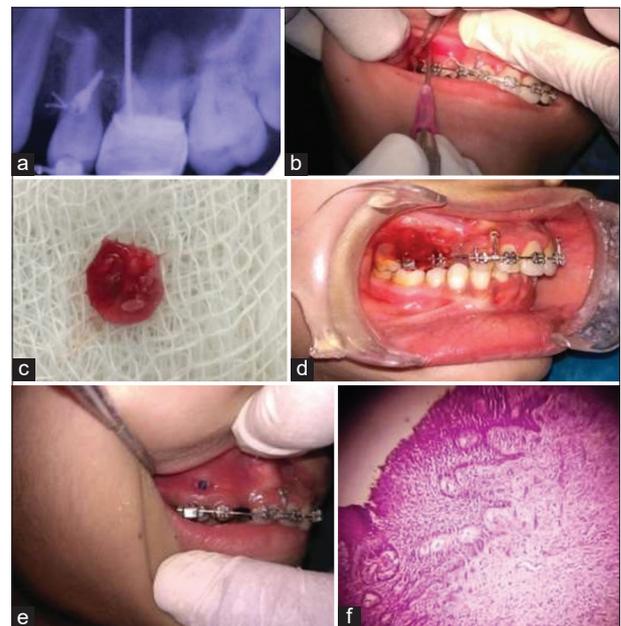


Figure 1: (a) IOPA radiograph showing miniscrew and alveolar bone, (b) lesion excised using diode laser, (c) excised tissue, (d) post-operative after 1 week, (e) post-operative after 1 month, (f) H and E stained tissue section

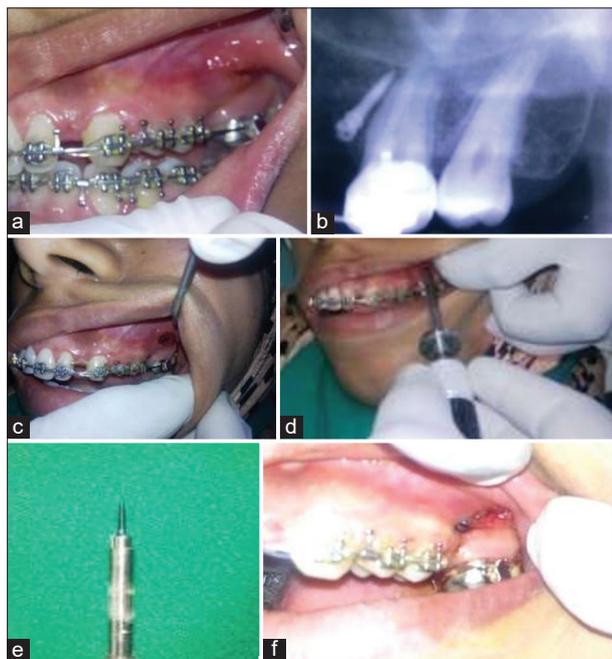


Figure 2: (a) Pre-operative showing lesion, (b) IOPA radiograph showing placement of miniscrew, (c) surgical exposure of miniscrew, (d) surgical exposure of miniscrew, (e) removal of the orthodontic miniscrew, (f) replacement of miniscrew

of miniscrew placement and may be the cause for gingival overgrowth around the miniscrew head [Figure 2b].

Accordingly, in the first visit, thorough scaling and root planning were performed, blood investigations were carried out which revealed all values within the normal limits. The patient was recalled after 3 days and surgical exposure of miniscrew was performed under local anesthesia by removing tissue overgrowth around the head of miniscrew with Bard Parks handle and 15 no. blades [Figure 2c and d]. Exposed screw was found to be placed in the alveolar mucosa which was impinging in buccal sulcus area of 26 regions. It was removed [Figure 2e], and with the consultation of the orthodontic department, the position of the miniscrew was changed from alveolar mucosa to attached gingiva [Figure 2f].

Case 3

Similarly as case report 2, this case of a 19-year-old female patient reported to the department of periodontology. The patient complained of swelling of the upper left back region of gums. The patient had noticed the swelling just couple of days after placement of miniscrew. Intraoral examination revealed a reddish overgrowth submerging head of miniscrew (1.6×8 mm size) and partial coil spring (American orthodontics closed space coil spring of 150 gm) with the presence of debris all around, involving the attached gingiva near the mucogingival junction in relation to maxillary left 2nd premolar and 1st molar. Cause of the swelling again may be the because of wrong placement

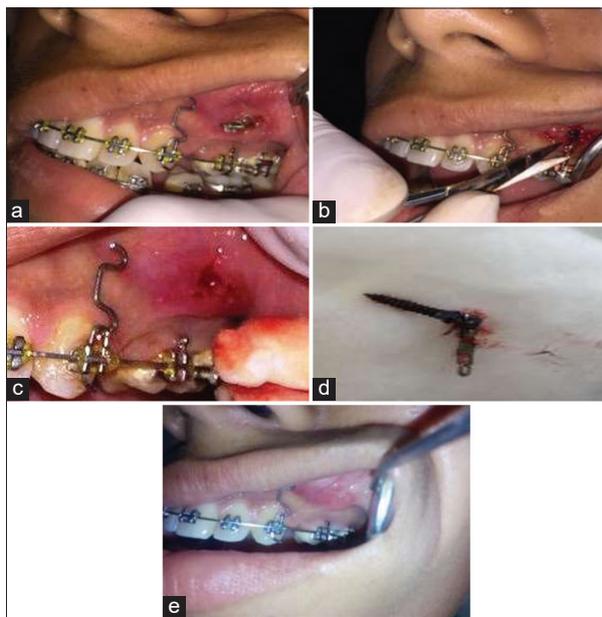


Figure 3: (a) Pre-operative showing lesion, (b) surgical excision, (c) post-operative, (d) removal of the miniscrew, (e) post-operative after 1 week

of miniscrew in alveolar mucosa. Then, under local anesthesia, surgically exposure of miniscrew head was performed followed by retrieval of miniscrew and coil spring. Appreciating result can be seen after 1 week follow-up [Figure 3a-e].

Discussion

This case series presents a complication of inter-radicular orthodontic miniscrew placement that resulted in a reactive pyogenic and tissue over growth of the surrounding tissue around the miniscrew head or called as peri-implant mucositis. Although miniscrews have been reported to have a success rate of 83.3%, there is still a one in five chance of failure using miniscrew implants for orthodontic anchorage. Placement of miniscrews is associated with risk of root injury or periodontal ligament injury, leading to loss of tooth vitality, osteosclerosis, ankylosis, or pyogenic growth, which can happen during insertion of the miniscrew, after orthodontic loading, or during removal of the screw. Fracture of the miniscrew is the most undesirable side effect that can occur during placement and removal.

Although injuries to soft tissues are temporary in nature in most cases, trauma to hard tissues is more often irreversible, thereby requiring special care to prevent such situations. Pain and discomfort after miniscrew insertion and root resorption due to tooth movement to a bone deficient area are drawbacks in implant-anchored orthodontics.

Careful assessment of the patient suitability for miniscrew placement is crucial to avoid any complications. A thorough evaluation including past dental records, medical history, and proper soft-tissue assessment is vital during treatment planning.

Certain categories of patients such as heavy smokers and individuals with bone metabolic disorders are contraindicated for this therapy.^[9] In addition, optimal oral hygiene is imperative to maintain the health of soft tissue surrounding the implant. Chlorhexidine mouth rinses (0.12%) can be prescribed to be used 2 times a day and after meals which could help in maintaining soft-tissue integrity.^[10]

Conclusion

Bone density and health of the soft tissues have a direct effect on implant stability. Proper home care by the patient after implant placement is equally important as the proper placement of the same by the orthodontist. Soft-tissue lesions if formed can be treated by various methods including laser applications, surgical excision, cryotherapy, electrocauterization, and steroid injections. Care should be taken to provide adequate keratinized soft tissue before placement of the implant as the first step to prevent such reactive lesions. Maximum effort should, therefore, be made to simplify the surgical procedure before modifying the mechanics.

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