



RESEARCH ARTICLE

INTEGRATION OF PERIODONTAL THERAPY TO CORRECT OCCLUSAL DISHARMONY: A CASE SERIES OF INTERDISCIPLINARY APPROACH

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ABSTRACT

A multidisciplinary approach is often necessary to treat dental problems in patients. Periodontics and Orthodontics are interrelated in variety of situations. A variety of periodontal procedures can be performed which are beneficial for orthodontic outcome. An impacted maxillary anterior tooth, particularly the canine, is a common problem. Unerupted teeth were usually scheduled to be extracted in the past, nowadays can be saved and take their place in the dental arch. A 20-years-old female Patient with impacted canine was treated with surgical exposure to form well- aligned dental arch. Selective alveolar corticotomy is defined as an intentional injury to cortical bone. A 25-years-old male patient was treated with corticotomy for the space closure between maxillary left canine and premolar. This technique is an effective means of accelerating orthodontic tooth movement. Thus, there are many benefits to integrating orthodontics and periodontics in management of patients for accelerating tooth movement.

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INTRODUCTION

Periodontics is not practiced in isolation, as frequently many patients have multiple dental needs or medical health issues that require management. Interdisciplinary periodontics comprises of the interactions and interrelationship between periodontal tissues/periodontal diseases and endodontics, fixed prosthodontics, implant dentistry, esthetics, orthodontics, pediatric dentistry, oral and maxillofacial surgery, oral pathology, special needs dentistry and general medicine (Lyons *et al.*, 2017). The most commonly rendered interdisciplinary approach is periodontics and endodontics, periodontics and prosthodontics. The objective of orthodontic therapy is to form a good occlusion relationship, improving the health of the periodontium, and enhance dental and facial esthetics. Periodontal health is an important factor in successful orthodontic tooth movement. Moreover various adjunctive periodontal procedures are needed to enhance the outcome of orthodontic treatment. Different periodontal surgeries associated with orthodontic therapy are: circumferential supracrestal fiberotomy, frenectomy, removal

of gingival invaginations (clefts), gingivectomy, surgical exposure of unerupted tooth, corticotomy, alveolar ridge augmentation, mucogingival surgery. An impacted tooth is defined as a tooth that fails to erupt into its functional position. The canine tooth is one of the most commonly impacted teeth. The permanent canine teeth play a fundamental role in a functional occlusion and a balanced smile. Canines also provide a major support for the cheeks. Canine impaction is associated with increased risk of infection and cyst formation. Also, the long-term prognosis of adjacent lateral incisors may be compromised. The prevalence of maxillary canine impaction ranges from 0.8 to 2.8% (Dachi *et al.*, 1961). Female have higher prevalence of maxillary canine impaction with a female/male ratio of 2.3:1 to 3:1. Some common local causes include one or a combination of the following: (1) overlying cysts or tumors, (2) supernumerary teeth, (3) loss of arch space, (4) over-retained primary teeth, (5) ankylosis, (6) root dilacerations, (7) trauma, (8) reconstructive surgery for cleft lip/palate repair, (9) thickened overlying bone or soft tissue, (10) missing adjacent lateral incisor, or (11) idiopathic. Alveolar corticotomies (ACS) are defined as a surgical intervention limited to the cortical portion of the alveolar bone. It was first introduced in 1959 by Kole as a mean for rapid

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tooth movement (Köle *et al.*, 1959). Wilcko *et al* mentioned, in cases of rapid orthodontics with corticotomies, that corticotomies could increase tooth movement by increasing bone turnover and decreasing bone density (Wilcko *et al.*, 2008). It was believed that the main resistance to tooth movement was the cortical plates of bone and by disrupting its continuity, orthodontics could be completed in much less time than normally expected (Fournier *et al.*, 1982). The indications for the use of Alveolar corticotomy in orthodontics have been grouped into three main categories: (1) to accelerate corrective orthodontic treatment, as a whole, (2) to facilitate the implementation of mechanically challenging orthodontic movements, and (3) to enhance the correction of moderate to severe skeletal malocclusions. Here, we are presenting two cases of surgical exposure of canine and corticotomy in patients undergoing orthodontic treatment to establish normal occlusion for esthetic purpose and maintainable oral hygiene.

CASE 1 (surgical exposure of canine)

A 20 year old female patient residing in Vadodara reported to Manubhai Patel dental college for orthodontic treatment. Patient was referred from the department of orthodontics to department of periodontology for surgical exposure of maxillary left canine. On clinical examination, maxillary left canine was impacted and spacing was present between maxillary left lateral incisor and second premolar (Figure 1A). All the four first premolars were extracted for orthodontic intervention. Panoramic image and intraoral periapical radiograph was taken which showed impacted maxillary left canine.

Surgical procedure: Local anesthesia was given. In this case full flap open procedure was planned. Mid crestal incision was given using number 15 blade and a full thickness mucoperiosteal flap was raised from maxillary left lateral incisor to 2nd premolar. On flap elevation only cusp tip of canine was visible and rest of crown was covered by alveolar bone. 5mm of ostectomy was done using micromotor and straight fissure, round bur with copious saline irrigation (Figure 1B,C). Traction button was bonded on midbuccal of canine, at the same time a ligature wire was placed on central incisor and canine with mild forces for the extrusion of canine, thus minimizing the number of appointment. Flap was stabilized using 4-0 silk suture (Figure 1D). Post operatively patient was prescribed analgesic (aceclofenac 100mg+ paracetamol 325mg) twice daily for 3 days. Patient was given oral hygiene instructions that included chlorhexidine mouthrinse for seven days, but was asked to restrain from brushing at the surgical site. One week later, sutures were removed. The patient was followed up by orthodontist to bring canine into proper occlusion. After six months canine was in normal arch form (Figure 1E).

CASE 2 (Alveolar corticotomy)

A 25 year old male patient residing in Vadodara was undergoing orthodontic treatment in the department of orthodontics for malocclusion. After failed attempt of space closure between maxillary right canine and second premolar, Periodontally Accelerated Osteogenic Orthodontics (PAOO) was planned in this case. The patient was then referred to department of periodontology for the procedure. On clinical examination, 4 mm spacing was present between maxillary canine and second premolar bilaterally due to extraction of

first premolars (Figure 2A). All four first premolars were extracted for orthodontic purpose.



Figure 1A. Preoperative picture

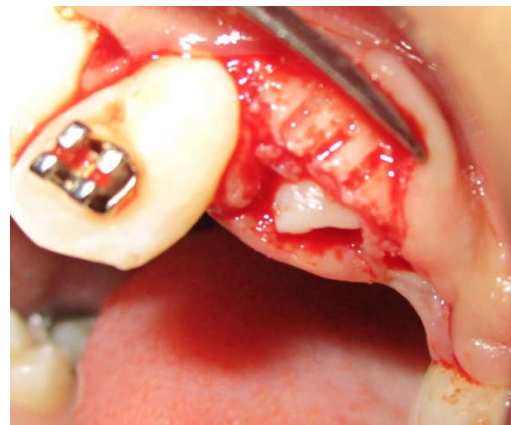


Figure 1B. Vertical Grooving of overlying bone after flap reflection

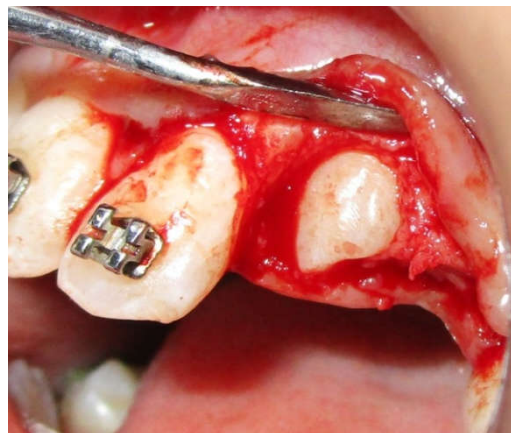


Figure 1C. Exposure of canine



Figure 1D. Traction button was placed and sutures were taken



Figure 1E. 6 month follow up



Figure 2D. Sutures were taken

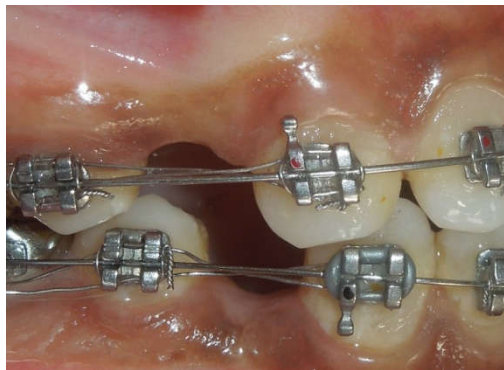


Figure 2A. Preoperative picture

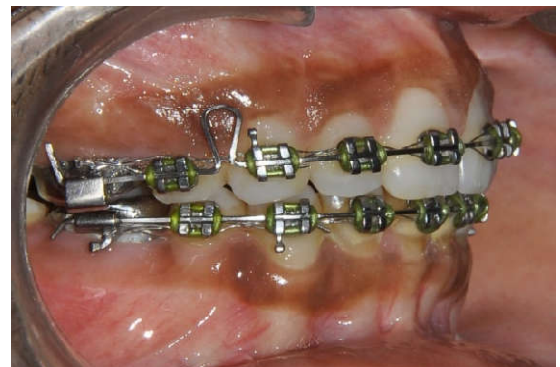


Figure 2E. 3 month follow up

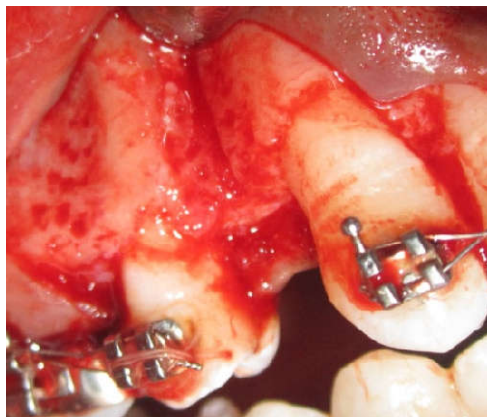


Figure 2B. Vertical groove and multiple perforations were made after flap reflection

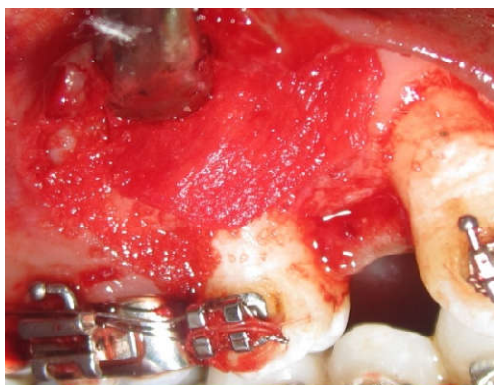


Figure 2C. Bone graft and bioresorbable membrane was placed

Surgical procedure: After administration of local anesthesia, vertical releasing incisions were placed extending from mesial of maxillary right canine to distal of 2nd premolar beyond the mucogingival junction (MGJ).

The 2 vertical incisions were connected horizontal intracrevicular incisions given by number 15 blade. Full thickness mucoperiosteal flap was reflected beyond the MGJ. Using micromotor and straight fissure bur with continuous saline irrigation, a vertical groove was made in interdental area of maxillary right canine and 2nd premolar following the root contour as determined radiographically, so as to not cause an injury to the roots. Cut should reach to the medullary bone, we can know that we have reached the medullary bone when we see bleeding from bone during cutting. The width of the cut is 0.5 to 1mm. In addition, small multiple perforations were created on cortical bone adjacent to vertical groove (Figure 2B). Bone graft and bioresorbable membrane was placed (Figure 2C). Flap was approximated using 4-0 silk suture (Figure 2D). Post operatively patient was prescribed analgesic (aceclofenac 100mg+paracetamol 325mg) twice daily for 3 days. One week later sutures were removed. 1 Week postoperatively orthodontic forces were resumed for the closure of space between canine and 2nd premolar. Three months follow up showed complete closure of space between maxillary canine and second premolar bilaterally (Figure 2E).

DISCUSSION

Fournier and colleagues suggested that a labially impacted tooth in a favorable vertical position should be surgically exposed without the application of orthodontic traction in a young patient, whereas immediate traction is almost always needed in an adult patient (Fournier *et al.*, 1982). Other authors have stated similar opinions regarding palatally impacted canines (Burden *et al.*, 1999); in particular, Schmidt and Kokich observed that surgical exposure and free eruption are preferable to closed exposure and early traction (Schmidt *et al.*, 2007). Several authors agreed to the fact that a lack of attached gingiva around the erupting canine can lead to inflammation and serious periodontal consequences during orthodontic traction. For this reason, many prefer to close the

flap in its original position after exposure of the tooth and attachment of a traction button, thereby ensuring adequate gingival tissue around the canine. Other clinicians prefer to perform a partial-thickness flap and to reposition it apically so as to cover the cemento-enamel junction and 2-3mm of the crown, thus preventing marginal bone loss and gingival recession (Vanarsdall *et al.*, 1977). A study by Lang and Loe demonstrated that although tooth surfaces may be kept free of clinically detectable plaque, areas with less than two millimeters of keratinized gingiva tend to remain inflamed (Lang *et al.*, 1972). Therefore, the gingival integrity is preserved by a band of keratinized tissue. In our case too, we have preserved the keratinized tissue yet, exposed the canine for extrusion. Reduction of orthodontic treatment time is considered an important goal in the management of malocclusions in adult patients. Corticotomy facilitated orthodontic treatment has been found useful in reducing treatment time and allowing for conventional orthodontic measures treating adult patients with severe malocclusion. Corticotomy procedure can accelerate the rate of orthodontic tooth movement about two times faster than conventional orthodontics. Extrapolation of the results from the present case helps to explain how selective decortication facilitates clinical orthodontic treatment in adult patient, when applied in conjunction with tooth movement. The osteotomy restricted to the cortical layer minimizes the injury of the vital structures. Kole showed the importance of preserving an intact spongiosa using this technique, while a total alveolar osteotomy may impair the intraosseous and intrapulpal blood circulation (Kole *et al.*, 1959) (Bell *et al.*, 1969). The histological study conducted by Sebaoun *et al.* showed that selective decortication injury provided an overwhelming activation stimulus for the catabolic resorption response and the anabolic formation response (Bell *et al.*, 1969). Another key finding of the same study was that increased bone metabolism was localized to the area immediately adjacent to the injury, which supports the suggestion that regional acceleratory phenomenon (RAP) is responsible for the observed tissue response to selective alveolar decortications (Sebaoun *et al.*, 2008). This procedure should be avoided on any patients having any form of periodontal pathology or deformity that compromises the periodontal health.

Conclusion

Certain adjunctive periodontal procedures may help an orthodontist achieve more stable and esthetically acceptable results. Impacted permanent canines pose a functional as well as an esthetic concern in the patients.

Correction of deeply impacted canines in patient was always a challenge for an orthodontist. Corticotomy accelerates the rate of orthodontic tooth movement about two fold faster than conventional orthodontics, thus decreasing the duration of orthodontic treatment.

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