Lingual Orthodontics: Accelerated Realignment of the "Social Six" with Piezocision™

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Abstract: Despite the growing number of adults interested in improving their smiles through orthodontic treatment, the visual impact and the duration of the treatment itself are frequently obstacles to patient acceptance. A treatment that is fast and less visible is a desirable option that adult patients often request of their orthodontists. Presented in this case report, which involves a young woman who wanted treatment completed in a limited amount of time, is a new application of a minimally invasive surgical approach to accelerate orthodontic movement combined with a simplified 2-dimensional lingual orthodontic treatment to resolve mild crowding in the anterior region, otherwise known as the "social six."

A variety of orthodontic techniques have been developed to meet the demand for improved smiles among adults for whom the appearance and duration of traditional orthodontic treatment are obstacles to acceptance. Such techniques include the application of lingual brackets[1] and the use of clear aligners.[2] Some surgical techniques to accelerate orthodontic tooth movement have been introduced as well.[3-7] Recently, the minimally invasive technique Piezocision™, which is aimed at significantly reducing orthodontic treatment time, was introduced.[8] Due to its minimal surgical impact, this technique, which consists of small, precise corticotomies done through small incisions of the soft tissues without flap reflection, is more readily acceptable to both patients and orthodontists than traditional methods.[8]

The current surgical approach to accelerate orthodontic movement is based on the work of Wilcko et al[6] and has its foundations in the regional acceleratory phenomenon (RAP) described by Frost in 1983.[9,10] According to this theory, after a surgical insult, the bone tissue reacts with a rapid, transient, localized osteopenia, a phenomenon in which there is no loss of bone volume but there is a decrease in bone density. Clinically, the bone becomes more "malleable," and, therefore, the teeth can be moved more quickly.[6] The Periodontally Accelerated Osteogenic Orthodontic (PAOO™) technique of the Wilckos[6] requires large vestibular and lingual gingival flaps to expose the underlying alveolar bone and create extensive bone decortications. Although highly effective, this technique is very invasive and traumatic in nature and has, therefore, been met with resistance by patients and orthodontists.

The Piezocision technique, proposed by Dibart et al[8] for its ease of use and minimal surgical trauma, is a newer procedure. It may be particularly indicated in those cases in which the orthodontic movement is aimed at resolving problems of crowding and/or misalignment in the anterior region, ie, the so-called "social six."

In this article, the authors present the application of the Piezocision technique in the resolution of mild crowding in the social six, with a simplified 2-dimensional lingual orthodontic treatment.[11] While this case report demonstrates this fast and invisible approach to solving a case of anterior crowding for purely esthetic reasons, the goal was not to treat the orthodontic malocclusion in its entirety, but just realign the anterior upper teeth to the cosmetic satisfaction of the patient in a rapid and minimally traumatic manner.

Fig 1. Patient presented with very mild crowding and central incisors overlapping in the upper anterior sextant.

Clinical Presentation

The patient, a healthy 21-year-old woman who was dissatisfied with her smile, presented with a slight crowding of the anterior superior teeth and overlapping central incisors (Figure 1). This college student on summer break wanted to resolve this rather mild esthetic problem before returning to college in the fall. The medical/dental history and intraoral examination found no medical contraindication to treatment. The periodontium was healthy, with no recession or bone resorption, as confirmed by interproximal radiography.

Various treatment modalities were proposed to the patient, including porcelain veneers and conventional orthodontic movement. Also, in an effort to accelerate the treatment, a lingual approach was proposed, combined with the minimally invasive Piezocision technique, which, as noted above, consists of small corticotomies done through vertical incisions of the soft tissues without the reflection of a flap. Considering the relatively short amount of time available, the patient opted for the latter solution.

Case Management

The 2-dimensional lingual brackets were applied from premolar to premolar with indirect technique. A slight interproximal reduction of the upper front teeth was performed, and a lingual 0.014 nickel titanium (NiTi) arch was placed (Figure 2). In the same session, the Piezocision technique as described by Dibart et al[8] was performed. After achieving anesthesia through local infiltration, vertical full-thickness incisions were made mid-root level, interproximally between each tooth from the upper right first premolar to the upper left first premolar (Figure 3). The localized bone decortications were done through the vertical gingival opening with a piezoelectric knife to a depth of 3 mm (Figure 4). Grafting of the area was not performed because a preoperative cone-beam computed tomography (CT) examination showed no presence of bony fenestrations, dehiscences, or thin buccal walls. Incisions were closed with single, interrupted resorbable sutures, and the patient was discharged.

Patient instructions included a postoperative pain medication (naproxen sodium 550 mg b.i.d.) as needed and rinsing with chlorhexidine gluconate 0.2% from the day following the intervention for 1 week. Antibiotic coverage was not prescribed.[12]

Clinical Outcomes

At the 7-day follow-up visit, the patient reported a normal course, with no pain, discomfort, or swelling (Figure 5). At the 18-day follow-up, the crowding was almost completely resolved (Figure 6). The orthodontic appliance was maintained for stabilization. The patient left for a vacation and returned for the 30-day follow-up (Figure 7 and Figure 8). The crowding was completely resolved, the patient was de-bracketed, and a thermoformed contention was delivered.

When the patient was seen at 6 months post treatment, she was very satisfied with the esthetic result (Figure 9).

Discussion

Adult patients often want the benefit of orthodontic treatment without the traditional "downsides": visible braces and lengthy treatment. The development of clear aligners, esthetic brackets, and lingual orthodontics has made the appliances more acceptable to patients who might be self-conscious about their appearance. The use of segmental corticotomy (applied only to the teeth that have to move more than others) can dramatically change the


Fig 2.


Fig 3.


Fig 4.


Fig 5.


Fig 6.

Fig 2. After a light interproximal reduction (IPR), or stripping, a lingual 0.014 NiTi arch was applied. **Fig 3.** Following the Piezocision technique, vertical full-thickness incisions of the mucosa were performed in the interproximal areas from canine to canine. **Fig 4.** Corticotomies 2-mm to 3-mm-deep were performed through the incisions of the mucosa. **Fig 5.** At the 1-week follow-up, the vertical cuts in the mucosa were completely healed. **Fig 6.** At the 18-day follow-up, the crowding in the upper anterior sextant was almost completely resolved.

Fig 7.

Fig 8.

Fig 9.

Fig 7. After 12 more days of stabilization, at day 30, the crowding was completely resolved. **Fig 8.** Occlusal view just before debanding at 30-day follow-up. **Fig 9.** Patient 6 months post treatment.

relationship between groups of teeth[13,14] and make certain teeth move more quickly.

The case presented here illustrates how the judicious use of segmental Piezocision allows for rapid orthodontic tooth movement with cautious respect for periodontal tissues. This new treatment approach—which combines minimally invasive periodontal surgery, piezoelectric bone decortication, and lingual orthodontics—uses the natural response of the body to injury to achieve the desired orthodontic outcome. Because of the conservative surgical approach, this technique is well tolerated by the patient, making it a particularly useful limited orthodontic method using a simplified orthodontic technique[11] for the "social six."

Summary

This case report presented an innovative combination of a simplified lingual orthodontic approach and a minimally invasive surgical procedure to accelerate treatment. It demonstrated how the careful use of Piezocision and lingual orthodontics helped rapidly and successfully resolve a case of anterior crowding for purely esthetic reasons in a 21-year-old woman who desired treatment to be completed in a limited amount of time. The goal of the case was not to treat the orthodontic malocclusion in its entirety, but to simply realign the anterior upper teeth to the cosmetic satisfaction of the patient in a rapid and minimally traumatic manner.

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REFERENCES

1. Scuzzo G, Takemoto K, Takemoto Y, et al. A new lingual straight-wire technique. *J Clin Orthod*. 2010;44(2):114-123.
2. Joffe L. Invisalign: early experiences. *J Orthod*. 2003;30(4):348-352.
3. Köle H. Surgical operations on the alveolar ridge to correct occlusal abnormalities. *Oral Surg Oral Med Oral Pathol*. 1959;12(5):515-529.
4. Gantes B, Rathbun E, Anholm M. Effects on the periodontium following corticotomy-facilitated orthodontics. Case reports. *J Periodontol*. 1990;61(4):234-238.
5. Suya H. Corticotomy in orthodontics. In: Hösl E, Baldauf A, eds. *Mechanical and Biological Basics in Orthodontic Therapy.* Heidelberg, Denmark: Hütlig Buch; 1991:207-226.
6. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ. Rapid orthodontics with alveolar reshaping: two case reports of decrowding. *Int J Periodontics Restorative Dent*. 2001;21(1):9-19.
7. Hajji SS. *The influence of accelerated osteogenic response on mandibular decrowding* [thesis]. St. Louis, MO: St. Louis University; 2000.
8. Dibart S, Sebaoun JD, Surmenian J. Piezocision: a minimally invasive, periodontally accelerated orthodontic tooth movement procedure. *Compend Contin Educ Dent*. 2009;30(6):342-350.
9. Frost HM. The biology of fracture healing. An overview for clinicians. Part I. *Clin Orthop Relat Res*. 1989;248:283-293.
10. Frost HM. The biology of fracture healing. An overview for clinicians. Part II. *Clinic Orthop Relat Res*. 1989;248:294-309.
11. Franchi L, Giuntoli F, Fortini A, et al. A simplified lingual technique. *J Clin Orthod*. 2010;44(3):183-189.
12. Caiazzo A, Casavecchia P, Barone A, Brugnami F. A pilot study to determine the effectiveness of different amoxicillin regimens in implant surgery. *J Oral Implantol*. 2011;37(6):691-696.
13. Spena R, Caiazzo A, Gracco A, Siciliani G. The use of segmental corticotomy to enhance molar distalization. *J Clin Orthod*. 2007;41(11):693-699.
14. Brugnami F, Caiazzo A, Ferro R, Cortesi R. Il movimento Ortodontico Parodontalmente Accelerato. *Ortodonzia Clinica*. 2010;3:11-16.