An innovative approach for faster orthodontic tooth movement – A case report

Sourav Chandra¹, Mrudul Vaidya², B. S. Avinash¹, H. Jyothikiran², N. Raghunath²

¹Department of Periodontology, JSS Dental College and Hospital, JSS Academy of Higher Education and Research, Mysore, Karnataka, India, ²Department of Orthodontics and Dentofacial Orthopaedics, JSS Dental College and Hospital, JSS Academy of Higher Education and Research, Mysore, Karnataka, India

Abstract
Wilckodontics also known as Periodontally Accelerated Osteogenic Orthodontics (PAOO) is a technique used to reduce orthodontic treatment time and achieve faster tooth movement as compared with conventional orthodontics. This present case demonstrates the use of piezosurgery to facilitate rapid orthodontic tooth movement in relatively shorter treatment time. The total treatment time required to complete the orthodontic treatment was 13 months for this case.

Keywords: Accelerated orthodontics, periodontally accelerated osteogenic orthodontics, regional acceleratory phenomena, Wilckodontics

Introduction

• The benefits of orthodontic treatment often go beyond the obvious physical changes of an improved occlusion and aligned teeth. It is also a great way to improve a person’s overall self-image. With all of the recent advancements in orthodontics, wearing braces have never been easier. Today, many people receive orthodontic treatment, but a perplexing challenge that has not been completely disentangled in clinical orthodontics is prolonged treatment time (on average 2–3 years). Figuring out these challenges will dramatically improve the quality of orthodontic care.[1]

• At present, there is an increased tendency for the researchers to focus on accelerating methods for tooth movement due to the colossal demand by adults for a shorter orthodontic treatment time.[2] Methods to accelerate orthodontic tooth movement can be broadly studied under the following categories: Drugs, surgical methods, and physical/mechanical stimulation methods.[3]

• It has been proved that the surgical-assisted approaches are the most effective techniques compared to any other methods of acceleration of orthodontic tooth movement.[4] Various surgical approaches available in this field are corticotomy,[5,6] Wilckodontics,[7,8] and piezocision.[9]

Case Report

Diagnosis and treatment planning

• A 22-year-old male patient in the permanent dentition presented with the chief complaint of forwardly placed upper and lower front teeth. His medical history showed no allergies or any medical problems. No signs and symptoms of temporomandibular joint dysfunction were observed. The patient had dolichocephalic head, leptoprosopic facial form with a convex profile, and 7 mm of lip incompetency. The patient presented with Class I molar relation, Class I canine relation, and Class I incisor relation bilaterally. Cephalometric analysis revealed orthognathic maxilla and mandible with proclined upper and lower anterior teeth on skeletal Class I jaw bases with horizontal growth pattern. The patient was diagnosed as Angle’s Class I malocclusion with bidental protrusion on skeletal Class I jaw bases with horizontal growth pattern. The overjet was 5 mm and the overbite was 3 mm. Lower midline was shifted to the right side by 2 mm. Carey’s and arch perimeter analysis showed 3 mm of tooth material excess in maxillary arch and 2 mm of tooth material excess in lower arch.

• Treatment plan advised for the patient was extraction of 14, 24, 34, and 44 with maximum anchorage using fixed...
orthodontic treatment utilizing preadjusted edgewise appliance mechanotherapy with McLaughlin Bennet Trevisi (MBT) prescription followed by frenectomy with respect to high frenal attachments.

Treatment progress

- MBT appliance with 0.022 × 0.028” slot (Ormco, Glendora, CA, USA) was used.
- Alignment and leveling both dentitions were accomplished with following sequence of archwires in a time period of 5 months: 0.016” heat-activated nickel–titanium archwires, 0.016” stainless steel archwires, 0.016 × 0.022” heat-activated nickel–titanium archwires, 0.017 × 0.025” stainless steel archwires, and 0.019 × 0.025” stainless steel archwires. After alignment and leveling phase, the second phase of extraction space closure had to be started. At this stage, the patient demanded the treatment to get over faster than the expected treatment time of traditional approach. Hence, the patient was given an option of an additional procedure of Wilckodontics for the acceleration of orthodontic tooth movement. After explaining the procedure in detail, he agreed for the same with a view of faster orthodontic results without any complications [Figure 1].

Periodontally accelerated osteogenic orthodontics (PAOO)/ Wilckodontics procedure performed

- The area to be operated was anesthetized by local anesthesia (4% Articaine).
- Crevicular incision extending from mandibular left first molar to mandibular right first molar (36–46), with no vertical release to preserve the blood supply, was given.
- The envelope flap was reflected extending 4 mm beyond the root apex.
- The ultrasonic piezoelectric bone surgery unit (NSK Variosurg 3) was used to carry out corticotomy [Figure 2].
- Both the horizontal and vertical corticotomies were performed interdentally. Horizontal grooves with the depth of 1.5 mm into cortical bone and vertical depth grooves connecting horizontal groove in a “U”-shaped fashion 2 mm beyond the root apex were placed [Figure 3].
- At the 1st premolar extraction space, corticotomy followed by interdental depth grooves using piezo round burs to enhance regional acceleratory phenomena (RAP) was performed.
- At the end of the procedure, all the corticotomies were covered with a blend of autogenous bone harvest during corticotomies and demineralized freeze-dried bone allograft [Figure 4].
- The area was sutured using a resorbable 5-0 vicryl suture. An external ice pack on the first post-surgical day to minimize post-operative swelling was advised.
- Post-surgically, Ultracet-P (a combination of tramadol-opiate analgesic and paracetamol) was prescribed to control pain and inflammation. Non-steroidal anti-inflammatory drugs are not indicated as it inhibits prostaglandin synthesis which, in turn, slows down bone turnover rate.

- The same procedure was repeated in the maxillary arch after 15 days.
- The patient was recalled after 2 weeks. Orthodontic activation was carried out at every 2 weeks interval until the retraction was completed. The closure of extraction space was observed
in all the four quadrants after 4–5 months [Figure 5]. There were no complications such as root resorption, fenestration, and dehiscence observed radiographically. Finishing of the case was completed in another 3 months of time with 0.021 × 0.025 titanium–molybdenum alloy archwire followed by 0.021 × 0.025 braided NiTi in maxillary and mandibular arches with settling of the occlusion. The full treatment duration for this particular case was 13 months. The patient was happy with the overall treatment results as well as the time duration in which it had got completed.

Discussion

• The PAOO also termed as Wilckodontics involves full-thickness labial and lingual periosteal flap reflection accompanied by selective corticotomy in the interdental areas both labial and lingual. The corticotomy segment can be moved faster in one-third to one-fourth the time required for traditional orthodontics alone. This is a physiologic-based treatment consistent with RAP and maintaining an adequate blood supply is essential. PAOO is an effective treatment approach in adults to decrease treatment time and reduce the risk of root resorption. Selected corticotomy limited to the buccal and labial aspects also significantly reduces treatment time.[8]

• The use of conventional instruments such as chisel and mallet or surgical burs, microsaws with external irrigants, or trephine burs has long been used traditionally in performing corticotomy procedures. However, the major disadvantage is that the conventional instruments require greater exposure of the surgical site, greater frictional heat generated by motor-driven instruments which may also hinder the healing process, and finally difficult to control in areas which require precise cut and are densely mineralized.

• To overcome these disadvantages, the piezoelectric device (Piezosurgery®) has been introduced. Ultrasonic piezoelectric bone surgery works on microvibrations generated by the piezoelectric device can be used to give fine precise incisions required to give corticotomy cuts causing less discomfort to the patient when compared to traditional surgical instruments. The Piezosurgery® device is also very gentle on the hard tissues since it does not require the use of manual force, thus improving the handling with greater intraoperative control, particularly in anatomically difficult areas.[10]

• All the extraction spaces were closed in 4 months of time with the mean rate of 1.9 mm per month. Conventional technique would have taken 7–9 months of time for the closure of premolar extraction spaces with normal rate of 1–1.2 mm per month. The full treatment duration for this particular case was 13 months which is lesser than the minimum treatment time of 18–20 months for any orthodontic extraction case.

Conclusion

This case report shows that PAOO or Wilckodontics can be smartly and effectively used in contemporary orthodontic practice to meet the increased demand of shorter orthodontic treatment time. However, one must not fail to realize that we are dealing with a biologic system and that each individual responds in a variable fashion, regardless of the type, and technique being used. In essence, the body and how it responds to orthodontic or any external manipulation still governs overall treatment time.

References