Acceleration of Orthodontic Tooth Movement - Department of Orthodontics and Head of Orthodontics – Syria

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Abstract

Introduction: The duration of orthodontic treatment is one of the issues patients complain about most, especially adult patients which maybe the reason beyond many refusals of undergoing orthodontic treatment [1]. To shorten orthodontic tooth movement times, various attempts have been made local or systemic administration of medicines, [2-5] mechanical or physical stimulation, [6,7] and oral surgery, including gingival fiberotomy, [8] alveolar surgery, [9] and distraction osteogenesis [1]. In 1959, Köle described a surgical procedure involved a radicular corticotomy and supraapical osteotomy. This was accomplished by creating blocks of bone with vertical buccal and lingual corticotomies and a supraapical horizontal osteotomy connecting cut to enable rapid movement of the dentoalveolar process [10,11]. Suya believed that a corticotomy was able to make tooth movement faster because of the simultaneous movement of the tooth and the surrounding bone block [12]. Wilcko et al. in a series of case reports [10,13] mentioned that rapid orthodontics with corticotomies could increase tooth movement by increasing bone turnover, decreasing bone density [14,15] and decreasing hyalinization of the periodontal ligament [1]. Frost found a direct correlation between the severity of bone corticotomy and/or osteotomy and the magnitude of the healing response, leading to accelerated bone turnover at the surgical site. This was called "Regional Acceleratory Phenomenon" (RAP). RAP was explained as a temporary stage of localized soft and hardtissue remodeling that resulted in rebuilding of the injured sites to a normal state through recruitment of osteoclasts and osteoblasts via local intercellular mediator mechanisms involving precursors [16]. Bogoch found a five-fold increase in bone turnover in a long bone adjacent to a corticotomy surgery site. In alveolar bone adjacent to corticotomy, there is a marked increase in regional bone turnover due to activation of new remodeling. Calcium is released from alveolar bone creating a reversible demineralized condition (alveolar osteopenia) resulting in a decrease in bone mass (mineral content or density) but no change in bone volume [17]. According to Hajji, the active orthodontic treatment times in patients with corticotomies were 3 to 4 times shorter compared to those of patients without corticotomies [18]. According to Al Naoum et al. Tooth movement velocities following corticotomies were 2-4 times faster on the experimental side than on the control side particularly during the early stage after corticotomy [19]. Nowzari et al. stated in their case report, using a modified surgical approach and limiting the corticotomy to the buccal and labial aspects, that the PAOO was an effective treatment approach in adults in decreasing treatment duration and in reducing the risk of root

resorption. Final lateral cephalometric analysis showed proclination of the upper and the lower anterior teeth [20]. Aljhani and Zawawi [21] applied the combined non-extraction orthodontic treatment with the corticotomy technique in an adult patient, 25 years old, with severely crowded dental arches to accelerate tooth movement and shorten the treatment time. Buccal and lingual corticotomies with alveolar augmentation procedure in the maxilla and the mandible were performed. The total treatment time was 8 months with no adverse effects observed at the end of active treatment. The addition of the decortication procedure to the conventional orthodontic therapy decreased the duration of treatment significantly. Compared with traditional orthodontic treatment, the PAOO procedure that combines the advantages of corticotomy-facilitated orthodontics and periodontal alveolar augmentation offers the advantage of achieving the desired results in a significantly reduced treatment duration.

Biography

Rabab Al-Sabbagh is currently working as a Professor in Hama University in Syria. She completed her PhD and Masters in Orthodontics in Cairo University, Cairo, Egypt. She published lots of research works and wrote number of books, organized several conferences and workshops, and supervised several masters & PhD students. She is interested in the area of orthodontics.

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