

# Anterior Maxillary Intrusion and Retraction with Corticotomy-Facilitated Orthodontic Treatment and Burstone Three Piece Intrusive Arch

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## ABSTRACT

An adult patient with proclination and spacing was performed orthodontic treatment combined with corticotomy and the burstone three piece intrusive arch who desired a shortened treatment period. The patient had Angle's Class I malocclusion with flaring of the maxillary and mandibular incisors. Pre adjusted edgewise appliance (MBT prescription) was fixed to the maxillary and mandibular teeth. Then corticotomy was performed on the cortical bone of the buccal sides in the maxillary anterior regions. Intrusion and retraction initiated immediately after the corticotomy. The intrusive arch was adjusted once in every 2 weeks. The total treatment time for intrusion was 5 months. Cephalometric superimpositions showed no anchorage loss, and panoramic radiographs showed neither significant reduction in the crestal bone height nor marked apical root resorption. A corticotomy-facilitated orthodontic treatment shortened treatment period without any anchorage loss or adverse effects.

**Keywords:** Intrusion, Corticotomy

## INTRODUCTION

Adult patients who seek orthodontic treatment often desire that their treatment should be completed in a short period [1]. One possible method for completing treatment in a shorter period is through an orthodontic treatment combined with corticotomy [2]. Orthodontic treatment usually lasts one to two years, and even more time is required for extraction cases. To shorten the time for orthodontic tooth movement, various attempts have been made. These attempts fall into three categories. The first is local or systemic administration of medicines [3-6]. The second category is mechanical or physical stimulation such as direct electrical current or a samarium-cobalt magnet. The last category is oral surgery, including dental distraction [7], alveolar surgeries to undermine interseptal bone [8], and alveolar corticotomies, which have been used to correct malocclusions for over 100 years [9]. Corticotomy is effective and safe to accelerate orthodontic tooth movement. It was performed by making small perforations on the alveolar bones along the way by which the tooth would be moved [10]. Corticotomy facilitated orthodontics enables the limitation of the undesirable adverse effects of the orthodontic therapy, such as root resorption and periodontal damage [11].

## CASE REPORT

A 28-year-old male patient had a chief complaint of proclination and spacing of upper and lower incisors [Table/Fig-1 and 2]. He was diagnosed with Angle's class I malocclusion with anterior spacing. Treatment plan was to intrude and retract the upper anteriors. Thick cortical bone was present in the anterior region. There was a need to finish the treatment early. So the decision was made to perform periodontally accelerated osteogenic orthodontics (PAOO) in this patient. The patient had no relevant medical history and the patient's consent was taken before the treatment.

## SURGICAL PROCEDURES

A modified corticotomy procedures was carried out by local anesthesia. A mucoperiosteal flap was elevated labially beyond the apex of the upper incisors [12]. The vertical cuts were performed from the distal of the right upper lateral incisor to the distal of the left upper lateral incisor and the cortical bone was removed by tungsten carbide bur (245) with continuous saline irrigation. This

incision preserves the interdental papilla on the buccal sides of the maxillary anteriors [Table/Fig-3] and no flap elevation or corticotomy was performed on the lingual or the palatal side in this case. Care was taken not to damage neurovascular bundles.

Platelet rich fibrin (PRF) [Table/Fig-4] was placed on apical region of anteriors [Table/Fig-5]. The horizontal envelope mucoperiosteal flap was extended to the apical region of the anteriors. The mucoperiosteal flaps were replaced and sutured with 4-0 silk sutures. The patient was given amoxicillin, 500 mg t.i.d. for 3 days. The sutures were removed after a week and advised to use chlorhexidine mouthrinse 0.12% b.i.d for 2 weeks.



[Table/Fig-1]: Front view



[Table/Fig-2]: Right view



[Table/Fig-3]: Cortical Bone Removed



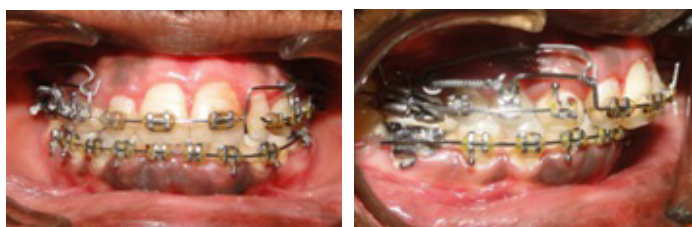
[Table/Fig-4]: PRF



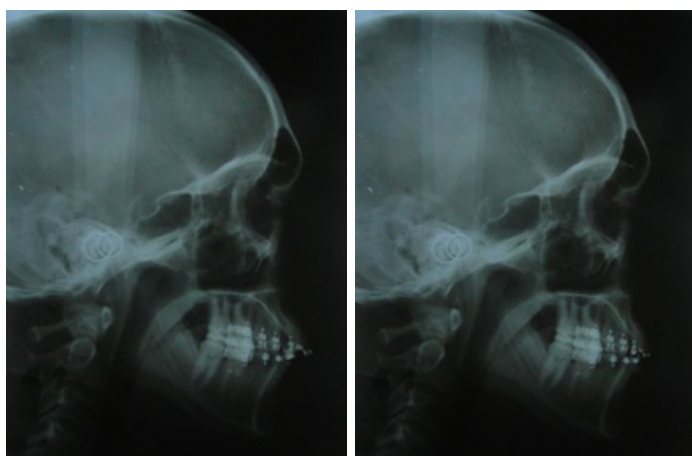
[Table/Fig-5]: After prf placement using tungsten carbide bur



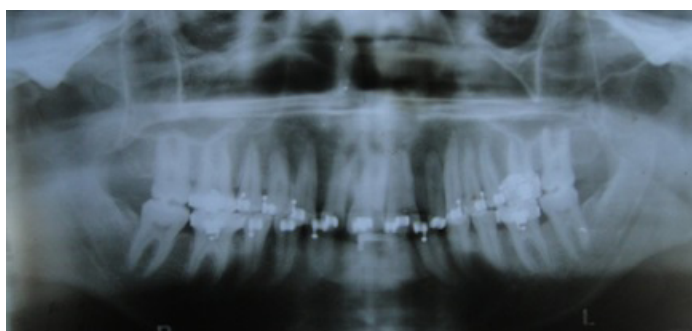
[Table/Fig-6]: Front view  
[Table/Fig-7]: Right view



[Table/Fig-8]: Front view  
[Table/Fig-9]: Right view



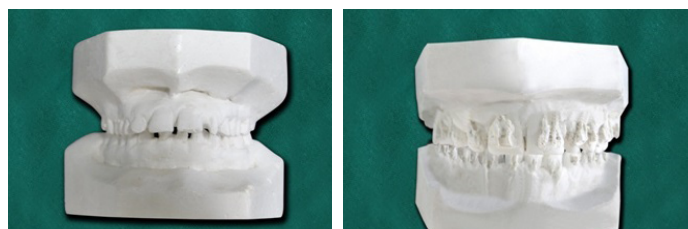
[Table/Fig-10]: Lateral ceph before treatment  
[Table/Fig-11]: Lateral ceph after treatment



[Table/Fig-12]: OPG before treatment



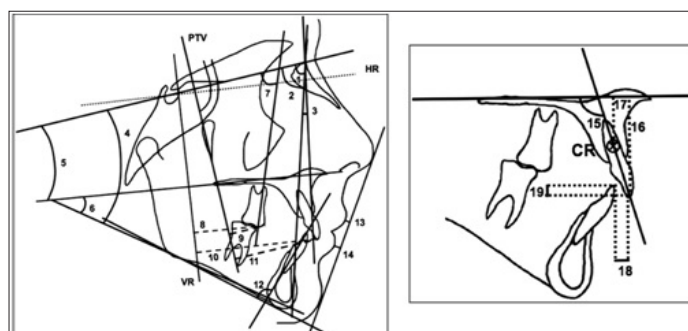
[Table/Fig-13]: OPG after treatment



[Table/Fig-14]: Pre-treatment cast  
[Table/Fig-15]: Post-treatment cast

Sl No.	Angles	Before Intrusion	After Intrusion
1	SNA(0)	84	83
2	SNB(0)	76	76
3	ANB(0)	8	7
4	GOGN/SN(0)	33	33
5	UI-PP(0)	125	106
6	UI-PP(mm)	33	30
7	CR-PP(mm)	16	13
8	UI-PTV(mm)	56	53
9	UI-VR(mm)	62	60
10	U6-PTV(mm)	27	26
11	U6-VR(mm)	34	33
12	U6-SN(0)	74	73
13	IMPA (0)	92	92
14	OVERJET(mm)	6	2
15	OVERBITE(mm)	5	2
16	Ls-E PLANE(mm)	4	3
17	Li-E PLANE(mm)	2	2

[Table/Fig-16]: Pre-treatment and Post-treatment cephalometric values



[Table/Fig-17]: Diagram illustrating linear and angular measurements

### ORTHODONTIC PROCEDURES

Fully banded maxillary and mandibular arches with 0.022' x 0.028' slot with MBT prescription was started and reached a stage of 17 x 25 S.S wire before periodontal surgery. Soon after a week of periodontal surgery, Burstone three piece intrusive arch in 17x 25TMA wire was given for simultaneous intrusion and retraction and the anterior segment was stabilised with 17 x 25 S.S wire [Table/Fig-6-9]. Patient was recalled once in fifteen days and activation of the intrusion arch was done. 20 to 25 gm of intrusive force was given after four months of periodontal surgery and orthodontic treatment, deep bite got reduced from 5 mm to 2 mm. Anterior space closure was done and overjet reduced from 6 mm to 2 mm [Table/Fig-10-15]. Eight months after the surgery, detailing of the occlusion was completed [Table/Fig-16]. Seventeen measurements (7 angular, 10 linear) were made on the cephalometric tracings [Table/Fig-17]. Two vertical reference planes were constructed for measurement confirmation of the dental movements. The first reference was the pterygoid vertical (PTV) drawn perpendicular to the sella-nasion (SN) plane, and the second was drawn perpendicular to the constructed horizontal plane (70 to the SN plane) from the point of intersection of

the anterior wall of sella turcica and the anterior clinoid process (VR). The center of resistance (CR) of the maxillary central incisor was determined rather than the CR of the anterior segment because of its ease of location and high reproducibility. The CR of the maxillary central incisor was taken as the point located at one-third of the distance of the root length apical to the alveolar crest. Results revealed that Skeletal variables SNA and ANB angle decreased slightly, GoGnSN did not show any significant change. UI-PP(0), UI-PP(mm), CR-PP(mm) UI-PTV(mm), UI-VR(mm) changed slightly. The following cephalometric parameters were considered for comparing pre and post results [Table/Fig-17].

#### The following orthodontic results were achieved:

1. Ideal occlusion was obtained.
  2. Deep bite correction was from 5 mm to 2 mm.
  3. Anterior spacing was closed.
  4. Overjet reduction from 6 mm to 2 mm.
  5. Straight profile was obtained.
  6. Pleasant smile was achieved.
- 1.SNA; 2. SNB; 3. ANB; 4. GoGn SN; 5. SN-PP; 6. GoGn-PP; 7. U6-SN; 8. U6-VR; 9. U6-PTV; 10. U1-VR; 11. U1-PTV; 12. IMPA; 13. Ls-E-plane; 14. Li-E-plane; 15. U1-PP; 16. U1-PP; 17. CR-PP; 18. overjet; 19. overbite.

## DISCUSSION

Optimal force for effective intrusion without root resorption is 20 to 25g per tooth for maxillary anteriors. If the PAOO procedure is performed, heavy intermediate force is the best protocol, because it will initiate rapid tooth movement (RAP) [13]. According to Macfadden et al, treatment time was the most significant factor for occurrence of root shortening. Faster intrusion reduced root shortening [14,15,13]. According to Hajji an average treatment time for the PAOO procedure was one-third to one-fourth of traditional orthodontic treatment [16]. Pure incisor intrusion is obtained and flaring is controlled by tying back the intrusion arch at the molar. Posterior tooth tend to tip back and extrude that help in deep bite correction [11]. Seong-Hun Kim et al., stated that prevention of root resorption and shorter treatment time were associated to the PAOO procedure. Wilcko et al., reported an average of 6.1 months of treatment time for the PAOO procedure [10].

## CONCLUSION

Alveolar corticotomy is an effective treatment to decrease the treatment time, reduces the incidence of root resorption and it increases the quality of the treatment. Conservative corticotomy technique eliminates the lingual approach which reduces the

operation time and patient discomfort. This technique would be expected to reduce the risk of moving the roots through the labial plate and reduce the risk of gingival recession.

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