

## Progressive Spacing of Incisors and Miller's Class II Gingival Recession with Anterior Tongue Thrust Treated with Proper Alveolar Root Housing and Autogenously Gingival Grafting

Harneet Kaur<sup>1</sup>, Zeba Jafri<sup>2</sup>, Anika Daing<sup>3</sup>, Nafis Ahmad<sup>4</sup>

<sup>1</sup>(Department of Orthodontics and Dentofacial Orthopaedics / Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India)

<sup>2,3,4</sup>(Department of Periodontology/ Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India)

**Abstract:** Amidst several controversies involving orthodontic treatment and gingival recession, periodontal complications of tongue thrust habit especially in adults have not yet been fully investigated. This case report presents a successful clinical case of progressive spacing of incisors (PSI) with gingival recession treated with proper alveolar root housing and autogenous grafting. A 24 year old girl reporting with mobility in mandibular anterior teeth was diagnosed Miller's class-II gingival recession of 7 mm and grade-II mobility in mandibular central incisors along with anterior tongue thrust habit. Spontaneous decrease in tooth mobility was achieved after correction of habit using fixed habit breaking appliance along with proper root positioning in the alveolar bone with fixed orthodontics. Post-debond, connective tissue gingival graft was performed using pouch and tunnel technique to achieve adequate root coverage. Thus interruption of tongue habit and correction of alveolar root housing is recommended for PSI with gingival recession.

**Keywords:** anterior tongue thrust, creeping attachment, connective tissue graft, gingival recession, progressive spacing of incisors

### I. Introduction

Gingival recession is displacement of the soft tissue margin apically leading to root surface exposure.[1] Many recent articles evaluated that patients with gingival recession have teeth that are out of their bony housing.[2-9] Therefore even proclination of mandibular anterior teeth may cause periodontal changes resulting in an overall decrease in the crestal bone height and loss of alveolar support.[3,4]

One of the etiologic factors for proclination and generalised spacing between anterior teeth is the protrusive tongue activity or anterior tongue thrust. During such activity, the mid-portion of the tongue, rather than getting pressed against the anterior palate, is employed down and forward so that the tip of the tongue is spread out between the anterior teeth and touching the lips momentarily. anterior tongue thrust during swallowing might result in labial inclination of incisors, open bite and spacing problems.[5,6] Especially in adults with gingival recession & periodontal loss, anterior tongue thrust leads to progressive inclination and lateral displacement of the teeth, also known as Progressive spacing of Incisors (PSI). This may further result in insufficient labio-lingual alveolar housing of the roots, thereby compromising the periodontium even further. Thus, even after orthodontic correction, if the anterior tongue thrust is not corrected, the treatment results will be temporary.

This case report illuminates the inter-disciplinary orthodontic and periodontal treatment in an a successful clinical case of a 24 year old female diagnosed with anterior tongue thrust habit and Miller's Class II gingival recession in mandibular anterior teeth.

### II. Case Report

An un-married female (24 years) reported with chief complaint of mobile lower anterior teeth, with spacing increasing since past 1 year. She had no notable medical history, no use of medications but history of previous fixed orthodontic treatment 5 years back which she had failed to comply. Upon examination, patient had a symmetric mesoprosopic face with straight profile, normal growth pattern, average nasolabial angle and competent lips. Smile evaluation revealed spaced maxillary anterior dentition, consonant smile arc and increased buccal corridors. (Fig. 1). Functional examination revealed simple anterior tongue thrust with tip of tongue placed upon lingual surface of mandibular incisors on swallowing. Intra-oral examination revealed Angle's Class I type 2 malocclusion with generalised anterior spacing of 4 mm in maxillary arch and 5 mm in mandibular arch. Deciduous mandibular left was over-retained with grade 1 mobility. Both mandibular central incisors presented with Grade II mobility and Miller's class II gingival recession of 6 mm in 31 and 7 mm in 41. (Fig. 2) OPG showed that all teeth were present except congenitally missing mandibular left second premolar and retained deciduous mandibular left second molar. The periapical radiographs presented a horizontal bone

loss at the alveolar crests between the mandibular incisors. Lateral cephalometric analysis showed maxillary and mandibular anteriors were significantly proclined. (Fig. 3).

### **III. Treatment Planning**

The treatment objectives were to intercept the tongue thrust habit, to correct anterior spacing with and obtain adequate root positions within the alveolar bone followed by gingival graft. It was also planned to extract the over-retained deciduous mandibular left second molar due to mobility followed by implant prosthesis for mandibular left second premolar.

### **IV. Treatment Progress**

At the start of orthodontic treatment, the patient was referred to the periodontist for evaluation. Following thorough oral prophylaxis, fixed palatal tongue cribs were placed for interruption of tongue thrust habit. 0.022 X 0.028-in slot MBT appliances were placed. After initial levelling and aligning, heavy .019 X 0.025-in S.S arch-wires were placed passively for 6 months prior to initiation of space closure with figure-of-8 ligation for stabilization of mandibular central incisors. Space closure was then initiated using light forces and mandibular .018-in stainless steel arch-wire. After closure of all diastemas, mandibular 0.019 X 0.025-in rectangular stainless steel arch-wire was placed back to achieve adequate root torque. The case was de-bonded after 24 months of active treatment. (Fig. 4-6). Maxillary begg's retainer and mandibular bonded lingual retainer were given.

While the mobility of mandibular anterior teeth improved significantly, only slight improvement in the gingival status occurred after the orthodontic movement. The post-orthodontic vertical dimension of the recession in 41 was 7 mm and in 31 was 6 mm with Grade I mobility. (Fig. 5) Uprighting of mandibular anterior teeth with adequate labiolingual and mesiodistal root positions within the alveolar bone was achieved as seen in lateral cephalogram. The final panoramic and periapical radiographs showed favourable root parallelism with no signs of root resorption and decrease in bone loss near the mandibular incisors. (Fig. 6).

It was then decided to proceed with the palatal connective tissue graft for root coverage in teeth 31 and 41 using pouch and tunnel technique. At the surgical recipient site a sulcular incision was made and the tissues were gently undermined, beyond the mucogingival junction so as to relax the flap sufficiently to allow placement of the connective tissue graft. To prepare the tunnel, the interdental papillae was undermined gently without cutting the tip of the papilla. The connective tissue graft harvested from the palate was placed at recipient site into the tunnel and stabilized with the suture. (Fig. 7). Periodontal pack was placed to protect the surgical site. and postoperative instructions were given.

### **V. Results**

Post Orthodontic Cephalometric evaluation [7] revealed slight increase in anterior alveolar height as well as anterior basal width of mandible. (Fig. 8, Table 1). After 3 weeks, the donor site appeared normal in colour and healthy and the recipient site showed pragmatic improvement in gingival biotype. The tension test was negative. Oral hygiene was reinforced at this appointment. At the 3 months evaluation there was a gain in attached gingiva, with reduction in vertical dimension of the recession indicative of root coverage. (Fig. 9)

### **VI. Discussion**

PSI is the most evident sign of the pathological change in the position of the teeth, in opposition to the 'physiological' dental crowding that usually occurs with aging. Based on the equilibrium theory of tooth position, the periodontium together with the cheeks and lips counteract the pressure exerted by the tongue at rest. When bone loss occurs the centre of resistance of the teeth changes and the tongue pressure on the incisors results in tooth migration leading to spacing. In patients with established PSI, periodontal treatment only will not close the interdental spaces or prevent its progression. Therefore, a combined interdisciplinary ortho-perio treatment approach is mandatory for such cases. [8]

In this case, functional examination revealed simple anterior tongue thrust as the principle etiologic factor with tip of tongue placed upon lingual surface of mandibular incisors on swallowing, for which crib appliance was placed. After elimination of etiology, our next goal was to stabilize mandibular anteriors and achieve reduction in tooth mobility. Therefore, figure-of-8 ligation was done along with rectangular S.S arch wires placed passively for 6 months prior to initiation of space closure. After the teeth were adequately stabilized, space closure was initiated to achieve adequate root positioning within the alveolar bone. Special care was taken to keep the forces as light as possible during space closure. Round stainless steel archwire was placed to further reduce the frictional forces.

Post-orthodontic vertical dimension of the recession in 41 was 7 mm and in 31 was 6 mm. Uprighting of mandibular anterior teeth was achieved with adequate root housing within the alveolar bone. The periapical radiographs showed favorable root parallelism with no signs of root resorption and decrease in bone loss near

the mandibular incisors. (Fig. 9) To maintain the stability of results achieved, splinting of mandibular anterior with 3-3 bonded retainers was done. Also removable acrylic palatal plate (Begg's retainer) served as reminder aid for continual of tongue exercises. Since width of attached gingiva was still insufficient, we decided for the palatal connective tissue graft to increase the amount of keratinized gingiva. A pouch and tunnel technique utilizing palatal connective tissue graft for root coverage was planned. Evaluation after 3 weeks post-surgery, although survival problems were evident for the graft showed definite enhancement in quality of the periodontal tissues. 3 months post-surgery, root coverage initiation was noted with decrease in vertical dimension of recession to 3 mm in 41 and 0.5 mm in 31. (Fig. 9).

After the orthodontic retreatment and placement of the roots within the bony housing, a gingival graft was recommended as the patient had a thin gingival biotype, which was more susceptible to recession. The improved biotype of keratinized attached gingiva with connective tissue graft, appeared to provide decreased potential for future clinical attachment loss and increased resistance to external injury. This might be due to a unique creeping attachment phenomenon showing commencement of anticipated root coverage. Creeping attachment typically occurs within 1 to 12 months after the graft surgery.[10] This phenomenon resulted in the coronal migration of tissue and is unique because unlike the previous surgeries undergone by the patient, it occurred only after the position of the tooth improved and the existing vascular tissues healed over time.[9]

After comprehensive orthodontic and periodontal treatment, the patient underwent implant prosthesis for missing 35. 18 months follow-up revealed optimal treatment stability. (Fig. 10) Although generous results have been achieved, we recommend careful observation of the clinical healing process to maintain the achieved biotype. Also even though fixed retention has been provided, such cases possess a high risk of relapse due to tongue habits. Therefore we endorsed adequate tongue exercises for life-long control of this habit.

## VII. Conclusion

Although the literature lacks direct evidence of the cause-and-effect relationship between tongue thrust habit and gingival recession, this clinical example shows improvement of gingival recession interruption of this habit and proper correction of tooth positioning in the alveolar bone. We recommend that a gingival graft should be performed after proper tooth root positioning in the alveolar bone housing in cases of PSI with gingival recession thus increasing the chances to achieve more favourable results. Nevertheless, since no evidence of the effectiveness of such a technique has been demonstrated, long-term treatment stability still needs to be looked upon.

## Acknowledgement

We are grateful to the entire staff of Department of Orthodontics, Department of Periodontology and the Radiology staff of our college for their constant assistance and support during the case.

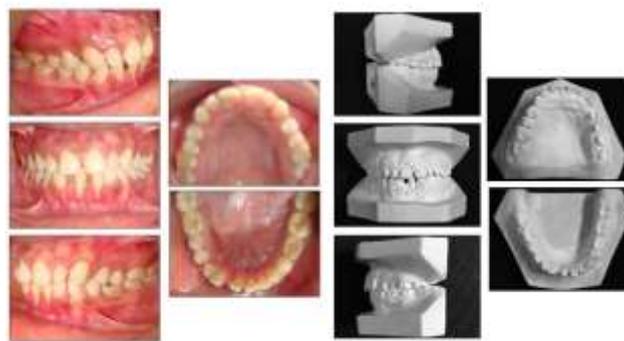
## References

- [1]. The American academy of Periodontology. Glossary of periodontal terms (3rd ed). Chicago: The American academy of Periodontology 1992:41.
- [2]. Greenwell H, Fiorellini J, Giannobile W, Offenbacher S, Salkin L, Townsend C, et al. Oral reconstructive and corrective considerations in periodontal therapy. *J Periodontol* 2005;76:1588-600.
- [3]. Richman C. Is gingival recession a consequence of an orthodontic tooth size and/or tooth position discrepancy? "A paradigm shift.". *Compend Contin Educ Dent* 2011;32:62-9.
- [4]. Artun J, Krogstad O. Periodontal status of mandibular incisors following excessive proclination. A study in adults with surgically treated mandibular prognathism. *Am J Orthod Dentofacial Orthop.* 1987;91:225-232.
- [5]. Alexander S, Sudha P. Genioglossis muscle electrical activity and associated arch dimensional changes in simple tongue thrust swallow pattern. *J Clin Pediatr Dent* 1997;21:213-22
- [6]. Overstake CP. Investigation of the efficacy of a treatment program for deviant swallowing and allied problems. *Int J Oral Myol* 1975;1:87-104.
- [7]. Suri S, Ross RB, Tompson BD. Mandibular morphology and growth with and without hypodontia in subjects with Pierre Robin sequence. *Am J Orthod Dentofacial Orthop.* 2006; 130:37-46.
- [8]. Melsen, B. 12. A Systematic Approach to the Orthodontic Treatment of Periodontally Involved Anterior Teeth. In *Adult Orthodontics*, ed. B. Melsen Wiley-Blackwell, 2012.
- [9]. Machado A.W, MacGinnis M, Damis L, Moond W. Spontaneous improvement of gingival recession after correction of tooth positioning. *Am J Orthod Dentofacial Orthop* 2014;145:828-35.
- [10]. Otero-Cagide F J, Otero-Cagide M F. Unique Creeping Attachment after Autogenous Gingival Grafting: Case Report. *J Can Dent Assoc* 2003; 69(7):432-5.

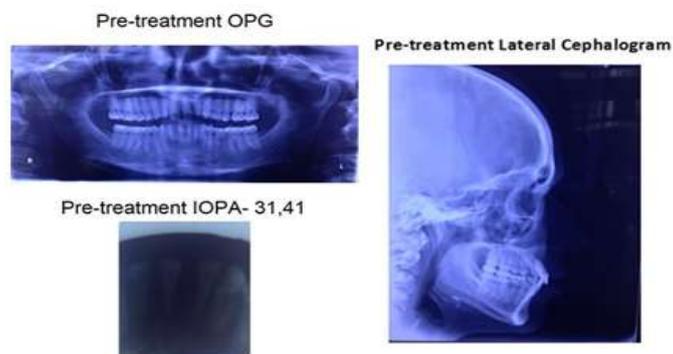
**Figures and Tables**



**Fig.1.** Pre-treatment extra-oral photographs



**Fig.2.** Pre-treatment Intra-oral photographs & Orthodontic Study Models



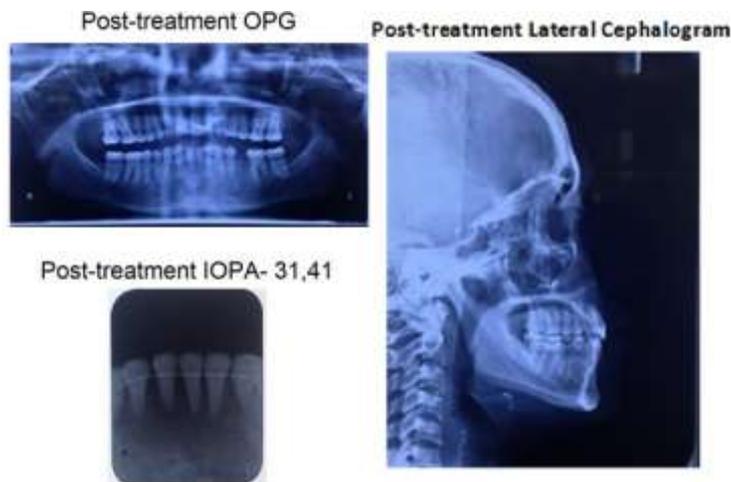
**Fig.3.** Pre-treatment Radiographs



**Fig.4.** Post-treatment extra-oral photographs



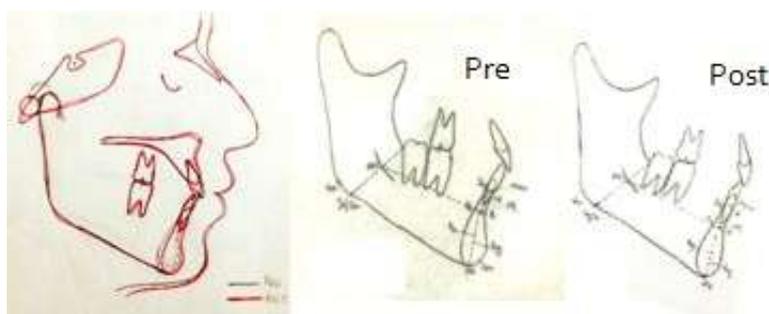
**Fig.5.** Post-treatment intra-oral photographs & Orthodontic Study Models



**Fig.6.** Post-treatment Radiographs



**Fig.7.** Palatal connective tissue gingival graft using pouch and tunnel technique for root coverage.



**Fig.8.** Cephalometric evaluation of Mandibular symphysis [6]

| Stage →    | Pre-treatment   | Post-orthodontic   | 3 week post-surgical  | 3 months post surgical  |
|------------|---|--|---|---|
| Photo →    |    |   |   |    |
| IOPA →     |    |   |   |    |
| Findings → | <ul style="list-style-type: none"> <li>- Grade II mobility in 31 &amp; 41</li> <li>- Miller's class II gingival recession of 41 (7 mm) &amp; 31 (6 mm)</li> </ul> | <ul style="list-style-type: none"> <li>- Grade I mobility in 31 &amp; 41</li> <li>- Miller's class II gingival recession of 41 (7 mm) &amp; 31 (6 mm)</li> <li>- Thin gingival biotype</li> <li>- Tension test positive</li> </ul> | <ul style="list-style-type: none"> <li>- Donor site → normal &amp; healthy</li> <li>- Recipient site → tension test was negative.</li> <li>- Improved biotype of keratinized attached gingiva</li> <li>- Tension test negative</li> </ul> | <ul style="list-style-type: none"> <li>- Gingival recession of 41 (3mm) &amp; 31 (0.5 mm)</li> <li>- Absence of mobility in 31 &amp; 41</li> <li>- Normal gingival biotype</li> <li>- Improvement in bone levels in IOPA</li> </ul> |

Fig.9. Assessment of Gingival recession at various stages of treatment



Fig.10. 18-months post retention.

| Mandibular anterior alveolar measurements | Pre    | Post   |
|---|--------|--------|
| Alveolar Height (malv- saj)               | 9 mm   | 9.5 mm |
| Anterior Basal width (B-BI)               | 4.5 mm | 5 mm   |
| Symphyseal Thickness (Pg-PgL)             | 10 mm  | 10 mm  |

Table1. Cephalometric evaluation of Mandibular symphysis [6]