Orthodontics-surgical combination therapy for Class III skeletal malocclusion

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Abstract

The correction of skeletal Class III malocclusion with severe mandibular prognathism in an adult individual requires surgical and Orthodontic combination therapy. The inter disciplinary approach is the treatment of choice in most of the skeletal malocclusions. A case report of an adult individual with Class III malocclusion, having mandibular excess in sagittal and vertical plane and treated with orthodontics, bilateral sagittal split osteotomy and Le – Forte I osteotomy for the correction of skeletal, dental and soft tissue discrepancies is herewith presented. The surgical–orthodontic combination therapy has resulted in near–normal skeletal, dental and soft tissue relationship, with marked improvement in the facial esthetics in turn, has helped the patient to improve the self-confidence level.

Keywords: Orthognathic Surgery, Bilateral sagittal split osteotomy, surgical orthodontics

Introduction

The combination treatment for skeletal malocclusions in adult individuals has been used not only to achieve a functional and stable occlusion but also to establish normal skeletal relationships with esthetically pleasing soft tissue profile.[1] Orthognathic surgery and Orthodontic therapy are compliment to each other in these types of cases to achieve the desired results.[2] Accurate clinical examinations followed by the right diagnosis and treatment planning are essential.

Case Report

A 20 year-old male patient with a complaint of un-even bite presented with a Class III skeletal relationship with prognathic mandible, increased lower facial height, concave profile Class III incisor and molar relationship and anterior open bite [Figures 1-9]. The patient had no relevant family and medical history. He was highly positive for the treatment. The cephalometric analysis confirmed the clinical findings. [Table 1].

List of problems
1. Prognathic mandible
2. Increased lower facial height
3. Class III incisor and molar relationship
4. Anterior open bite
5. Concave profile and compromised esthetics

Treatment plan
1. Pre-treatment prophylaxis, restorations
2. Combination therapy
3. Surgical plan: Le- Forte I osteotomy superior and forward placement of maxilla and Bilateral sagittal split osteotomy for mandibular setback
4. Non extraction Orthodontic therapy with 0.022” Roth Pre-adjusted Edgewise Appliance
5. Long term retention plan

Treatment rationale
Le- Forte I osteotomy with superior impaction of maxilla allows the auto rotation of mandible, which would reduce the lower facial height, and the forward placement of maxilla, which would help to improve the soft tissue balance.[3] It would also help to correct the Class III skeletal relationship along with the Bilateral sagittal split osteotomy with mandibular setback.

The pre-surgical Orthodontics was planned to increase the reverse overjet to facilitate the proper positioning of the jaws during the surgery.

Progress of treatment

After initial restorative and prophylactic measures, pre-surgical orthodontics was begun with 0.022 × 0.028” Roth Pre-adjusted Edgewise prescription appliance. Initially, 0.016 NITI wires were used to align the arches, and later shifted to heavier 0.019” × 0.025” SS arch wires sequentially. Mild Class II elastics were used to correct the incisor position and to increase the reverse overjet to 6 mm.

Face bow transfer and articulation of models on a semi-adjustable articulator was done and two surgical wafers (
Le- Forte I surgical procedure was carried out as decided and the maxilla was repositioned 3 mm anteriorly and 3 mm superiorly. Bilateral sagittal split osteotomy was performed and the mandible was set back by 7 mm. Rigid type of fixations were used in both the jaws. The surgical and post-surgical phase passed on without any complications.

Post -surgical Orthodontics was initiated after a period of
Table 1: Burstone’s Cephalometric analysis

| Measurement                              | Mean (males) | Pre-treatment | Post-treatment |
|------------------------------------------|--------------|---------------|----------------|
| Cranial base                             |              |               |                |
| Ar-Ptm                                   | 37.1~2.8 mm  | 34 mm         | 34 mm          |
| Ptm-N (II to HP)                         | 52.8~4.1 mm  | 54 mm         | 54 mm          |
| Horizontal Skeletal                      |              |               |                |
| N-A-Pg angle                             | 3.9~6.40     | −10°          | +6°            |
| N-A (II To HP)                           | 0~3.7 mm     | +1 mm         | +3 mm          |
| N-B (II To HP)                           | −5.3~6.7 mm  | +15 mm        | +4 mm          |
| N-Pg (II ToHP)                           | −4.3~8.5 mm  |               | +5 mm          |
| Vertical skeletal and dental             |              |               |                |
| N-ANS (II ToHP)                          | 54.7~3.2 mm  | 54 mm         | 51 mm          |
| ANS-Gn                                   | 66.6~3.8 mm  | 70 mm         | 71 mm          |
| PNS–N                                    | 53.9~1.7 mm  | 53.5 mm       | 50 mm          |
| MP–HP                                    | 23.0~5.9°0   | 23.5°0        | 29°0           |
| Upper incisor to NF                      | 45.0~2.1 mm  | 28 mm         | 30 mm          |
| Lower incisor to MP                      | 30.5~2.1 mm  | 40 mm         | 42 mm          |
| Upper molar to NF                        | 26.2~2.0 mm  | 25 mm         | 28 mm          |
| Lower molar to MP                        | 35.8~2.6 mm  | 32 mm         | 34 mm          |
| Maxilla–Mandible                         |              |               |                |
| PNS-ANS                                  | 57.7~2.5 mm  | 52 mm         | 52 mm          |
| Ar-Go                                    | 52.0~4.2 mm  | 56 mm         | 52 mm          |
| Go-Pg                                    | 83.7~4.6 mm  | 85 mm         | 79 mm          |
| B-Pg                                     | 8.9~1.7 mm   | 7 mm          | 6 mm           |
| Ar-Go-Gn                                 | 119.1~6.5°0  | 136°0         | 132°0          |

Table 2: Result analysis

| Features           | Pre-treatment   | Post-treatment |
|--------------------|----------------|----------------|
| Incisor relationship| Reverse over jet| Positive over jet |
| Over jet           | −4 mm          | +2 mm          |
| Overbite           | Open bite      | +2 mm          |
| Lower incisor      | Retroclined    | Upright        |
| Midlines           | Shifted        | Co incident    |
| Left molar         | Class III      | Class I        |
| Right molar        | Class III      | Class I        |
| Skeletal relationship| Class III     | Class I        |
| Index Of Treatment Need | Dental Health Component | 5 | 1 |
|                      | Esthetic Component   | 9 | 1 |
| Peer Assessment Rating | 33             | 0 (100% improvement) |
characteristics to determine the extension of facial asymmetry. Class III skeletal problems are treated with a combination of orthodontic and orthopedic mechanics in growing individuals whereas, correction of the Class III malocclusion usually requires complex surgical procedures during adulthood for attainment of an optimal aesthetic and functional result in Class III patients.[10]

The Orthodontics—surgical combination therapy has been successfull in this case of skeletal Class III malocclusion. It

Result analysis and Conclusion

A profound improvement in facial esthetics was achieved, along with the near-normal dental, skeletal and soft tissue relationships. [Tables 1, and 2]; [Figures 1–9].

Skeletal class III anomalies are one of the most complicated problems in both childhood and adulthood of all dentofacial abnormalities.[4,5] Many studies have demonstrated that transverse dental compensation is correlated with skeletal asymmetry.[6,8] Inclinations of the occlusal plane observed in the posteroanterior cephalograms are important

Figure 6: Post-treatment intra oral

Figure 7: Post-treatment ortho Pantomogram

Figure 8: Post-treatment cephalogram

Figure 9: Pre- and post-treatment superimposition

4 weeks and with the arch wires sequentially changed from 0.017” × 0.025” NITI to 0.021” × 0.025” SS wires. Finishing and settling of occlusion was carried out using short elastics. Mild Class III elastics were maintained throughout the phase of treatment. The overall treatment duration was about 22 months. Upper and lower Hawley’s type of retainers was given with instructions to wear full time.

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is also evident that the self-confidence level of the individual was raised considerably following the total change in the perception.

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