Interdisciplinary Treatment of a Periodontally Compromised Adult

Kshitij Bansal, Surendra Lodha, Nidhi Bansal

ABSTRACT
This case report describes the interdisciplinary treatment of a 32-year-old female patient showing protrusive profile, a Class I canine relationship complicated with multiple missing teeth, extruded upper left first molar, exaggerated curve of Spee, generalized bone loss and an endo-perio lesion involving lower left first premolar. After achieving a complete control of active periodontal disease, extraction of third molars, endodontic therapy of lower left first premolar, followed by orthodontic treatment was carried out. A functional and esthetic occlusion with improved facial profile was established at the end of treatment combined with esthetic restorations of upper anterior teeth to close the black triangles and prosthetic replacement of missing teeth.

Chronic periodontal disease create multitude of complications which needs to be treated by a team of dental specialists and not by one individual; in the best interest of the patients including their apprehensions, medical and oral conditions, time and cost.

Keywords: Interdisciplinary treatment, Adults, Molar and incisor intrusion, Microimplant, Endo-perio lesion, Black triangles.

INTRODUCTION
Periodontal disease is a generic term for inflammatory diseases; triggered by bacteria; affecting the gingiva, the supporting connective tissue and the alveolar bone; causing the loss of connective tissue attachment and alveolar bone. The clinical characteristics, such as increased probing depths combined with factors, such as the age of the patient at the onset of the disease process, the rate of progression of the disease, psychological maladjustments and several dental restorations; decide the treatment plan and outcome.1,2

The complications arising from periodontal breakdown, such as pathologic migration, supraerupted teeth, spacing, loss of interdental papillae, missing teeth often make multitasking from dental specialties essential.

It is evident that orthodontic tooth movement can be performed in adults with reduced but healthy periodontium without further periodontal deterioration;2,3 provided effort is made to eliminate or reduce, plaque accumulation and gingival inflammation. This implies great emphasis on personal oral hygiene, strategic appliance construction and periodical checkups throughout treatment.

According to Ackerman,4 adult orthodontics is concerned with striking a balance between ‘achieving optimal proximal and occlusal contacts of the teeth, acceptable dentofacial esthetics, normal function and reasonable stability’ having a realistic and not ideal treatment tactic.

CASE REPORT
A 32-year-old woman reported with a chief complaint of the unesthetic appearance with spacing in upper front teeth. Her medical history showed no contraindication to orthodontic therapy. Facial photographs show protrusive lips, convex facial profile and an unesthetic smile (Fig. 1). Dental history include extractions of the upper right third molar, lower left first and second molars because of dental caries.

On intraoral examination, halitosis, spontaneous bleeding gums, gingival recession, severe loss of interdental papillae anteriorly was seen. The maxillary left third molar 28 and lower anterior teeth were grade 2 mobile. Maxillary anterior teeth were grade 1 mobile. 34 was tender to percussion. A generalized attrition was present. Dentally, she revealed 7 mm of overjet with deep overbite of 6 mm, a deep curve of Spee of 3 mm; 6 mm spacing in the upper dental arch, 1 mm of crowding in the lower dental arch, a mesially tipped lower left third molar 38, rotated left mandibular second premolar 35 and microdont 38. A Class I canine and premolar5 (Katz modification) relationship was observed bilaterally with the lower dental midline deviated to the right by 2 mm (Fig. 2). The maxillary left first molar, 26 was extruded 3 mm beyond the occlusal plane. Loss of the mandibular first and second molar resulted in mesial tipping of the lower left third molars and overeruption of the opposing maxillary first molar.
Radiological Examination

Periapical views showed furcation involvement with reference to 27, extensive bone resorption around 28, 34 (Figs 3A to D to 5A to C). Evaluation of panoramic radiograph revealed generalized moderate horizontal bone loss (Fig. 4A). Cephalometric analysis showed normodivergent facial pattern, proclined upper and lower incisors (Fig. 4B) (Table 1).

DIAGNOSIS

The patient presented with a Class II skeletal relationship, bimaxillary dentoalveolar protrusion with chronic periodontitis.

TREATMENT OBJECTIVES

The treatment objectives were to eliminate all pathosis before contemplating orthodontic therapy; to provide acceptable facial esthetics, a functional nontraumatic occlusion (i) to intrude the maxillary first molar 26 and lower anteriors, (ii) to level and align, (iii) to upright the lower left posterior occlusion.

TREATMENT PLAN

Control of active periodontal disease was required before orthodontic therapy could be started. Extractions of upper left third molar 28, 48 (lower right third molar) were done. Full mouth periodontal rehabilitation and controlling the active disease was started. After 2 months, significant improvement in the gum condition was seen.

However, inflammation was still persistent around the region of 34. Endodontic therapy of 34 was done. After 3 months, resolution of inflammation with decrease in mobility and exudation occurred. It was probably a primary periodontal lesion involving the pulp secondarily. Henceforth, endodontic therapy appeared to be a wise decision.

After completion of periodontal treatment, significant reduction in probing depth, mobility, number of bleeding

Fig. 1: Pretreatment extraoral photographs

Fig. 2: Pretreatment intraoral photographs. Note the upper spacing, deep bite, loss of interdental papillae especially in the lower anteriors, extruded upper left first molar, inflamed gingiva
Figs 3A to D: Pretreatment periapical views: (A) 13, 12, 11, (B) 21, 22, 23, (C) 25, 26, 27, 28, (D) 31, 32, 41, 42.
Note the extensive bone loss around the teeth.

Figs 4A and B: Pretreatment radiographs including the (A) panoramic film and (B) lateral cephalogram.

Figs 5A to C: Progress periapical view of (A) 34 after root canal treatment was done, (B) 34 after 3 months, (C) mini-implant placed distal to 35, 38 stabilized to mini-implant.

Points and exudation was seen. There was a waiting period of 6 months, after which orthodontic tooth movement was attempted. Postorthodontic treatment, fixed lingual retention followed by referral to the prosthodontic department for replacement of missing lower molars.

**TREATMENT PROGRESS**

A full 0.022” preadjusted Roth prescription brackets were used. Initially 34 (lower left first premolar) was not bonded to assess its prognostic value. To ensure light and continuous forces,
Figs 8A to D: Intraoral progress photographs. (A-C) Just before debonding. Small black triangles seen in upper anterior teeth, (D) minor interproximal reduction was done. Further space closure was done as contact points shifted gingivally.

0.016" and 0.018" round nickel-titanium wires were used. 26 was gently tied to the main continuous archwire to exert light intrusive forces. The upper molar was progressively intruded as archwires were sequentially changed (Fig. 6).

After 3 months, modest signs of intrusion were seen; a separator was placed between the left upper first and second molars, to prevent door-wedge effect. Once the upper occlusal plane was leveled, 26 was included in the continuous archwire.

An orthodontic miniscrew (SK Surgical, Pune; 1.4 mm in diameter and 8 mm in length), inserted distally to 35 buccally, at the level of the mucogingival junction (Figs 5A to C and 6A to C). The angle of insertion was right angles to the ridge. Postinsertion instructions were given and the miniscrew was loaded after a waiting period of 7 days. Thirty-eight was stabilized to miniscrew using a thick ligature wire.

The lower incisors were intruded using 0.017 × 0.025" ß TMA intrusion arch delivering a force of 40 gm7,8 (Fig. 7). A tight cinch-back bend distal to the molar tube was placed, to prevent incisor flaring during intrusion and to minimize tipback.9 38 being stabilized to the miniscrew could withstand the undesirable moments created during incisor intrusion. It took 4 months for lower intrusion.

After 6 months of start of orthodontic treatment, the lower left first premolar was bonded and was brought into alignment. The NiTi coil was compressed between 38 and 35 to close the space distal to 34. NiTi coil allowed for the delivery of a more...
constant force, preventing the need for subsequent reactivation. Rectangular archwires with closing loops were used in upper arch for space closure. The case was finished with 0.019” × 0.025” rectangular stainless steel archwires.

To close upper black triangles esthetic composite restoration were done just before debonding thus maintaining the golden proportions (Figs 8A to D). Orthodontic treatment was retained using bonded lingual retainers for both the upper and lower dentition. The upper left buccal segment was stabilized using fixed buccal retainer. An interim partial lower acrylic denture was given till implants are placed.

RESULTS

After 15 months of active orthodontic treatment, a functional occlusion was established in the right posterior dentition by intruding the upper first molar and uprighting the lower third molar, creating adequate space for an endosseous implant and crown. The facial profile and the smile esthetics were improved (Fig. 9). The arches were leveled; the spaces closed; axial inclinations and midlines were corrected. A Class I canine relationship and normal overjet and overbite were obtained (Figs 10 and 11A and B). Periapical radiographs (Fig. 12) showed intact lamina dura around the first molar within the sinus floor, with no radiographically observable root resorption. Cephalometric superimpositions (Figs 13 and 14A and B) revealed significant retraction of upper incisors, correcting the steep occlusal planes. Table 1 compares the cephalometric parameters pre- and post-treatment.17-19

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**Table 1: Cephalometric parameters and comparison of pre- and post-treatment**

<table>
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<tr>
<th>Down’s analysis</th>
<th>Pretreatment</th>
<th>Post-treatment</th>
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<tbody>
<tr>
<td>Facial angle</td>
<td>76.5-91.0°</td>
<td>93°</td>
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<tr>
<td>Angle of convexity</td>
<td>0-17°</td>
<td>19°</td>
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<tr>
<td>AB-NPog</td>
<td>-5 to -11°</td>
<td>-13°</td>
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<tr>
<td>Y axis</td>
<td>56-69.5°</td>
<td>57°</td>
</tr>
<tr>
<td>Mand plane angle</td>
<td>13.5-33°</td>
<td>28°</td>
</tr>
<tr>
<td>Cant occlusal plane</td>
<td>-2 to 14°</td>
<td>8°</td>
</tr>
<tr>
<td>Interincisal angle</td>
<td>91-144°</td>
<td>117°</td>
</tr>
<tr>
<td>Lower incisor—MP</td>
<td>88-129.5°</td>
<td>9°</td>
</tr>
<tr>
<td>Lower incisor—occlusal plane</td>
<td>14-44°</td>
<td>32°</td>
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<tr>
<td>Upper incisor—APog</td>
<td>2.5-12 mm</td>
<td>14 mm</td>
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<tr>
<th>Tweed’s analysis</th>
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<tr>
<td>FMA</td>
<td>13.5-33°</td>
<td>28°</td>
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<tr>
<td>IMPA</td>
<td>88-129.5°</td>
<td>109°</td>
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<tr>
<td>FMIA</td>
<td>62.5-66.5°</td>
<td>43°</td>
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<th>Steiner’s analysis</th>
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<tr>
<td>SNA</td>
<td>72-90.5°</td>
<td>85°</td>
</tr>
<tr>
<td>SNB</td>
<td>73.5-84.5°</td>
<td>79°</td>
</tr>
<tr>
<td>ANB</td>
<td>2-8°</td>
<td>6°</td>
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<tr>
<td>Upper incisor—NA</td>
<td>5-12 mm, 71-80°</td>
<td>12 mm, 40°</td>
</tr>
<tr>
<td>Lower incisor—NB</td>
<td>4-14 mm</td>
<td>8 mm, 33°</td>
</tr>
<tr>
<td>NB-Pog</td>
<td>2.25 mm</td>
<td>-2 mm</td>
</tr>
<tr>
<td>Interincisal angle</td>
<td>20-40°</td>
<td>31°</td>
</tr>
<tr>
<td>Go-Gn-SN</td>
<td>4.5-22°</td>
<td>10°</td>
</tr>
<tr>
<td>Wits appraisal</td>
<td>0.83 mm</td>
<td>4.5 mm</td>
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<tr>
<td>H angle</td>
<td>7-15°</td>
<td>24°</td>
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**Figs 11A and B:** Post-treatment radiographs including the lateral cephalometric and panoramic films

**Fig. 12:** Post-treatment periapical radiographs
In this case, the lower extraction space was not closed orthodontically as the periodontium was already compromised. In adults, closing an old extraction site with bone defects is challenging and time consuming. After several years following extraction, the remodeling of the bone produces a buccolingually narrowed alveolar process, and closure of the extraction spaces requires reshaping of the cortical bone. As proper root position allows for better periodontal health, the uprighting of the lower left third molar was selected as the appropriate treatment strategy.

Implant-supported prosthetic rehabilitation was planned for the restoration of the extraction site. However, the placement of implants was deferred as a healing radiolucency was present in relation to lower left premolars raising stability issues for the implants, although patient was asymptomatic. The case shall be re-examined after a year to decide whether to place implants or not. Meanwhile, an interim partial lower acrylic denture was given.

In this case, light forces with long activation intervals favored easy maxillary molar intrusion without any undesirable rotations seen. The left lower premolar and molar occlusion prevented upper premolar and molar extrusion. Professional scaling may be particularly indicated during active intrusion of elongated incisors, and when new attachment attempts are made because orthodontic intrusion may shift supragingival plaque to a subgingival location. Melson et al reported that in addition to frequently controlling soft tissue inflammation, it is necessary to prevent excessive jiggling and tooth mobility during treatment. Increasing tooth mobility superimposed on reduced but healthy periodontal tissues produces no effect on the level of connective tissue attachment.

True incisor intrusion is achievable in both arches. The utility arch and the base arch seemed to result in both the largest intrusion and the largest gain in bony support. In adults, mandibular incisor intrusion is readily achieved compared with maxillary incisor intrusion. There was extensive loss of interdental papillae in upper anteriors. The size of black triangles was considerably reduced as upper spacing closed and slight interproximal enamel was removed to create adequate crown morphology. This moves the contact points more gingivally, minimizing the open space between the teeth. The upper anterior teeth were restored with composites.

**CONCLUSION**

Interdisciplinary approach combining periodontics, oral surgery, orthodontics, endodontic, esthetic, prosthodontic treatments helped to achieve good esthetic and functional results in this case with multiple dental problems complicated by periodontal breakdown. There is a defined beneficial effect on the periodontal condition of the patient when judged at the
clinical and radiographic levels. Adult age is no contra-indication for orthodontic treatment. Orthodontics can contribute toward optimal oral health, eliminate occlusal trauma and prevent adverse periodontal conditions from developing and improve the psychological well being of the patient at any age.

REFERENCES