MEDWIN PUBLISHERS
Committed to create value for Researchers

Open Access Journal of Dental Sciences
ISSN: 2573-8771

Enhancement of Facial Aesthetics and Function in Periodontally Compromised Adult Patients by an Interdisciplinary Approach: A Case Series

SS Agarwal[1]*, Jayan B[1], Nehra K[1], Mohit S[1], Prasanna K[1] and Devendra S[2]

[1]Department of Orthodontics, Indian Army Dental Corps, India

[2]Department of Periodontics, Indian Army Dental Corps, India

Case Report

Volume 2 Issue 3

Received Date: May 26, 2017

Published Date: July 20, 2017

DOI: 10.23880/oajds-16000136

***Corresponding author:** SS Agarwal, Department of Orthodontics, Indian Army Dental Corps, India, Tel: 7086104044; E-mail: docshivagarwal@rediffmail.com

Abstract

Periodontium is a common link between Orthodontics and Periodontics. Orthodontics is dependent on the inflammatory changes in periodontium for effective tooth movement. Orthodontic biomechanics and treatment planning are dependent on the health of periodontium and certain changes in the same are required while treating periodontally compromised adult patients. In this case series, we present successful management of two periodontally compromised adult patients by an interdisciplinary team approach.

Keywords: Ortho-perio interdisciplinary management; Orthodontics in periodontally compromised patients

Introduction

The number of adult patients seeking orthodontic treatment has increased drastically in recent times and so has the understanding of the clinicians regarding importance of interdisciplinary approach in the management of such patients [1]. Approximately, one fourth of all orthodontic patients are adult patients with primary desire to improve their facial and dental appearance [2]. Orthodontic force can be considered as an agent that brings about desired tooth movement by causing inflammatory changes in the periodontium [3,4]. Periodontium is the common link between Orthodontics and Periodontics. Orthodontic diagnosis and treatment bio-mechanics are dependent upon periodontal factors such as periodontal ligament, width of attached gingiva, height and health of alveolar bone, gingival health etc. [5]. Orthodontic treatment may improve periodontal conditions in adults by: correction of crowding and facilitation of oral hygiene maintenance, alteration of papillary attachments and gingival contours, altering the morphology of osseous defects and facilitating bone graft placement, providing a harmonious occlusion free from gingival trauma etc [6]. Various periodontal procedures performed as an adjunct to orthodontic treatment in adults are: scaling and root planing to provide a healthy periodontium prior to orthodontic treatment; muco-gingival surgeries like frenotomy and frenectomy, recession coverage and augmenting the width of attached gingiva; and regenerative / resective osseous surgeries to correct the bony deformities [7]. This case series presents successful management of two periodontally compromised adult patients by an interdisciplinary team approach.

Case Report 1

Case History

A 34 years old female patient reported to us with complains of compromised facial aesthetics due to forwardly placed and spaced upper front teeth. No significant medical history was elicited by the patient. She got her lower anterior tooth extracted 1 year back due to mobility. She first noticed spacing in relation to upper front teeth one year back which gradually increased to the present severity. She was under periodontal therapy for past 6 months which involved scaling, root planing, curettage and maintenance therapy. She had been referred for orthodontic treatment since her periodontal inflammation and oral hygiene were under control.

Clinical examination: Pretreatment facial photographs (Figure 1) showed a grossly proportionate face with a straight facial profile, acute nasolabial angle, a non-consonant smile arc and potentially incompetent lips. Intraorally, she had Angle's Class I molar relation bilaterally with an overjet of 11mm and an impinging deep bite. Spacing of 9mm in maxilla and 5 mm in mandible was observed along with missing 31. She had a thin alveolar and gingival biotype with reduced width of attached gingiva in lower anterior region, pathologic migration in relation to 11, 12, 21, 22, periodontal pockets (4-5mm) in relation to 16, 17, 26, 41, 35, 45 and Grade 1 mobility in relation to 32, 41 and 42.

Figure 1: Pretreatment facial and intra-oral photographs.

Radiographic examination: Pretreatment Orthopantomogram (OPG) (Figure 2) revealed that she was in a permanent dentition stage with a generalized moderate horizontal bone loss, vertical bone loss in relation to 16 and missing 31. No radiographic signs of Temporomandibular joint disorder (TMJ) were noticed. Pretreatment Lateral cephalogram (Figure 2, Table 1) showed that both jaws were in a skeletal Class I relationship [SNA = 83°, SNB = 80°, ANB = 3°] with proclined maxillary and mandibular incisors [UI-NA = 32(11) and LI-NB = 30(9) respectively]. The mandibular plane angle was within normal limits [GoGn-SN = 30° and FMA = 25°]. The nasolabial angle was reduced [69°].

Figure 2: Pretreatment OPG and Lateral Cephalogram.

Diagnosis and Treatment Objectives: She was diagnosed as a case of skeletally and dentally Class I with chronic moderate generalized periodontitis, increased overjet and overbite, potentially incompetent lips, acute nasolabial angle, a non-consonant smile arc, spaced maxillary arch secondary to pathologic migration and missing 31. The treatment objectives were (1) to improve periodontal health and augment the width of attached gingiva in lower anteriors (if required) (2) to enhance smile aesthetics (3) leveling and alignment of teeth and cater adequate space for prosthesis in relation to 31 (4) maintenance of Class I molar and achievement of Class I canine relationship bilaterally (5) intrusion and retraction of upper front teeth (6) finishing and detailing of occlusion (6) long term retention (7) prosthesis in relation to 31. Prognosis of her treatment was considered good as periodontal condition was stable.

Treatment plan: The treatment plan included fixed orthodontic mechanotherapy with 0.018 X 0.025 inch Roth Pre-adjusted Edgewise Appliance (PEA) with a non-extraction approach, en-masse intrusion and retraction of maxillary incisors with Temporary Anchorage Device/orthodontic mini-implants (TADs), finishing and detailing of occlusion and implant prosthesis in relation to 31. The treatment plan was discussed and agreed upon by the patient. She however, did not agree for additional surgery for dental implant placement and hence a removable partial denture was planned for 31.

Treatment progress: The case was bonded with 0.018 Roth PEA and leveling and alignment of teeth was done with continuous arch wires beginning with 0.012 inch nickel-titanium (Niti) and progressed upto 0.016 X 0.022 inch stainless steel (SS) working arch wires in both arches. In the upper arch, anterior and posterior segments were formed and consolidated with laced SS ligatures. A pre-posted 0.016 X 0.022 inch SS wire was placed in the upper arch. TADs (orthodontic mini-implant - 9x1.2mm) were placed bilaterally in premolar-molar region and a light intrusion-retraction force was applied with Niti closed coil springs (Figure 3). The space closure and intrusion of about 3 mm was achieved in three months. In the lower arch, space was created for 31 by applying light forces with a Niti open coil spring and gradually monitoring the progress. During the course of treatment, gingival recession was observed in relation to 41 as anticipated. A free gingival graft was harvested from palate, sutured at the recipient site and periodontal pack was placed (Figure 4a,b). Sutures were removed after 5 days. The graft integrated well as noticed after six weeks post surgery. After finishing and detailing, settling of occlusion was done and the case was debonded. Fixed spiral retainers were placed in both upper and lower arches for long term retention.

Figure 3: Intrusion-retraction of upper anteriors with TADs.

Figure 4a: Donor Site preparation and harvesting of gingival graft.

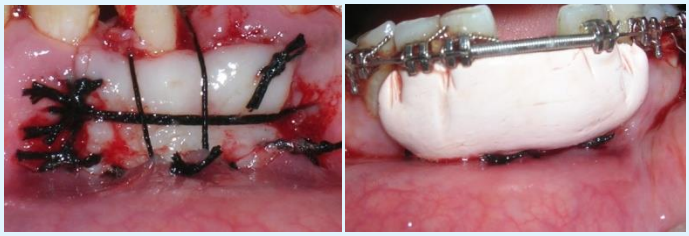

Figure 4b: Placement of gingival graft.
Figure 4a,b: Augmentation of attached gingiva in lower anterior region.

Treatment results: Post-treatment facial photographs (Figure 5) showed a marked improvement in smile aesthetics and confidence of the patient. A Class I molar and canine relationship with an optimum overjet and overbite (2mm and 3mm respectively) was achieved along with a functional occlusion. The mean probing depth was reduced and a marked improvement in periodontal health was noticed. Post treatment OPG (Figure 6) revealed a favorable crown/root ratio. The horizontal bony defected transformed into vertical defects especially in upper anterior and lower posterior region which are more conductive to regenerative osseous surgery. No significant root resorption or reduction in alveolar bone height was observed posttreatment. Post treatment Lateral cephalogram (Figure 6, Table 1) did not reveal significant skeletal changes [SNA = 82°, SNB = 80°, ANB = 2°]. Marked reduction in proclination of maxillary and mandibular incisors was noticed [UI-NA = 26(5) and LI-NB = 28(6) respectively]. Improvement in nasolabial angle was [91°] was also observed. The entire treatment duration was 15 months and at the end of treatment the patient was highly satisfied with her facial and dental appearance. She was referred back to the Department of Periodontology for post orthodontic periodontal therapy and regenerative osseous surgical procedures.

Figure 5: Posttreatment facial and intra-oral photographs.

Figure 6: Post treatment OPG and Lateral Cephalogram.

Measurements	Pre Treatment	Post Treatment
SNA	83^0	82^0
SNB	80^0	80^0
ANB	3^0	2^0
A-Na vertical	+2	+1
Pog-N vert	-2	-2
UI-NA	32(11)	26(5)
LI-NB	30(9)	28(6)
GoGn-SN	30^0	30^0
FMA	25^0	25^0
IMPA	98^0	94^0
Nasolabial angle	69^0	91^0

Table 1: Pre and post treatment cephalometric values.

Case Report 2

Case history: A 33 years old male patient reported with chief complains of compromised facial aesthetics due to irregularly placed and spaced upper front teeth, excessive mobility in upper right back tooth with frequent pain and swelling and missing lower right back tooth. No significant medical history was elicited by the patient. He got his lower left back tooth extracted one and half year back due to excessive mobility. He first noticed spacing and movement of his upper front teeth one and half year back which gradually increased to the present severity. He was under periodontal therapy for past 8 months which involved scaling, root planing, curettage and maintenance therapy. After achieving adequate control over periodontal inflammation and good oral hygiene maintenance, he was referred for orthodontic treatment to improve his smile aesthetics and chewing efficiency.

Clinical examination: Pretreatment facial photographs (Figure 7) showed a grossly proportionate face with a convex facial profile, acute nasolabial angle and a non-consonant smile arc. Intraorally, he had Angle's Class II (Half cusp) molar relation on right side and non specific molar relation on left side with an overjet of 6mm and 4mm overbite. Spacing of 6mm in maxilla and 10 mm in mandible (due to missing 36) was observed. The width of attached gingiva was adequate in upper and lower anterior region, pathologic migration in relation to 11 and 21, 22, periodontal pockets in relation to 16 (9mm) and 11 (4mm), Grade 1 mobility in relation to 11, 21, 31 and 41 and Grade 3 mobility in relation to 16 were also noticed .

Figure 7: Pretreatment facial and intra-oral photographs.

Radiographic examination: Pretreatment OPG (Figure 8) revealed that he was in a permanent dentition stage with a generalized moderate horizontal bone loss, vertical bone loss in relation to 16 and missing 36. No bony pathology or radiographic signs of TMJ disorder were noticed. Pretreatment Lateral cephalogram (Figure 8, Table 2) showed that both jaws were in a skeletal Class II relationship [SNA = 82^0, SNB = 78^0, ANB = 4^0] with proclined maxillary and mandibular incisors [UI-NA = 35(10) and LI-NB = 29(6) respectively]. The mandibular plane angle was within normal limits [GoGn-SN = 32^0 and FMA = 27^0]. The nasolabial angle was reduced [76^0].

Figure 8: Pretreatment OPG and Lateral Cephalogram.

Measurements	Pre Treatment	Post Treatment
SNA	82°	81°
SNB	78°	78°
ANB	4°	3°
A-Na vertical	1	1
Pog-N vert	-4	-4
UI-NA	35(10)	25(4)
LI-NB	29(6)	24(4)
GoGn-SN	32°	32°
FMA	27°	27°
IMPA	96°	92°
Nasolabial angle	76°	92°

Table 2: Pre and post treatment cephalometric values.

Diagnosis and Treatment Objectives: He was diagnosed as a case of skeletally and dentally Class II with chronic moderate generalized periodontitis, increased overjet and overbite, acute nasolabial angle, a non-consonant smile arc, pathologic migration in maxillary anteriors secondary to periodontal disease, missing 36 and hopeless prognosis in relation to 16. The treatment objectives were (1) extraction of 16 (2) improvement of periodontal health (3) enhancement of smile aesthetics (4) leveling and alignment of teeth (5) achievement of Class I molar canine relationship bilaterally (6) intrusion and retraction of upper front teeth (6) finishing and detailing of occlusion (7) long term retention (8) Sinus lift and implant prosthesis in relation to 16 (9) implant prosthesis in relation to 36. Prognosis of his treatment was considered good as periodontal condition was stable.

Treatment plan: The treatment plan included extraction of 16, fixed orthodontic mechanotherapy with 0.018 X 0.025 inch Roth PEA and implant prosthesis in relation to

16 (after sinus lift) and 36. The treatment plan was discussed and agreed upon by the patient. He however, did not agree for sinus lift surgery for dental implant placement in relation to 16 and hence a removable prosthesis was planned for 16 and implant prosthesis for 36.

Treatment progress: The case was bonded with 0.018 Roth PEA and leveling and alignment of teeth was carried out with continuous arch wires beginning with 0.012 inch Niti and progressed upto 0.016 X 0.022 inch SS working arch wires in both arches (Figure 9). The remaining spaces were closed by applying light forces using continuous elastomeric chains. Space was maintained in relation to 16 and 36 by a passive closed coil spring. After completion of space closure, an implant was placed in relation to 36. Prosthesis was placed after confirming osseointegration of the implant (four months). Finishing and detailing was carried out and the case was debonded. A removable prosthesis was delivered for replacement of 16. Fixed spiral retainers were placed in both upper and lower arches for long term retention. Total treatment duration was 14 months.

Figure 9: Bonding with 0.018 Roth PEA and application of light continuous forces.

Treatment results: Post-treatment facial photographs (Figure 10) show a marked improvement in facial profile, smile aesthetics and confidence of the patient. A Class I molar and canine relationship with an optimum overjet and overbite (2mm and 2mm respectively) was achieved along with a functional occlusion. The mean probing depth was reduced and a marked improvement in periodontal health was noticed. Posttreatment OPG (Figure 11) showed achievement of a favorable crown/root ratio. The horizontal bony defected transformed into vertical defects in upper anterior, upper posterior and lower posterior region which were more conductive to regenerative osseous procedures. No significant root resorption or reduction in alveolar bone height was observed posttreatment. Posttreatment Lateral cephalogram (Figure 11, Table 2) did not reveal any significant skeletal changes [SNA = 81^0, SNB = 78^0, ANB = 3^0]. Marked reduction in proclination of maxillary and mandibular incisors was noticed [UI-NA = 25(4) and LI-NB = 24(4) respectively]. Improvement in nasolabial angle was [92^0] was also observed. The entire treatment duration was 14 months. At the end of treatment, the patient was highly satisfied with his facial and dental appearance as well as occlusion. He was referred back to the Department of Periodontology for post orthodontic periodontal therapy and regenerative osseous procedures.

Figure 10: Post treatment facial and intra-oral photographs.

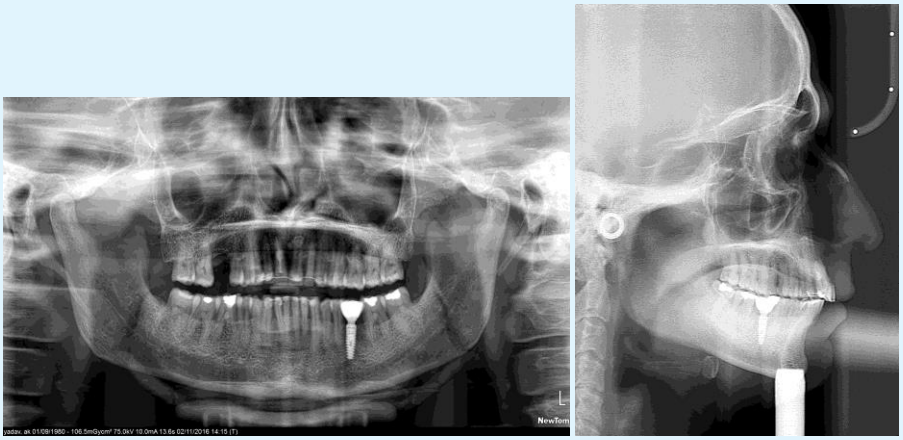

Figure 11: Post treatment OPG and Lateral Cephalogram.

Discussion

The number of adult patients seeking orthodontic treatment is increasing manifold in recent times (about 20-25% orthodontic cases are adults). Improvement in facial aesthetics is the main motive apart from difficulty in chewing and oral hygiene maintenance. Adult patients are both biologically and psychologically different from children and adolescents. Hence, realistic goals and treatment procedures should be explained to them and written consent to be taken. Both the beneficial effects and side effects of the treatment like gingival recessions, gingival clefts and invaginations, bony dehiscences, root resorption etc. should be explained to the patient [7-9]. In both the cases presented here, this approach was followed and written consents were obtained. Literature suggests that periodontally compromised patients can be successfully treated orthodontically without any detrimental effects on periodontium provided sufficient plaque control and oral hygiene maintenance has been achieved during the pre-orthodontic periodontal therapy. The patient is usually observed for a period of 2 months after periodontal therapy to assess if he/she is able to maintain the desired oral hygiene failing which the periodontium may be adversely affected during the orthodontic treatment [10]. In the present case series, an adequate plaque control was achieved pre-orthodontically by scaling, root planing and curettage and the patients were followed up for 2 months for their suitability to orthodontic treatment. In the orthodontic phase, the biomechanics should be tailor made for individual patients and should be based on findings and treatment objectives. Light forces, skeletal anchorage, minimal use of looped mechanics (due to difficulty in oral hygiene maintenance), proper calculation of anchorage requirements, active and reactive forces and their moments should be done [4,11-13]. In the present case series, the same was followed. Light continuous wires starting from 0.012 Niti were used and complex wire bending and loops were avoided which could jeopardize oral hygiene maintenance. TADs were used for skeletal anchorage to apply light continuous forces with Niti closed coil springs in case 1 and in case 2, since most of the spaces were closed during leveling and alignment, minor spaces were closed by light forces with an elastomeric chain. No significant root resorption was observed posttreatment in both cases as seen from post treatment OPG.

An adequate width of attached gingiva is essential for periodontal health during orthodontic treatment and thin alveolar and gingival biotypes may be associated with apical displacement of gingiva during tooth movement especially in presence of gingival inflammation [11,14,15]. On the contrary, there are studies which suggest that even a thin band of attached gingiva can withstand light orthodontic forces without recession [16,17]. So we decided to observe for occurrence of gingival recession in case 1 where patient had a thin alveolar biotype pretreatment and intervene if required instead of pre-treatment recession coverage. Gingival recession (4mm) was noticed after leveling and alignment as patient couldn't comply with oral hygiene instructions and thus, a free gingival graft was harvested from palatal gingiva to augment the width of attached gingiva in lower anterior region. Retention is a continuation of orthodontic treatment and in periodontally compromised patients, a permanent or long term retention is often required [5,10,11]. In the present case series, bonded spiral wire lingual retainers were placed in both arches.

Implant prosthesis is considered as the best option for definitive replacement of teeth without affecting adjacent teeth [10]. Implant prosthesis was considered for replacement of 36 in case 2. But in relation to 16 in case 2 and in case 1, removable prosthesis were considered as patients did not consent for additional surgeries as already mentioned in the case report. Both patients were referred back to the Department of Periodontology for post orthodontic periodontal therapy and are under regular follow up and maintenance therapy.

Conclusion

This case series describes successful interdisciplinary management of two periodontally compromised adult orthodontic cases. An interdisciplinary team approach, holistic diagnosis and treatment planning, a custom made plan (force magnitude; appliance, arch wire and biomechanics selection), meticulous periodontal therapy pre and post orthodontic therapy and excellent patient co-operation were the key to success.

References

1. Proffit W (2000) Special considerations in comprehensive treatment for adults. In: Proffit W, Fields HW, (eds.), Contemporary Orthodontics. (3rd edn), St Louis, Mosby; pp. 644-74.

2. Tripuwabhrut P, Brudvik P, Fristad I, Rethnam S (2010) Experimental orthodontic tooth movement and extensive root resorption: periodontal and pulpal changes. Eur J Oral Sci 118(6): 596-603.

3. Crescini A, Nieri M, Buti J, Baccetti T, Prato GPP (2007) Orthodontic and periodontal outcomes of treated impacted maxillary canines: An appraisal of prognostic factors. Angle Orthodontist 77(4): 571-577.

4. Diedrich P, Fritz U, Kinzinger G (2004) Inter-relationship between periodontics and adult orthodontics. Clinical and case reports 1(3): 143-149.

5. Festila D, Roman R, Ghergie M (2016) Orthodontic treatment in periodontally affected patients: a case report. HVM Bioflux 8(1): 1-4.

6. Goyal S (2013) Orthodontic management of a periodontally-Compromised adult patient. Rwanda Medical Journal 70(1): 31-35.

7. Kapoor A, Singhal L, Kapoor S, Kapoor A (2016) Ortho-perio relationships: an overview. Int J Prev Clin Dent Research 3(3): 206-212.

8. Bagga DK (2010) Adult orthodontics versus adolescent orthodontics: An overview. J Oral Health Comm Dent 4(2): 42-47.

9. Cardaropoli D (2009) Orthodontics for the adult periodontal patient: first or second choice treatment? Prog Orthod 10(2): 88-96.

10. Feng X, Oba T, Oba Y, Moriyama K (2005) An Interdisciplinary approach for improved functional and esthetic results in a periodontally compromised adult patient. Angle Orthod 75(6): 1061-1070.

11. Panwar M, Jayan B, Arora V, Singh S (2014) Orthodontic management of dentition in patients with periodontally compromised dentition. J Indian Soc Periodontol 18(2): 200-204.

12. Lee TC, Leung MT, Wong RW, Rabie AB (2008) Versatility of skeletal anchorage in orthodontics. World J Orhod 9(3): 221-232.

13. Leung MT, Lee TC, Rabie AB, Wong RW (2008) Use of miniscrews and miniplates in orthodontics. J Oral Maxillofac Surg 66(7): 1461-1466.

14. Lang NP, Loe H (1972) The relationship between the width of keratinized gingiva and gingival health. J Periodontol 43(10): 623-627.

15. Wennstrom J, Lindhe J, Nyman S (1981) Role of keratinized gingiva for gingival health, Clinical and histologic study of normal and regenerated gingival tissue in dogs. J Clin Periodontol 8(4): 311-328.

16. Coatoam GW, Behrents RG, Bissada NF (1981) The width of keratinized gingiva during orthodontic treatment: its significance and impact on periodontal status. J Periodontol 52(6): 307-313.

17. Dorfman HS (1978) Mucogingival changes resulting from mandibular incisor tooth movement. Am J Orthod 74(3): 286-297.