

Guided tissue regeneration and orthodontic movement for the treatment of pathological migration in esthetic zone

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Abstract:

Pathological migration is one of the chief complaints of patients-seeking dental treatment. It results in difficulty in mastication, speech, poor esthetic appearance, and decreased self-confidence. The prevalence ranges from 21.73% to 55.8% in patients having moderate-to-severe periodontitis. In this presentation, a 38-year-old adult male, systemically healthy, nonsmoking presented with the complaint of mobility and forward displacement of maxillary anterior tooth causing poor esthetic appearance and low self-esteem. He was treated with the interdisciplinary approach of periodontal and orthodontic intervention. Two-year posttreatment follow-up shows significant improvement in esthetics, periodontal status, and boosted the self-confidence of the patient and improved the oral health-related quality of life. This case emphasizes the importance of regenerative therapy and orthodontic movement for the treatment of periodontally compromised pathologically migrated tooth in adult patient.

Key words:

Adult orthodontics, pathological migration, severe periodontitis

INTRODUCTION

Pathological tooth migration is one of the prime concerns of patients to seek periodontal therapy as it significantly affects self-esteem of patients. The etiology of pathological migration is multifactorial and the major causative factor is bone loss followed by tooth loss and gingival inflammation.^[1]

Treatment of pathological migration depends on severity of condition. In early and localized cases, spontaneous reposition has been found after nonsurgical and surgical periodontal therapy.^[2] Moderate-to-severe cases require an interdisciplinary approach involving periodontal intervention followed by orthodontic or/and prosthodontic treatment. Extraction and replacement of teeth are required in advanced cases.^[3]

The aim of this case report is to emphasize the importance of combined periodontal-orthodontic intervention in a severe pathologically migrated anterior tooth in an adult chronic periodontitis patient.

CASE REPORT

A 38-year-old, systemically healthy, nonsmoking male presented with a complaint of mobility,

forward displacement, and spacing between upper front teeth which slowly increased for 3–4 years. The patient was electrician by occupation and had a habit of cutting wires with anterior teeth. Intraoral examination revealed a pocket-probing depth of 11 mm on the mesial side of 21 and a gingival recession of 2 mm [Figure 1]. There was Grade II mobility with 21 and diastema of 6 mm between 11 and 21. Fremitus test was positive and tension test negative. Overjet with pathologically migrated tooth was 8 mm and overbite was 3.5 mm. On radiological examination, intraoral periapical radiograph showed around 80% bone loss with 21 and a vertical defect with mesial aspect

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of 21 [Figure 2]. Intrabony defect was further assessed by transgingival probing.

On clinical and radiological assessment, the diagnosis was generalized moderate chronic periodontitis with localized severe chronic periodontitis with 21. According to 2017 classification,^[4] diagnosis was generalized Stage II Grade B periodontitis with localized Stage III Grade C periodontitis with 21. It was noticed that unesthetic appearance due to pathological migration affected the self-esteem and quality of life of the patient. Thus, before the treatment, oral health impact profile-14 (OHIP-14) questionnaire was given to the patient and a score of 21 was obtained which indicated poor oral health-related quality of life (OHRQoL).^[5]

The patient was referred for endodontic and orthodontic opinion with 21. Pulp vitality tests showed the tooth to be vital and the patient was not having any painful symptom with 21, and thus, no endodontic treatment was initiated. Treatment objectives were to eliminate the periodontal disease first followed by orthodontic movement for alignment correction. Before the start of treatment, written informed consent was obtained from the patient.



Figure 1: 11-mm PPD with 21. PPD – Pocket-probing depth



Figure 3: Flap reflection and debridement

Nonsurgical periodontal therapy showed remarkable improvements in the periodontal status with resolution of tissue inflammation. However, the periodontal pocket with 21 persisted. The patient was more concerned about the esthetic appearance and did not want to extract and replace the tooth due to economic reasons. The patient was planned for a regenerative periodontal flap surgery with 21 to treat primary periodontal problem. Regenerative surgery was planned before orthodontic treatment as the available bone support was less, tooth was Grade II mobile with deep periodontal pocket which would further deteriorate the periodontal health if orthodontic treatment was initiated first. Furthermore, the resistance center of the periodontally compromised tooth will be shifted to a more apical direction due to bone loss and the applied force will result in unwanted tipping and root resorption.^[6]

Under local anesthesia, full-thickness mucoperiosteal flap using conventional papilla preservation technique was elevated to allow adequate visualization at the surgical site [Figure 3]. A combined intrabony defect with coronal one-walled defect and apical three-walled defect circumferentially extending on the palatal surface was found around 21 after thorough debridement of the granulation tissue [Figure 4]. Guided tissue regeneration was performed by placing demineralized freeze-dried bone allograft (DFDBA), DFDBA graft (TATA Memorial Hospital, Tissue Bank), and chorion membrane (TATA Memorial Hospital, Tissue Bank) over the apical three-walled defect [Figure 5]. Flap was sutured with 3-0, nonresorbable interrupted silk suture. COE Coe-Pak™ (GC America Inc., IL, USA) noneugenol periodontal dressing was given. The patient received antibiotic therapy (amoxicillin 1.5 g/day for 5 days) and analgesic and anti-inflammatory therapy (aceclofenac 100 mg + paracetamol

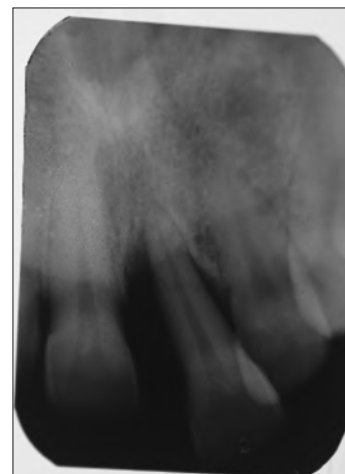


Figure 2: Preoperative IOPA with 21. IOPA – Intraoral periapical radiograph



Figure 4: Combined intrabony defect (coronal one walled and apical three walled)

325 mg + serratiopeptidase 15 mg twice/day for 5 days) and rinsed twice a day for 14 days with chlorhexidine 0.12% mouthwash to reduce postoperative complications, including swelling and pain. The patient was recalled after 14 days for suture removal and good tissue healing was observed. At 1-month recall, mobility of the tooth was reduced to Grade I and extracoronary wire splinting was done to stabilize the tooth during healing period [Figure 6]. The patient was kept under regular follow-up and reinforcement of oral hygiene instructions was done. After 9 months of periodontal surgery and improvement in the periodontal status, the patient was referred for orthodontic treatment [Figure 7].

Orthodontic clinical examination was done and the extraoral and intraoral features are summarized [Tables 1 and 2]. On

radiographic analysis, lateral cephalogram revealed proclined upper and lower incisors underlying a Class I skeletal base with straight profile [Table 3]. Orthodontically patient was diagnosed as Angle's class I type 2 malocclusion, underlying a Class I skeletal base with average growth pattern [Table 4].

Comprehensive orthodontic treatment was planned instead of adjunctive treatment. Nonextraction treatment with retraction and intrusion with 21 and symmetric closure of midline

Table 1: Extraoral analysis

Parameters	Inferences
Facial form	Mesoprosopic
Facial symmetry	No gross facial asymmetry noted
Facial profile	Mild convex
Facial height	Upper facial height/lower facial height: Average
Lips	Potentially competent
Nasolabial angle	Decreased
Mentolabial sulcus	Average

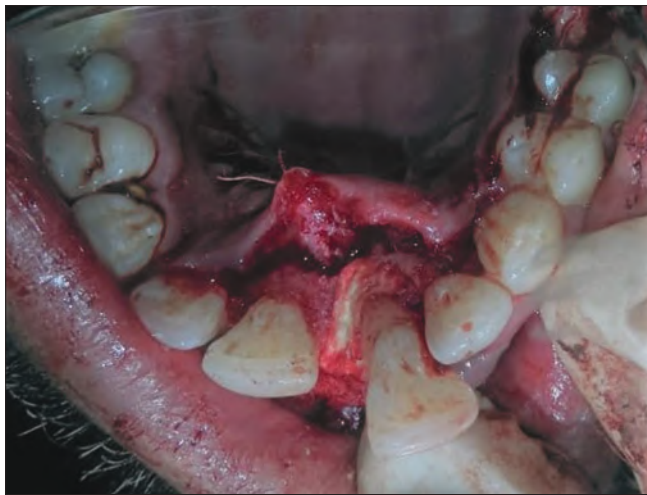


Figure 5: DFDBA graft and chorion membrane placed. DFDBA – Demineralized freeze-dried bone allograft



Figure 7: Nine-month follow-up after periodontal surgery



Figure 9: Debonding and permanent retention



Figure 6: Extracoronary splinting



Figure 8: Progression of orthodontic treatment



Figure 10: (a) Extraoral features – Preoperative view (b) Extraoral features- Postoperative view



Figure 11: One-year follow-up



Figure 12: Reduction in PPD with 21 (2-year follow-up). PPD – Pocket-probing depth

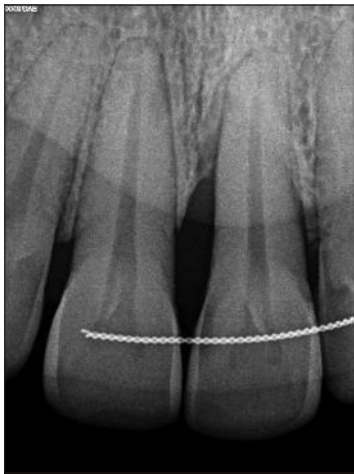


Figure 13: Postoperative radiograph (2-year follow-up)

diastema along with permanent fixed retainers was scheduled. After 2 days of separator placement mesially and distally to the first molars, molar bands (0.180 × 0.005 in) were custom made and cemented with glass ionomer luting cement (D-tech, Pune, India). Preadjusted edgewise MBT brackets (Ortho Organizers, Carlsbad, Calif) of 0.022-in slot were bonded with Transbond XT (3M Unitek, Monrovia, Calif). Teeth units were made on the right and left sides of maxillary arch excluding 21 with figure of eight ligature wire. Alignment and leveling were done using sequences of wires with very light amount of force. After alignment and leveling, a final working wire was placed: 19 × 25-in stainless steel (Orthoforce; G and H Wire, Franklin, Indiana). After 21 days, light elastic force using E chain was applied to close midline diastema [Figure 8]. On closure of diastema, incisors were consolidated using 0.009-in steel ligature wire and retraction was done using closed

Table 2: Intraoral analysis

Parameters	Inference
Teeth present	8 7 6 5 4 3 2 1/1 2 3 4 5 6 7 8 8 7 6 5 4 3 2 1/1 2 3 4 5 6 7 8
Molar relation	Class I on the both the sides
Canine relation	Class I on both the sides
Overjet	1 mm (8 mm with 21)
Overbite	1.5 mm (3.5 mm with 21)
Maxillary arch	U shaped, wide, and symmetric
Mandibular arch	U shaped, wide, and symmetric

mm – Millimetre

Table 3: Cephalometric parameters

Cephalometric parameters	Patient's value
Sagittal skeletal relationships (°)	
SNA	78.5
SNB	77.5
ANB	1
Wits appraisal	0.5 mm
Dental base relationships (mm/°)	
Upper incisor to NA	11/35
Lower incisor to NB	9/30
Lower (IMPA)	102
Dental relationships	
Interincisal angle	112
Vertical skeletal relationships	
Maxmand plane angle	20.5
SN planemand plane	25
FMA	24.5
Soft tissues	
Lower lip to Rickett's E plane (mm)	3
Upper lip to S line	4
Nasolabial angle (°)	85

S – Sella; N – Nasion; A – Point A; B – Point B; IMPA – Incisor mandibular plane angle; FMA – Frankfurt mandibular plane angle

coil spring and settling elastics were advised. Debonding was done followed by fixed lingual retainer placement. Orthodontic treatment resulted in Angle's Class I molar and Simon's Class I canine relationship, corrected midline, normal overjet and overbite, and correction of soft-tissue profile. Smile esthetics and gingival marginal level greatly improved [Figures 9 and 10a, b].

The patient was kept on meticulous oral hygiene maintenance and professional recall regimen. One-year postorthodontic treatment showed stable results with no relapse [Figure 11]. OHIP-14 questionnaire score was reduced to 4 at 1-year follow-up thus showing improvement in the OHRQoL. Improvement in the periodontal parameters by the reduction in pocket-probing depth and intrabony defect was seen at the 2nd-year follow-up [Figures 12 and 13]. The defect size was reduced and converted to one-walled defect which was maintained by nonsurgical periodontal treatment, meticulous oral hygiene, and professional follow-up. Patient's facial esthetics and self-esteem have been vastly improved.

DISCUSSION

Pathological migration is one of the common complications of severe periodontitis and a motivation for the patient to seek dental treatment. Migration of anterior tooth due to occlusal trauma, habits, and diseased periodontium leads to serious esthetic and functional problems. In the present

Table 4: Orthodontic diagnosis

Dimension	Skeletal	Dental	Soft tissue
Anteroposterior	Class I skeletal base	Proclined upper and lower incisors, Class I relationship on both sides Overjet of 8 mm with 21	Protrusive lips and mild convex facial profile
Transverse	-	Midline diastema of 6 mm in maxillary arch	
Vertical	Average mandibular plane angle	Increased overbite of 3.5 mm with 21	

mm – Millimeter

case, pathological tooth migration was due to advanced bone loss which was aggravated by deleterious habit of cutting wire with the same tooth. Thorough nonsurgical periodontal therapy was performed to control the active inflammation as the pressure from the underlying granulation tissue is one of the causes of pathological migration.^[7] On re-evaluation, the inflammation was resolved but periodontal pocket persisted and also intrabony defect was present. Thus, the patient was treated with guided tissue regeneration using DFDBA graft and chorion membrane with the aim of regenerating the apical three-walled defect with 21 as resective osseous surgery would have resulted in compromising available bone support.

Lee *et al.* found spontaneous resolution of drug-induced gingival enlargement and pathological migration after the nonsurgical periodontal treatment and oral hygiene reinforcement without any orthodontic or surgical intervention.^[8] Manor *et al.* also reported spontaneous repositioning of pathologically migrated teeth after periodontal therapy followed by the healing period of 4–8 weeks.^[9] These results may be attributed to the elimination of the tissue edema and granulation tissue followed by healing and repair of the collagen fibers of gingival and transseptal ligaments which maintain the teeth position in the arch.^[2] However, in the present case, there was no repositioning of teeth after the periodontal therapy. This may be due to the presence of severe bone loss on the mesial side of 21. The resolution of large diastema along with proclination of 21 was achieved by orthodontic treatment.

In the present case, reduction in the intrabony defect, residual pocket-probing depth, and gingival recession were seen after the orthodontic treatment. Cardaropoli *et al.* (2006) treated the pathologically migrated teeth in the esthetic zone by orthodontically moving them into the intrabony defects augmented with Bio-Oss collagen.^[10] Cirelli *et al.* (2006) used a multidisciplinary approach with periodontal, orthodontic, and restorative treatment to close diastema due to pathological migrated teeth in esthetic zone.^[11] Thus, these reports show a satisfactory management of pathologically migrated teeth with interdisciplinary approach.

Studies have shown that periodontal disease due to bleeding, swollen gums, oral malodor, tooth mobility, and tooth loss severely affect the self-esteem and quality of life of an individual.^[12] Interdisciplinary treatment in the present case markedly improved the OHRQoL of the individual by reducing the psychological impact due to unesthetic appearance.

Two-year postorthodontic retention showed sustained positive results obtained after periodontal and orthodontic treatment. The defect was reduced to one walled which is maintained by nonsurgical treatment including thorough subgingival scaling and root planing. As resective osseous surgery to eliminate

the defect would compromise available bone support on adjacent tooth and result in gingival recession and loss of interdental papilla in esthetic zone. Regenerative surgery was not attempted postorthodontic treatment as defect was reduced to noncontained one-walled defect.

The patient was kept on meticulous oral hygiene maintenance and regular professional periodontal and orthodontic evaluation after every 3 months to avoid repopulation of the periodontal pockets.^[13] In few patients, orthodontic treatment may accelerate existing active periodontal disease due to inability to remove entire plaque. However, in the present case, active periodontal disease was eliminated before the initiation of orthodontic treatment and the patient was kept under strict maintenance program which resulted in the reduction of the intrabony defect and gain in clinical attachment without deteriorating the periodontal health.

CONCLUSION

Pathologically migrated teeth can be treated with an interdisciplinary approach with the elimination of periodontal disease followed by orthodontic intervention in moderate-to-severe cases. The key to treatment success was the regular monitoring of the oral hygiene status and frequent professional follow-up. Improvement in the esthetics and periodontal status boosted the self-confidence of the patient and improved the quality of life.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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