

Interdisciplinary approach for pathologic tooth migration in advanced periodontal disease patient

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ABSTRACT

Background: Recent treatment trends have included an interdisciplinary approach to cases and have stressed the importance of orthodontic treatment in optimising the prognosis for patients with periodontal disease. Orthodontic intrusion is a reliable method to improve periodontal support as research has previously documented. **Purpose:** This case study demonstrates an interdisciplinary approach to treating a patient with moderately advanced periodontitis disease and pathologic tooth migration (PTM) of the upper left central incisor to enhance structure, function and aesthetics. **Case:** A 46-year-old systemically healthy male patient came with a chief complaint of a protruding and elongated tooth. Clinical examination showed a mobile, extruded incisor along with bleeding on probing and suppuration. Periodontal and radiographic examinations showed generalised horizontal bone loss combined with infrabony defects at the pathologically migrated upper left central incisor. **Case Management:** Periodontal inflammation was treated with a combination of nonsurgical and surgical therapy. Afterward, orthodontic treatment was done using a self-ligating system. The intrusion of a pathologically extruded tooth improved infrabony defects, creating a favourable bone level and probing depth. **Conclusion:** The combination of periodontal–orthodontic therapy achieves satisfactory outcomes if periodontal inflammation is controlled, physiologic forces are used, and oral hygiene is maintained throughout therapy.

Keywords: interdisciplinary; orthodontic; intrusion; periodontitis; pathologic tooth migration

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INTRODUCTION

Pathologic tooth migration (PTM) is a tooth position change due to disruption of the forces that hold it in the normal position. The etiologic factors of PTM are varied; however, periodontal bone loss appears to be a primary factor. PTM may damage patients' smile aesthetics and affect their confidence. To resolve this problem, an interdisciplinary approach is frequently required; it includes periodontal, orthodontic and restorative treatment.^{1,2}

The decision to keep the periodontally involved tooth with PTM necessitates a properly defined treatment plan. Initial periodontal treatment to resolve inflammation and reduce probing depths has to precede orthodontic therapy.^{3,4} Studies imply that a new attachment is possible in association with orthodontic tooth intrusion. Moreover, the procedure has the potential to re-establish a wholesome and well-functioning periodontium with a

favourable aesthetic result.² This case study demonstrates periodontal and orthodontic intervention in a patient with moderately advanced periodontitis combined with PTM of an anterior tooth followed by prosthetic rehabilitation to enhance structure, function and aesthetics, while emphasising the role of an interdisciplinary approach.

CASE

A 46-year-old male with an acute periodontal lesion, generalised periodontitis, along with functional and aesthetic issues was referred to a periodontist. His upper left central incisor had migrated and was showing mobility with a history of intermittent swelling and suppuration (Figure 1A and 1B). The patient's chief concern was his appearance and impaired function.

He was a non-smoker and in good general health. Clinical examination revealed probing depth around 4–10 mm, recession 1–5 mm and teeth mobility grade I and II on anterior teeth and molars. The most severe attachment loss was found on the extruded and protruded upper left central incisor with Miller mobility grade II and recession Class III. Initial probing depths were around 9–10 mm with bleeding on probing and suppuration. The vitality test on the severely affected tooth was negative. A dental radiograph revealed severe bone loss, widened periodontal space and loss of lamina dura (Figure 1C).

Patient was diagnosed with generalised moderate to advanced periodontitis with an acute periodontal lesion on the upper left central incisor. The prognosis for the upper left central incisor was deemed hopeless.⁵ Treatment options included tooth extraction and prosthetic replacement. The best options for retaining the tooth were regenerative periodontal surgery followed by orthodontic treatment. After a thorough explanation, the patient preferred the regenerative–orthodontic approach and signed the informed consent form.

CASE MANAGEMENT

The treatment started with cause-related non-surgical periodontal therapy, which included plaque control, scaling, root planing and temporary periodontal splint placement using wire, followed by subgingival

administration of metronidazole (Ti–Es). Since the tooth vitality tested negative, root canal treatment was carried out. Four weeks later, there was no bleeding on probing and suppuration although periodontal pockets remained deep.

Guided tissue regeneration was done using demineralised freeze-dried bone allograft and collagen membrane to reduce vertical bone loss in the upper anterior region (Figure 2). Six months after surgery, a re-evaluation showed a stable periodontal condition with reduced probing depth (2–5 mm), no sign of inflammation and good oral hygiene. After removal of the temporary splinting, orthodontic treatment was started.

The pre-orthodontic examination revealed skeletal Class II malocclusion with overjet 7 mm, overbite 3 mm and A point – Nasion – B point angle 7° (Figure 3A). Canine relationship Class I was on the left side and Class II — on the right side along with bilateral first molar relationship Class II (Figure 3B and C). During centric occlusion, there was interference between the upper left central incisor and lower lip (seen as a red X in Figure 3A). The patient had refused to undergo more invasive procedures such as teeth extraction or surgical correction. The orthodontic treatment goals were to align the teeth, achieve a stable occlusion and improve the smile aesthetics.

The treatment started using Roth self-ligating brackets with a 0.022 x 0.028 in the slot. Bonded orthodontic molar tubes were used because poorly adapted molar bands could harm the periodontal tissue. The treatment began with

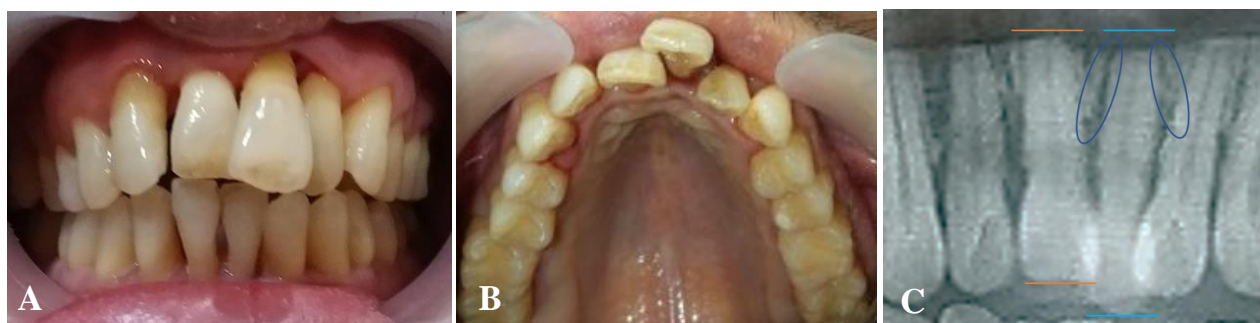


Figure 1. Pre-treatment intraoral facial view (A), upper occlusal view (B) and dental radiograph showed extruded left central incisor (blue lines) as compared with the neighbouring tooth (orange lines) (C).

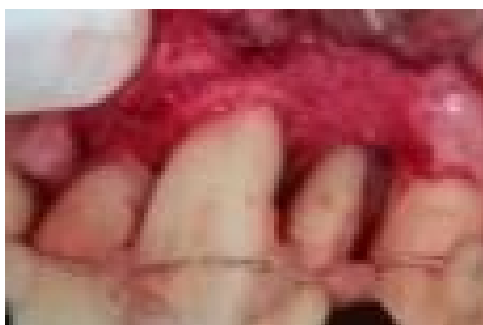


Figure 2. Surgical treatment.

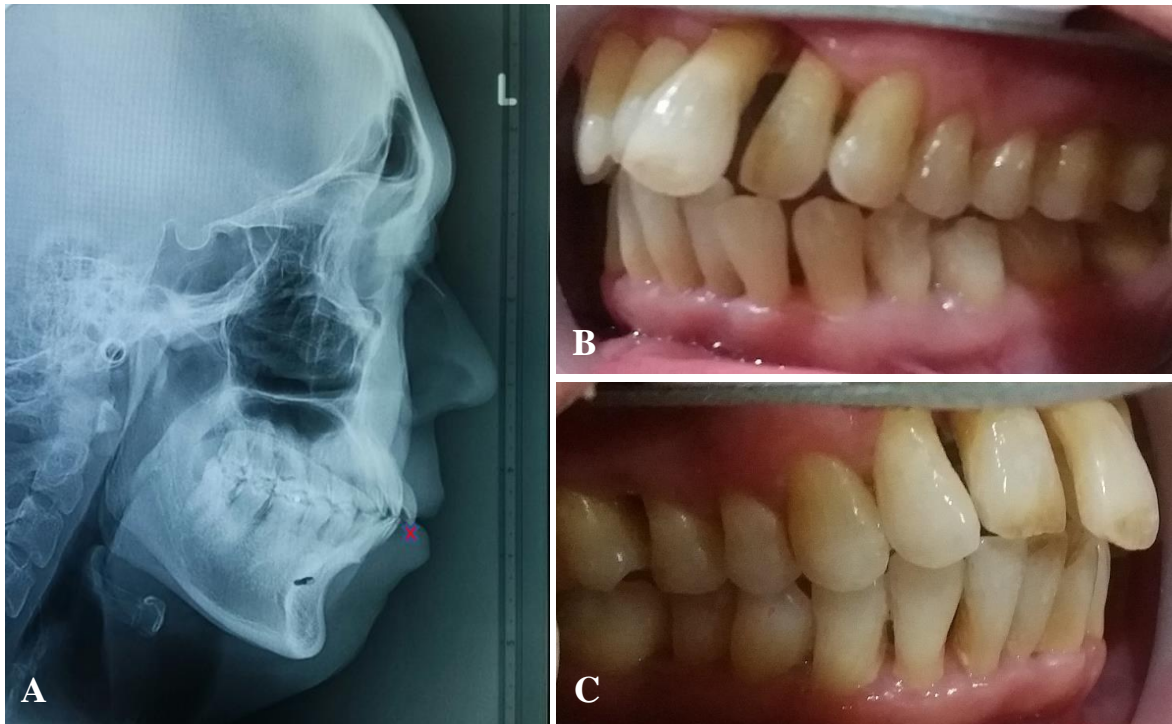


Figure 3. Pre-orthodontic lateral cephalometry with X sign indicating left central incisor interference with lower lip during centric occlusion (A), left view of occlusion (B) and right view of occlusion (C).

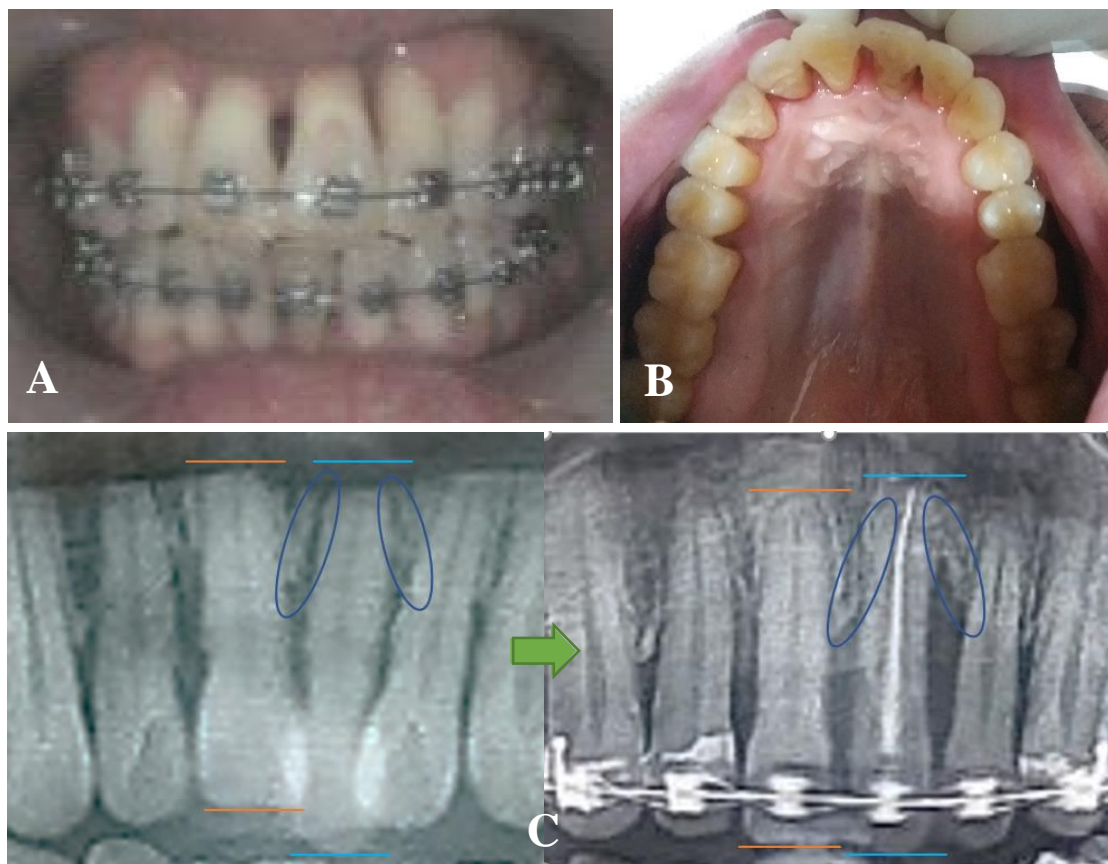


Figure 4. Orthodontic treatment intraoral facial view (A), aligned teeth after debonding (B), and pre- and post-orthodontic radiograph comparison showing intruded left central incisor (blue line on incisal plane was levelled with orange line) and increased density of surrounding alveolar bone (inside the blue circles) (C).



Figure 5. Post-treatment extra oral-facial view (A) and normal probing depth (2 mm) on left central incisor without any sign of inflammation during four-month control (B).

0.012-in, 0.014-in, 0.016-in and 0.016–0.022 in NiTi to align and level the teeth with light force for nine months. Gradually, the left central incisor was intruded and brought to the occlusal plane (Figure 4A).

Retraction of the upper front teeth was performed with 0.017 x 0.025-in stainless steel arch wire with cuspid hooks supported by Class II elastics for 6 months. The patient was then kept in a retentive phase to stabilise the teeth in a new position for 5 months. The total treatment time was 20 months. Before debonding (Figure 4B), a dental radiograph was taken. A comparison of pre- and post-orthodontic radiographs revealed intruded upper left central incisor (seen as blue lines compared with red lines in Figure 4C) with no evidence of root resorption, normal periodontal space, intact lamina dura and increased density of alveolar bone (seen inside blue circles in Figure 4C).

After debonding, the patient had an improved smile with no interference between the upper left central incisor and lower lip during centric occlusion. No mobility observed along with normal overjet and overbite. Removable Hawley-type retainers were chosen to facilitate patient's oral hygiene care.

The significant deficiency in gingival scallop since the beginning of treatment was not improved to a satisfactory level, even after intrusive orthodontic movement. Afterwards, the patient was referred for restorative treatment using dental veneers to close black triangles and improve his smile (Figure 5A). At the end of treatment, the patient was pleased with the results provided by comprehensive dental treatments. Periodic follow-ups were scheduled along with continuous reinforcement of oral hygiene instruction. Four months after restorative treatment, re-evaluation revealed normal probing depth within 2 mm (Figure 5B) without any sign of inflammation.

DISCUSSION

Pathologic tooth migration is a common complication of moderate to severe periodontitis and often becomes the motivation to seek treatment. Occlusal trauma and periodontitis are mutually aggravated due to PTM. Common consequences of PTM are greater loss of attachment, extrusion and mobility of the displaced tooth. Periodontitis patients often suffer from extrusion and spacing of anterior teeth, resulting in functional and aesthetic issues. Orthodontic correction in these cases can relieve occlusal trauma, stabilise the dentition and enhance the periodontal support.^{1,2}

Several studies have shown that orthodontic treatment can be done in stabilised periodontal patients.¹ In this case, both nonsurgical and surgical periodontal therapies were completed prior to orthodontic treatment in order to eliminate inflammation. Re-evaluation six months later revealed no inflammation, reduced pocket depth, and reduced tooth mobility. The orthodontic treatment was initiated along with professional periodontal maintenance and meticulous plaque control procedures to ensure the stability of long-term treatment.^{3,4}

At the beginning of treatment, NiTi wires were chosen in order to exert light force during aligning and levelling.⁵ Bite correction and finishing stages were then completed using stainless steel wires. Bonded orthodontic molar tubes were used because poorly adapted molar bands would damage the subgingival supporting tissues, leading to infection and subsequent alveolar bone loss.⁶

Sabatowski et al.⁷ suggest that orthodontic tooth movement can also enhance the periodontal ligament cells mitotic activity. Intrusion and retraction towards the bone have a potential osteogenicity. These movements

encourage bone apposition and sometimes improve bony defect.⁷ Kumar et al.¹ claim that intrusive movement promotes new attachment. This movement also appears to be more effective and less invasive in realigning an extruded tooth.¹

After debonding, periodontally compromised patients may have troubles such as a relapse. Therefore, they require permanent retention that can be achieved by fixed or removable retainers.⁸ In this case, removable Hawley retainers were used in both arches to facilitate the patient's plaque control procedure.⁹ Upon completion of orthodontic treatment, the patient was scheduled for follow-up every 4 months to maintain his periodontal condition.

A combined periodontal–orthodontic approach can help modify the papillae height. The goal is to reduce the distance between the alveolar bone crest and the interproximal contact point. If this distance is 5 mm, 98% of the embrasure papilla space can be completely filled; when the distance is 6 mm, only 56% can be completely filled; and when it is near 7 mm, the percentage goes down to 27%. When the distance is about 10 mm, the space cannot be reduced.¹⁰ In this case, due to the severe bone loss from previous inflammation, the distance was around 11 mm, even after intrusive movement. Hence, restorative treatment using dental veneers was finally chosen to close the black triangles and improve patient's smile.

Treatment for periodontitis patient with PTM was complex due to the interdisciplinary treatments needed. The keys to achieve satisfactory outcomes are complete

elimination of inflammation, controlled orthodontic force and adequate oral hygiene maintenance.

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