



PATHOLOGIC TOOTH MIGRATION IN PATIENTS WITH PERIODONTAL DISEASE: A CLINICAL PERSPECTIVE

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<p>Article Info Received 15/08/2014 Revised 27/08/2014 Accepted 22/09/2014</p> <p>Key words: Periodontal disease, Pathologic Tooth Migration, Periodontal Therapy, Reactive Repositioning, Multidisciplinary Therapy.</p>	<p>ABSTRACT Pathologic tooth migration is a common complication of periodontal disease and most frequently affects the anterior teeth. Many a times, pathologically migrated tooth or teeth can have a deep negative impact on self-esteem and psyche of patients and often motivates them to seek dental care. The etiology being complex and multifactorial, correction of pathologic tooth migration may involve either periodontal therapy alone or a multidisciplinary approach involving periodontal, orthodontic and restorative treatments.</p>
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INTRODUCTION

The position of teeth in the dental arch depends on the health and height of the periodontium and on the forces exerted upon the tooth, mainly occlusion and pressure of lips, cheeks and tongue. The alteration of any of these factors provokes a sequence of interrelated changes in the environment of a single tooth or of a group of teeth that results in pathological migration [1]. Therefore, pathological tooth migration (PTM) can be defined as tooth displacement that occurs when the balance among the factors which maintain physiologic tooth position is disturbed by periodontal disease [2].

PTM related to periodontal disease is one of the most common chief complaints of periodontal patients and it most commonly occurs in the anterior region (Figures 1 and 2). Pathologic migration of anterior teeth is an esthetic and functional problem associated with advanced periodontal disease, may impact patients, socially as well

as psychologically, and becomes a motivation to seek dental care [3-5].

TYPES AND DEGREES

Prevalence of PTM among patients with periodontal disease has been reported to range from 30.03% to 55.8 % [5]. PTM can present clinically in different forms including facial flaring, diastema, extrusion, rotation, and tilting of affected tooth or a group of teeth, with most patients appearing to have combined forms [4,5]. According to a study by Towfighi et al, facial flaring (90%) and diastema (88.6%) were recorded as the most frequent kinds of PTM observed in patients with moderate to severe periodontitis [6]. Costa *et al* evaluated the periodontal conditions of anterior teeth that presented pathologic migration in patients with chronic periodontitis and found that the most prevalent kind of pathologic migration in periodontal patients was facial flaring, which



was associated to higher levels of bone loss. In addition, higher percentage of bone loss and greater attachment loss in anterior teeth with pathological migration were observed when compared to non-migrated anterior teeth [1]. Different degrees of PTM may be encountered as shown (Table 1).

ETIOLOGY

The etiology of PTM is complex as well as multifactorial and may include the following [1,3-7]:

- a) periodontal attachment loss
- b) pressure produced from inflammatory tissues within periodontal pockets
- c) occlusal factors such as posterior bite collapse from loss of posterior teeth, class II malocclusion, occlusal interferences, anterior component of force, protrusive functional patterns of mastication, bruxism, and shortened dental arches
- d) pressure from soft tissues like the tongue, lip, cheeks and labial frenum
- e) gingival hyperplasia induced by medications such as phenytoin, cyclosporine, and calcium channel blockers
- f) eruption force
- g) habits such as lip and tongue habits, fingernail biting, thumb sucking, pipe smoking, and playing wind instruments

However, evidence-based literature suggests that destruction of tooth supporting structures is the most relevant factor associated with pathological migration [6].

It is believed that as periodontal disease begins, the normally tightly adapted gingival tissues lose their tonicity, and swelling produces a continuous light load on the tooth surface. Loss of the attachment apparatus in combination with a non-periodontal condition such as excess occlusal force leads to a progressive migration of the tooth [2,3].

TREATMENT

It is important that the etiology of PTM must be determined and prognosis of involved tooth or teeth, as the case may be, should be carefully evaluated before initiating treatment [3,4].

Periodontal Therapy

Early stages of PTM can be managed either by non-surgical periodontal therapy alone or occasionally with the combination of surgical periodontal therapy (including regenerative therapy), but longstanding cases might require adjunctive or conventional orthodontic therapy [8].

Several case reports have demonstrated success with periodontal therapy alone causing spontaneous correction of PTM by reactive repositioning [9-11]. Reactive repositioning may be defined as tooth movement that occurs without the use of orthodontic appliances leading to spontaneous resolution of PTM. Reactive repositioning, as a result of periodontal treatment (non-surgical and surgical therapy) occurs within weeks and

tends to move rapidly at the beginning of therapy and then slow down [4,9,12].

The physiological mechanism leading to reactive repositioning of migrated teeth after periodontal therapy has not been documented. One of the explanations could be that following periodontal therapy there is a reduction in edema and inflammatory cell infiltration of the soft tissues, resulting in the reduction of erythema and shrinkage of soft tissues. With this, healthy collagen fibers replace the inflammatory cell infiltrate and may contribute to re-establishment of a normal equilibrium of forces leading to reactive movement of migrated tooth to its original position [8,9]. Also, during the healing process, as fibroblasts populate the newly formed granulation tissue, wound contraction occurs and this contributes to the repositioning of the tooth [9,13].

Gaumet *et al* studied 16 patients with 33 diastema sites of anterior teeth that had developed in the last 5 years, of which, partial and complete diastema closure was obtained in 49% and 36% of the teeth respectively after scaling and root planing (SRP). When patients received surgical treatment (open flap debridement or guided tissue regeneration with demineralized freeze dried bone allograft), 52% of the teeth had complete diastema closure without additional orthodontic therapy. It was concluded that, if a recently formed diastema of anterior teeth associated with periodontal disease is ≤ 1 mm in dimension, complete closure is predictable after periodontal therapy [9].

However, some studies have indicated closure of even wider spaces [10,11]. Sato *et al* reported a case in which spontaneous correction of pathologic tooth migration including 3 mm diastema occurred following non-surgical periodontal therapy [10]. Brunsvold *et al* reported a case with 2 mm diastema between maxillary right lateral and central incisors with severe periodontitis, which was corrected without orthodontic appliances following nonsurgical and surgical periodontal therapy. However, the closure of diastema was noticed at 4 months postoperatively with no relapse at least one year following therapy [11].

Multidisciplinary Therapy

The treatment of moderate to severe cases of PTM may be complex and time consuming and often requires a multidisciplinary approach including periodontal, orthodontic and restorative therapy. Appropriate case selection and careful treatment planning are critical to a successful outcome and patient satisfaction in multidisciplinary cases. Prior to finalizing the esthetic design, a treatment plan should be developed with comprehensive examinations and smile analysis, as well as good understanding of the patient's expectations [3,14].

Re *et al* evaluated 267 patients with severe periodontitis and PTM, of which half of them were treated with scaling and root planning (SRP). In the remaining half of patients, who were surgically treated, orthodontics was



initiated one week post-surgery followed by fixed retention after completion of orthodontic treatment. Follow-up period of up to 12 years indicated significant improvements in anterior teeth realignment, probing depths and bleeding on probing [4,15]. Other case reports have demonstrated successful outcomes with SRP, open flap for debridement and guided tissue regeneration techniques in combination with orthodontic treatment [3,4,16-21].

In cases where orthodontic therapy is needed, control of inflammation during active treatment, the use of light forces and fixed retention are recommended [4,20]. Orthodontically moving teeth in the presence of inflammation can result in increased attachment loss [21]. Post-surgical periodontal maintenance is therefore imperative in patients undergoing active orthodontic treatment as part of their overall treatment for PTM and case reports have shown that both one and three month recall intervals seem appropriate [4,15,18]. Fixed orthodontic retention is recommended to reduce the risk of

relapse of PTM by better distributing occlusal forces in a treated but reduced periodontium [4,15]. Maintenance of the treatment result of pathologic migration is dependent on the continuous preservation of periodontal health [3].

Extraction

From clinical observations, it appears that a considerable number of cases of severe PTM have to be treated by extraction, the reasons being severe alveolar bone loss, expensive and time-consuming therapy [3,14].

PREVENTION

Prevention of PTM is beneficial because severe PTM can be psychologically destructive and costly often requiring complex and longer treatment time involving multiple disciplines. Since periodontal disease must be present for PTM to occur, prevention and early treatment of periodontal disease is recommended [4].

Table 1. Degrees of Pathologic Tooth Migration [5]

Degrees	Clinical Signs
Degree 1	A unilateral labial drifting and extrusion in the maxillary and mandibular anterior teeth creating diastema. It is weakened by loss of periodontal support and posterior deflective contact.
Degree 2	Both maxillary and mandibular anterior incisors drift labially and extrude, creating facial flaring in the maxilla and crowding in the mandible.
Degree 3	Reduction in periodontal support leads to further migration of the teeth and mutilation of the occlusion. The maxillary and mandibular anterior incisors continue to drift and extrude, creating severe facial flaring with crowding in the maxilla and extreme crowding in the mandible.
Degree 4	Missing anterior teeth with advanced teeth migration. Occlusal disharmonies created by pathologic migration of teeth traumatize the supporting tissues of the periodontium and aggravate the destruction caused by the inflammation.

Figure 1. Pathologic migration of anterior teeth (labial view)



Figure 2. Pathologic migration of anterior teeth (occlusal view)



CONCLUSION

PTM is a common finding in patients with periodontal disease. Early identification of the potential and contributory factors of PTM remains a crucial factor in achieving success and also restoring the patient’s psychological wellbeing. Depending on the severity of

PTM, interdisciplinary forms of therapy can be successfully implemented to improve the prognosis of affected teeth. Because of its clinical importance, higher prevalence and direct relationship to periodontal attachment loss, more research needs to be undertaken for thorough evaluation of PTM.

REFERENCES

1. Costa MR, Silverio KG, Rossa CJ, Cirelli JA (2004). Periodontal conditions of teeth presenting pathologic migration. *Braz Oral Res*, 18(4), 301-305.



2. Carranza FA (2006). Periodontal response to external forces. In, Newman MG, Takei HH, Klokkevold PR and Carranza FA (eds.), Carranza's Clinical Periodontology, 10th edn. London, W.B. Saunders Company. Chapter 29, 469-479.
3. Cirelli JA, Cirelli CC, Holzhausen M, Martins LP, Brandao CH (2006). Combined periodontal, orthodontic, and restorative treatment of pathologic migration of anterior teeth, a case report. *Int J Periodontics Restorative Dent*, 26(5), 501-506.
4. Bahrani Y, Roman I (2011). Pathologic tooth migration. *Clinical Update*, 33(3), 1-2.
5. Brunsvold MA (2005). Pathologic tooth migration. *J Periodontol*, 76(6), 859-866.
6. Towfighi PP, Brunsvold MA, Storey AT, Arnold RM, Willman DE, McMahan CA (1997). Pathologic migration of anterior teeth in patients with moderate to severe periodontitis. *J Periodontol*, 68(10), 967-972.
7. Martinez-Canut P, Carrasquer A, Magan R, Lorca A (1997). A study on factors associated with pathologic tooth migration. *J Clin Periodontol*, 24(7), 492-497.
8. Agrawal N, Siddani PS (2011). Reactive positioning of pathologically migrated tooth following non-surgical periodontal therapy. *Indian J Dent Res*, 22, 591-593.
9. Gaumet PE, Brunsvold MI, McMahan CA (1999). Spontaneous repositioning of pathologically migrated teeth. *J Periodontol*, 70(10), 1177-1184.
10. Sato S, Ujiie H, Ito K (2004). Spontaneous correction of pathologic tooth migration and reduced infrabony pockets following nonsurgical periodontal therapy, a case report. *Int J Periodontics Restorative Dent*, 24(5), 456-461.
11. Brunsvold M, Zammit K, Dongari A (1997). Spontaneous correction of pathologic migration following periodontal therapy. *Int J Peridont Rest Dent*, 17, 183-189.
12. Ross IF (1963). Reactive positioning and improved gingival architecture. *J Periodontol*, 34, 444-446.
13. Gabbiani G, Ryan GB, Majno G (1971). Presence of modified fibroblasts in granulation tissue and their possible role in wound contraction. *Experientia*, 27, 549-550.
14. Lee JY (2008). Combined periodontal regenerative and prosthetic treatment of pathologic migration of anterior teeth. *J Korean Acad Periodontol*, 38, 405-412.
15. Re S, Corrente G, Abundo R, Cardaropoli D (2000). Orthodontic treatment in periodontally compromised patients, 12-year report. *Int J Periodontics Restorative Dent*, 20, 31-39.
16. Maeda S, Maeda Y, Ono Y, Nakamura K, Sasaki T (2005). Interdisciplinary treatment of a patient with severe pathologic tooth migration caused by localized aggressive periodontitis. *Am J Orthod Dentofacial Orthop*, 127(3), 374-384.
17. Corrente G, Abundo R, Re S, Cardaropoli D, Cardaropoli G (2003). Orthodontic movement into intrabony defects in patients with advanced periodontal disease, A clinical and radiologic study. *J Periodontol*, 74, 1104-1109.
18. Ghezzi C, Masiero S, Silvestri M, Zanotti G, Rasperini G (2008). Orthodontic treatment of periodontally involved teeth after tissue regeneration. *Int J Periodontics Restorative Dent*, 28, 559-567.
19. Passanezi E, Janson M, Janson G, Sant'Anna A, de Freitas M, Henriques J (2007). Interdisciplinary treatment of localized juvenile periodontitis. *Am J Othod Dentofac Orthop*, 131, 268-276.
20. Boyd R, Leggott P, Quinn R, Eakle W, Chambers D (1989). Periodontal implications of orthodontic treatment in adults with reduced or normal periodontal tissues versus those of adolescents. *Am J Orthod Dentofac Orthop*, 96, 1919-199.
21. Wennstrom JL, Stokland BL, Nyman S, Thilander B (1993). Periodontal tissue response to orthodontic movement of teeth with infrabony pockets. *Am J Orthod Dentofacial Orthop*, 103, 313-319.

