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PATHOLOGIC MIGRATION – A REVIEW

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ABSTRACT

Pathologic tooth migration is relatively common among periodontitis patients and its prevalence has been reported to range from 30.03% to 55.8% having multifactorial etiology. Mostly occurs in anterior aesthetic area so it is of major concern for the patient. Management involves multidisciplinary approach involving periodontal therapy/orthodontic therapy/ restorative therapy. However, some cases have shown success in a spontaneous correction of pathologic migration when only periodontal therapy was opted. Advanced stages of pathologic tooth migration involve complex, expensive, time-consuming procedures so, attention must be given in its early stages to prevent its further progression.

KEYWORDS: Alveolar bone loss; Pathologic tooth migration; Periodontitis; multidisciplinary approach.

INTRODUCTION

Teeth orientation in the jaws is determined by periodontal wellbeing and also by continuous presence of occlusal load and forces exerted by the cheek, lips and tongue musculature (Proffit *et al*., 1978). Any alteration in this natural equilibrium leads to altercations in the milieu of a tooth, or an entire arch, eliciting Pathological tooth migration. It is a common condition with complex and multifactorial etiology and very high rates of prevalence (Costa 2004).

Pathologic migration refers to "tooth displacement that results when the balance among the factors that maintain physiologic tooth position is disturbed by periodontal disease". (Carranza 2011). It is common condition occurring mostly in anterior region so its concern is increasing constantly in patients. If noticed in early part of the disease, it gets resolved spontaneously.[1,2]

Prevalence

Pathologic tooth migration is relatively common and may be an early sign of disease, or it may occur in union with gingival inflammation and pocket formation as the disease progresses.

Occurrence: Mostly occurs in the anterior region when compared to the posterior region thus causing major concern in aesthetics and seen in cases of aggressive periodontitis.[2]

According to Khorshidi and Costa, the mean age of patients reported to be from 40.74 ± 11.4 to 46 ± 11.6 years, respectively. There is also sex predisposition with a female to male ratio 2:1 (or 3:1 in some studies).[1,3]

Various authors have quoted prevalence of pathologic migration in periodontitis patients. (**Table no 1)**

Table no 1: These includes.

SL.NO	AUTHORS	Type of study	PREVALENCE RATE
1.	Martinez-Canut et al (1997)[4]	Cross-sectional epidemiological study	55.8%
2.	Towfighi et al. (1997)[5]	Cross-sectional study	30.03%
3.	Demetriou et al. (1991)[6]	Questionnaire study	36.96%
4.	Brunsvold et al. (1999)[7]	Cross-sectional survey	9.4%
5.	Niveda Rajeshwaran, Arvina Rajasekar, Gurumoorthy Kaarthikeyan. (2020)[8]	Retrospective study	72%

ETIOLOGY[2]

Pathologic tooth migration etiology is complex and multifactorial which can be caused due to -

- ✓ Weakened periodontal support
- ✓ Pressure from granulation tissue
- ✓ Trauma from occlusion
- ✓ Tongue thrusting

According to Kim *et al*., 2012 primary factor is periodontal bone loss in etiology of pathologic migration.[9] Rohatgi *et al*. revealed that direct relationship exist between pathological tooth migration and clinical attachment loss as well as gingival inflammation.[10] Oh SL 2011 revealed that the transseptal fibres (hold the adjacent teeth) may play a very important role.[11] Hirschfeld (1933) was the first person to report that pathologic teeth migration results from pressure of inflammatory tissue in periodontal pockets.[12]

Predisposing Factors for pathologic tooth migration[13]

Primary Predisposing Factors

- Loss of attachment/ Alveolar bone loss.
- Weakened periodontal support.

Other predisposing factors

1. Occlusal Trauma/Malocclusion.
2. Due to adjacent tooth loss
3. Occlusal changes associated with unreplaced missing teeth.
4. Parafunction Habits: E.g., Bruxism and clenching.
5. Inflammatory changes:

a) Gingival/Periodontal inflammation: Pressure from granulomatous tissue of the periodontal pocket.

b) Periapical inflammation.

6. Lip and tongue pressure.
7. Oral habits-tongue thrusting, thumb sucking
8. Gingival overgrowth

PATHOGENESIS[12] **(Figure no 1)**

The normal teeth position is determined by

- Health & normal height of the periodontium
- Forces exerted on the teeth (Forces of occlusion and pressure from the lips, cheeks and tongue)

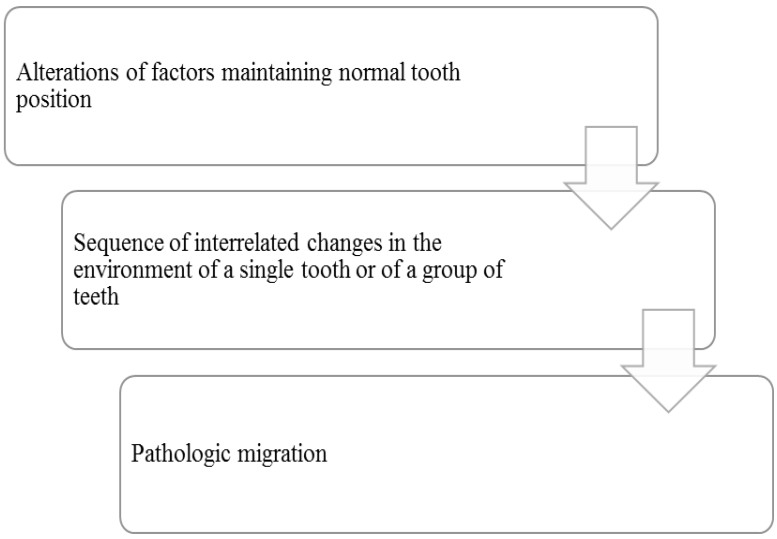

Figure no 1.

MANAGEMENT (Table no 2)

Periodontal therapy primarily focuses at maintaining the natural dentition in health and comfortable function.

Table no 2: Treatment plan is based on.

Severity	Signs and symptoms	Treatment
Mild or early	Diastema of anterior teeth, ≤2 mm	Periodontal treatment includes scaling and root planing and flap surgery.
Moderate	Extrusion and flaring of the teeth	Periodontal treatment and orthodontic treatment (light intrusive forces)
Severe	Diastema of anterior teeth, >2 mm in dimension due to periodontal disease	Prosthodontic treatment (extraction and replacement with prosthesis)

1. **Severity of pathological migration**[14]
2. **Etiology** – Treat the underlying cause

Many previous cases of pathologic tooth migration wherein only periodontal therapy were opted have shown success in a spontaneous correction of pathologic migration. But the mechanism by which there is correction of migrated tooth spontaneously after periodontal therapy has not been reported.

Following clinical observation

A. Brunsvold et al concluded that:

1. The destructive effects of inflammation is removed following control of bacterial infection;
2. Following the bacterial control there is reduction in vascular engorgement and inflammatory cell infiltration of the soft tissues resulting in reduced erythema and tissue shrinkage;
3. The tooth returns to its original position following the healing of periodontal lesion and replacement of infiltrate with healthy collagen fibres and
4. In some patients, reorganization of collagen in the gingival fibre apparatus is favoured by removal of abnormal occlusal forces.[15]

B. Hirschfeld believed resolution of inflammation and shrinkage of periodontal tissues occurs following periodontal therapy alone in treatment of pathologic migration. Additionally, there is spontaneous repositioning of teeth and diastema closure following contraction of the healing connective tissue.[16]

C. Seki *et al*. Emphasized the role of oral musculature (lips, cheek, and tongue) in the movement of the migrated teeth during normal function, after periodontal therapy alone. However, no scientific evidence is present to validate this theory.[17]

Table 3: Studies revealing success through periodontal therapy alone.

SL.NO	AUTHOR	STUDY
Small to moderate (<1mm) diastema closure		
1.	Gaumet et al[18]	Scaling and root planing (SRP) alone resulted in partial (49%) and complete (36%) diastema closures. When surgically treated - complete diastema closures (52%). A higher percentage of complete diastema closures was found in patients with diastema <1mm.
Wider diastema closure		
2.	Sato et al[19]	Complete closures of diastema of around 3 mm were noticed following non-surgical periodontal therapy
3.	Brunsvold et al[15]	Complete closure of diastema of around 2 mm in teeth with severe periodontitis was noticed following nonsurgical and surgical periodontal therapy.

Spontaneous tooth correction with light to moderate degrees of pathologic migration is noticed following conventional periodontal therapy.[10,18] Yet in severe cases of pathologic tooth migration treatment is complicated and thus requires an interdisciplinary approach consisting of periodontal, endodontic, and orthodontic treatment. Periodontal treatment followed by orthodontic treatment using clear aligners has been used in the successful treatment of pathological tooth migration since clear aligners have been shown to decrease probing depth, gingival recession, clinical attachment level, mobility, and exhibits aesthetic restoration.[20]

PREVENTION

Data collected by **Brunsvold**[21] in his review suggested that pathologic migration associated with periodontal disease and other aetiologies is preventable. The single most successful strategy in prevention of pathologic migration is to manage the periodontal disease. There are studies that affirm pathologic migration caused by drug-induced gingival overgrowth is manageable to some extent.[22] Pathologic migration in its early phase is reversible with periodontal treatment alone. Thus, early diagnosis of pathologic migration is important in preventing its progression to periodontal disease.[18,23]

CONCLUSION

Pathologic migration has multifactorial etiology. Periodontitis associated with pathologic tooth migration affects patients' self -esteem and self-confidence and sometimes even cause serious psychological problems. Based on prevalence findings, pathologic migration needs more attentiveness with regards to its etiology, prevention and management in dental examination. Managing the cases of pathologic tooth migration in its advanced stage involves complex, expensive, time-consuming procedures requiring inter-disciplinary approach. Thus, the best way to treat it is to rather prevent it. So, attention must be given in its early stages to prevent its further progression.

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