

Retracing Capacity of Pathologically Migrated Upper Anterior Teeth after Surgical Intervention

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Abstract:

Background: The aim of the study is to evaluate the retracing capacity of pathologically migrated upper anterior teeth that present in patients with periodontitis after periodontal therapy.

Materials and Methods: A total of 26 patients with pathologically migrated upper anterior teeth have been chosen for the present study. The study is attempted to estimate the correction of pathologically migrated teeth using the orthokal study model at baseline, 6 weeks re-evaluation and 4 months post-surgically using the digital caliper. Periodontal flap surgery has been instituted for the correction of pathologically migrated teeth.

Results: The outcome of the periodontal therapy of pathologically migrated upper anterior teeth of facial flaring (FF) is statistically significant with a score of 0.051 at the end of 6 weeks and 0.030 at the end of 4 months, and diastema sites were statistically significant with a score of 0.000 at the end of 6 weeks and 0.000 at the end of 4 months.

Conclusion: The present study proved that pathologically migrated teeth spontaneously reposition themselves after the periodontal surgical intervention. Results were statistically significant in both FF and diastema sites at the end of 4 months but not very attractive as it requires more time for the teeth to retrace back.

Key Words: Diastema, facial flaring, palatal rugae, pathological teeth migration, surgical intervention

Introduction

One of the challenges in dentistry in general and Periodontics, in particular, is the management of maxillary anterior spacing. The spacing or drifting in adults is mainly due to underlying periodontal pathology. Once the pathology is corrected either by surgical or non-surgical means, the drifted tooth will trace back

to its near normal position. In the event of not being treated, the tooth will become loose within the socket and may fall off.

Spacing could be due to pathological migration such as extrusion, diastema formation, facial flaring (FF), rotation and tipping into edentulous spaces. In the event of loss of lower posteriors, upper anterior flare-up resulting in space between upper anterior. These spacing problems often require a multidisciplinary approach between periodontics, orthodontics and restorative dentistry. Identification of different causes of anterior spacing is the prime factor to be looked into when the anterior spacing correction is an objective.

Specific habits related to pathologically tooth migration include tongue thrusting, lip forces, mouth breathing, bruxism, pipe smoking, and playing wind instruments. The medications that can cause gingival enlargement and pathological migration include phenytoin, cyclosporine, and calcium blockers¹ and genetic reasons may add insult to injury. Spacing could be due to pathological migration such as extrusion, diastema formation, FF, rotation and tipping into edentulous spaces.

Pathologic migration mainly results from alterations in the factors responsible for maintaining the physiological tooth position gets altered by the underlying periodontal disease. Posterior bite collapse results in labial flaring of upper anterior. Premature loss of several posterior teeth may have an impact on the anterior teeth. Effective treatment of this situation broadly depends on stabilization of the posterior vertical dimension, treatment of the periodontal disease, and repositioning of the upper anterior teeth. The present study has been concentrated on 4 months post-operative evaluation after periodontal flap surgery in pathologically migrated upper anterior.¹⁻³

Materials and Methods

The present study includes 26 subjects of both sexes selected from outpatient Department of Periodontics SRM Dental College, Ramapuram, Chennai. The 26 patients with pathologically migrated upper anterior teeth have been chosen for the present study. The pathologically migrated teeth are being treated with surgical intervention without regenerative procedures.

Inclusion criteria

1. Patients with history of spacing between upper anterior teeth of 5 years duration

2. Patient with the complaint of recently formed diastema.
3. Patient with pathological migration of upper anterior teeth which is caused due to moderate to severe periodontal disease
4. Patient with probing depth ≥ 7 mm
5. Patient with age group ranging from 25 to 60 years
6. Patient without systemic problems
7. Patient who have not received any periodontal or antibiotic treatment 6 months prior to commencement of the study.

Exclusion criteria

1. Patient with increased occlusal load or occlusal interference
2. Patient with parafunctional habits.
3. Patient with bleeding disorder
4. Smokers
5. Patients with periapical pathology.

Methodology

26 subjects with periodontitis with pathologic tooth migration (PTM) of upper anterior teeth have been chosen for the present study from among the patients who attend the department of periodontology for redressal of their periodontal problems. So, chosen 26 subjects have been subjected to intra-oral screening for the identification of PTM of upper anterior teeth. The study subjects are subjected to Phase I therapy and surgical intervention using papillae preservation flap after recording the required clinical parameters for the study (Figures 1 and 2). The clinical parameters included in this study are: Oral hygiene index simplified (OHI-S) (Green and Vermilion, 1964), plaque index (PI) - (Sillness and Loe, 1964), mobility index (Miller, 1985), probing pocket depth and clinical attachment loss in mm. The degree of migration and type of migration has been recorded at the baseline. The orthokal models have been prepared with the proper impression of upper and lower jaws for the purpose of the study. The amount of pathological migration of teeth from its anatomical position has been measured using a digital caliper. The stability of

the palatal rugae has been taken as a landmark for measuring the pathological migration of upper anterior teeth from its anatomical position. In this study, orthokal cast have been prepared for each subject for upper and lower jaws at baseline, 6 weeks and 4 months after surgical intervention (Figure 3). The diastema between the teeth have been



Figure 2: Four months post-operative review.

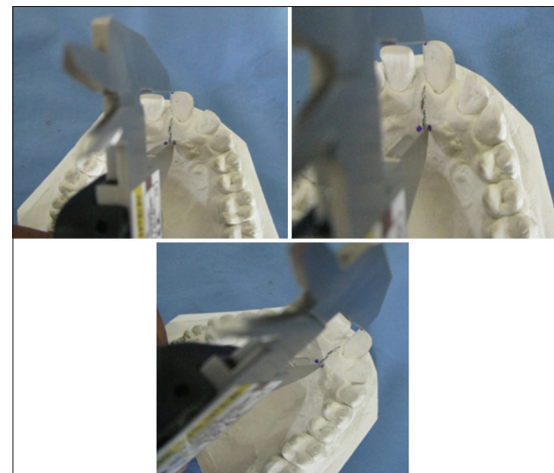


Figure 3: Quantitative assessment of migration on orthokal cast. Anterior flaring: (a) Baseline, (b) 6 weeks, (c) 4 months.



Figure 1: Base line photograph.

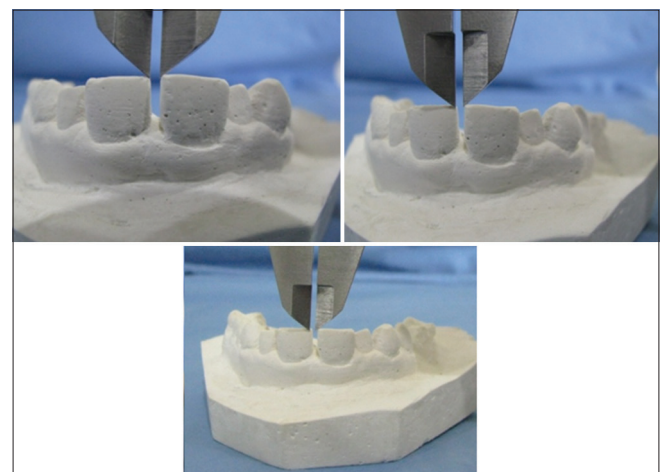


Figure 4: Diastema: (a) Baseline, (b) 6 weeks, (c) 4 months.

recorded at baseline, 6 weeks and 4 months post-surgically using the digital caliper, keeping the ends of the caliper at the approximating surfaces of the adjacent teeth (Figure 4).

Statistical analyzes

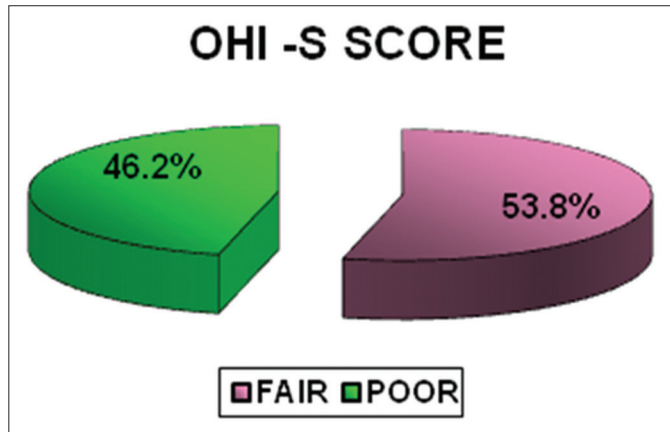
Student's *t*-test has been employed for assessing the outcome of the periodontal therapy of pathologically migrated teeth anterior teeth of FF and diastema.

Results

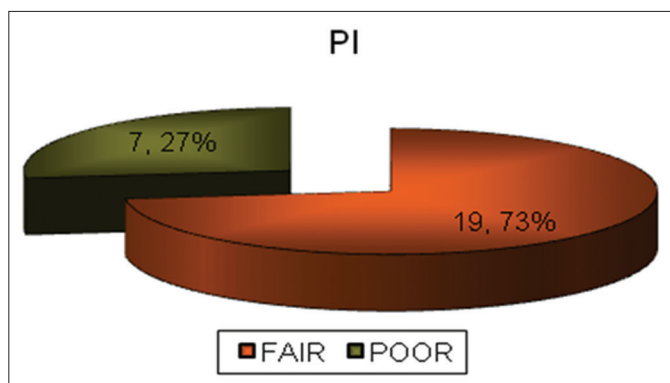
The recorded indices of OHI-S (Graph 1) and PI (Graph 2) revealed that 14 out of 26 subjects who have been included in this study exhibited poor oral hygiene status and poor plaque maintenance score. Remaining 12 subjects exhibited different plaque score and oral hygiene status. The subjects exhibited neither good plaque control score nor good oral hygiene status. After 4 months, teeth with FF showed a measurable improvement in mm (Table 1). At 6 weeks, post-operative statistical data of FF is 17.9288 ± 0.9154 (Table 2). At 4 months, post-operative statistical data of FF is 17.5837 ± 0.79631 .

Discussion

Pathological migration is the common complaint of patients with periodontitis. It commonly occurs in the upper anterior teeth and affects the esthetics and self-esteem of the patient,



Graph 1: Oral hygiene index simplified score.



Graph 2: Plaque index score.

motivating them to seek dental treatment.^{4,5} Ross in 1960 first commented on the spontaneous correction of pathological migrated teeth in a series of cases.⁶ The mechanism behind the spontaneous repositioning was given by various authors. A review on the biomechanics of periodontium suggested by Gaumet *et al.* 1997 indicates that periodontal disease can induce tooth movement only by altering the distribution of physiologic periodontal forces, such as those generated by the transseptal fibers. After periodontal therapy, the tissue remodeling will take place to regenerate a normal biomechanical environment at the tooth - periodontium interface. The consequence of this newly re-established equilibrium of forces would be the spontaneous movement of the tooth back in the alignment of the dental arch.³

The methodology used in the present study was adopted from the study conducted by Almeida *et al.* 1995 where they digitized the landmarks using reflex metrograph which is not used in this study. Because its time consuming, technique sensitive, and requires sophisticated equipment. This study utilized digital calipers, which are made of stainless steel and able to measure in 1/100th mm. They have a rated accuracy of 0.01 mm and are easy to handle and less time consuming.⁷

Out of 30 diastema sites, 93.33% of the sites showed improvement (i.e. decrease in diastema) from baseline. In case of multiple diastema sites, the movement of the teeth to one side created an increase in diastema at the adjacent sites. Thus, 6.66% of such sites showed inconclusive results (i.e. increase in diastema). This could be attributed to the fact that spontaneous repositioning of teeth was observed to move straight in the direction of the site that had exhibited the greatest initial probing depth.⁸ Similar results were obtained in various case reports.^{4,5,9}

The patients who completed the study were evaluated at the 4th month following surgical intervention to assess the extent of diastema closure. Out of the 30 diastema sites, 33.33% of the sites exhibited an improvement of >1 mm and the remaining 60% of the sites showed <1 mm of improvement. Out of the 8 teeth with FF, 37.5% of the teeth showed an improvement of more than 1 mm and remaining 62.5% showed an improvement of <1 mm. The reason for sites showing <1 mm improvement could be attributed to unidentifiable forces acting on the teeth such as pressure from the surrounding soft tissues, non-determinable forces of occlusion arising from cuspal inclination, axial inclination of the roots, and contact point relationships.

The outcome of the periodontal therapy of pathologically migrated upper anterior teeth with diastema is statistically significant with a score of 0.000 at the end of 6 weeks and 0.000 at the end 4 months (Table 3). The outcome of the periodontal therapy of pathologically migrated upper anterior teeth of FF is statistically significant with a score of 0.05 at the end of

6 weeks and 0.03 at the end 4 months. This is in agreement with the study conducted by Brunsvold *et al.* 1997 who observed complete closure of diastema sites in 51.5% sites and partial closure in about 69.7% of the diastema sites. In additions, only small to moderate migrations only were considered, the frequency of successful closure was 77.8%, and the movement of spontaneous repositioning teeth was consistently initiated 7-10 days after the procedure and was completed by 3-4 weeks in most cases.¹ In an another study conducted by Rohatgi *et al.*, observed 79.99% rate of positive response to therapy.¹⁰

The patients in this study were recruited based on the presence or absence of diastema. However, the classification of patients based on different degrees of diastema would have facilitated the interpretation of results more accurately. This study has re-confirmed that spontaneous correction of pathologically migrated teeth which occurs following root surface debridement and periodontal pocket management surgery. The degree of this correction, however, is not complete.

Case no.	Op/no.	Tooth with FF	Improvement after 4 months in mm
1.	127,196	11 21	0.04 0.14
2.	201,052	11 21	1.1 0.43
3.	218,966	21	0.76
4.	237,010	21	0.29
5.	238,134	11	1.25
6.	270,776	21	2.73

FF: Facial flaring

Paired samples statistics				
Pairs	Mean	N	Standard deviation	Standard error mean
Pair 1				
BI	18.4288	8	1.45300	0.51371
After 6 weeks	17.9288	8	0.91548	0.32367
Pair 2				
BI	18.4288	8	1.45300	0.51371
After 4 months	17.5837	8	0.79631	0.28154

FF: Facial flaring

Paired samples test								
Pairs	Paired differences					t	df	Significance (two-tailed)
	Mean	Standard deviation	Standard error mean	95% confidence interval of the difference				
				Lower	Upper			
Pair 1								
BI - After 6 weeks	0.40200	0.39166	0.07151	0.25575	0.54825	5.622	29	0.000
Pair 2								
BI - After 4 months	0.60767	0.51651	0.09430	0.41480	0.80054	6.444	29	0.000

The following factors have been elaborated as factors that cause spontaneous correction: (1) Control of the bacterial infection by the patient and the therapist reduces the inflammatory tissue pressures, which are a cause for PTM,¹¹ (2) tractional forces are produced in the area as a result of wound contraction during wound healing, (3) following periodontal therapy, there is reestablishment of the "periodontal force" through healing of the supracrestal gingival tissues, (4) eradication of pathologic forces secondary to periodontal treatment can lead to the spontaneous repositioning of teeth in the direction of the site that had exhibited the greatest initial probing depth, and (5) containment of a clot in the healing site will result in increased tensile forces exerted centrifugally on the root in the area with the greatest probing depth at baseline.³

Within the limitations of the present study, such as smaller sample size and short observation period and selection criteria covering wide range of subjects: The present study has thrown light on retraction capacity of surgically treated pathologically migrated teeth. This study suggests that surgical correction alone cannot correct neither FF nor diastema created between the teeth due to PTM. Better results can be achieved by adding an orthodontic correction, prosthetic intervention and including restorative procedures along with periodontal surgical intervention.

The surgical outcome of the present study is statistically significant both in the correction of flaring as well as diastema closure. The resultant correction of pathologic migration does not fulfill the esthetic requirements of the dental fraternity but may be acceptable to patients who might accept a compromised esthetic form. Comprehensive esthetics to the patient will require a multi-disciplinary approach, where the periodontist would still play a central role in maintaining a healthy periodontium and a pristine smile.

Conclusion

The present study proved that pathologically migrated teeth spontaneously reposition themselves after the periodontal surgical intervention. In the present study, repositioning is estimated only after 4 months. Hence, the results are not very attractive as it requires more time for the teeth to retrace back. Moreover, severe diastema cases were also included in the present study which requires multidisciplinary approaches. The

present study revealed that not only surgical intervention is sufficient but also orthodontic intervention is required in cases of multiple diastema involving two or more teeth. Increasing the number of cases with extended time period is required for achieving better results.

References

1. Brunsvold MA, Zammit KW, Dongari AI. Spontaneous correction of pathologic migration following periodontal therapy. *Int J Periodontics Restorative Dent* 1997;17(2):182-9.
2. Bien SM. Fluid dynamic mechanisms which regulate tooth movement. *Adv Oral Biol* 1966;2:173-201.
3. Gaumet PE, Brunsvold MI, McMahan CA. Spontaneous repositioning of pathologically migrated teeth. *J Periodontol* 1999;70(10):1177-84.
4. Singh J, Deshpande RN. Pathologic migration – spontaneous correction following periodontal therapy: A case report. *Quintessence Int* 2002;33(1):65-8.
5. Kumar V, Anitha S, Thomas CM. Reactive repositioning of pathologically migrated teeth following periodontal therapy. *Quintessence Int* 2009;40(5):355-8.
6. Ross IF. Endogenous tooth movement. *J Am Dent Assoc* 1957;60:738-46.
7. Almeida MA, Phillips C, Kula K, Tulloch C. Stability of the palatal rugae as landmarks for analysis of dental casts. *Angle Orthod* 1995;65(1):43-8.
8. Gaumet P. Predictability of Spontaneous Repositioning of Pathologically Migrated Teeth After Conventional Periodontal Treatment (Thesis). San Antonio: University of Texas; 1997.
9. Manor A, Kaffe I, Littner MM. Spontaneous repositioning of migrated teeth following periodontal surgery. *J Clin Periodontol* 1984;11:540-5.
10. Rohatgi S, Narula SC, Sharma RK, Tewari S, Bansal P. Clinical evaluation of correction of pathologic migration with periodontal therapy. *Quintessence Int* 2011;42(1):e22-30.
11. Ross IF. Reactive positioning and improved gingival architecture. *J Periodontol* 1963;34:444-6.