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Analysis of spontaneous repositioning of pathologically migrated teeth: A clinical and radiographic study

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Objective: Pathologic migration is defined as a change in tooth position, resulting from a disruption of forces that maintain the teeth in the normal position with reference to the skull. Clinical evidence is limited that pathologically migrated teeth may reposition themselves after periodontal therapy. The current study was carried out to determine the frequency of spontaneous repositioning of pathologically migrated teeth after periodontal therapy, and to study the relation between the severity of migration and the degree of repositioning following treatment. **Method and Materials:** Twenty-five patients aged 20 to 45 years with moderate to severe form of periodontitis presenting 52 diastema sites secondary to pathologic migration involving maxillary anterior teeth participated in the study. After conventional periodontal treatment had been performed, reactive repositioning was assessed by measuring the space between pathologically migrated teeth and adjacent teeth on study models and radiographs obtained at baseline, reevaluation at 4 weeks after scaling and root planing (SRP), 3 months after periodontal surgery, and 6 months from baseline. **Results:** No changes were noted after SRP. On study models, 88.46% of all sites (46 of 52 sites) demonstrated various degrees of repositioning (both partial closure and complete closure) after periodontal therapy 6 months after baseline. Of these 46 sites, all exhibited improvement after surgical therapy. Labiopalatal repositioning was seen in 32 out of 51 teeth (62.74%). On radiographs, 77.27% of all sites (34 of 44 sites) demonstrated various degrees of repositioning (both partial closure and complete closure) after periodontal therapy 6 months after baseline. Of these 34 sites, all exhibited improvement after surgical therapy. Complete repositioning occurred in 34.61% and partial closure was seen in 53.80%. **Conclusion:** The findings suggest that spontaneous repositioning after periodontal therapy is likely, particularly when light to moderate degrees of pathologic migration are considered. *(Quintessence Int 2014;45:733–741; doi: 10.3290/j.qi.a32246)*

Key words: pathologic tooth migration, periodontal therapy, spontaneous repositioning, tooth movement, wound healing

One challenge of periodontics and esthetic dentistry is management of the periodontal conditions that impair a patient's dentofacial esthetics. Pathologic migration is one such condition, and can be extremely disfiguring when associated with anterior teeth.

Pathologic migration is defined as a change in tooth position, resulting from disruption of the forces that maintain teeth in the normal position with reference to the skull.[1] Different types of pathologic migration include extrusion, diastema formation, facial flaring, rotation, and tipping into edentulous spaces. The prevalence of pathologic migration is reported to range

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from 30.03% to 55.80%. It is more frequent in the anterior region and is the most common complication in moderate to severe forms of periodontitis.[2]

A survey of the literature regarding the etiology of pathologic migration suggests it is multifactorial. Possible etiologic factors include occlusal forces, soft tissue pressure of the cheek, tongue, and lips, oral habits, periodontal inflammation, and eruptive forces.[3,4] Periodontal bone loss appears to be a major factor in the etiology of pathologic migration.[2]

Of all the etiologic factors associated with pathologic migration, pressure from periodontal inflammatory tissue deserves special mention, as it is crucial in spontaneous repositioning ("spontaneous" in this context is meant to emphasize that no orthodontic measures were taken and the tooth moved back to its initial position). Further support for inflammatory tissue pressure as a cause for pathologic migration is provided by numerous reports that document spontaneous correction of pathologically migrated teeth following control of inflammation.[3,5,7]

Case reports[5,7] describing reactive positioning and spontaneous correction of pathologic migration following periodontal treatment, indicate that migrated teeth sometimes move back to their normal position following nonsurgical periodontal treatment or in some instances when combined with surgical methods.[6] However, the predictability and stability of this phenomenon is not well documented, with only one study providing data.[9]

To date, only one study has specifically assessed the frequency with which this reactive movement may occur.[9] Therefore, the present study was planned to investigate repositioning of pathologically migrated teeth after periodontal therapy and the relation between the severity of migration and the degree of repositioning following therapy.

METHOD AND MATERIALS

The study included 25 patients aged 20 to 45 years with moderate to severe periodontitis, presenting with pocket depth greater than or equal to 6 mm around pathologically migrated maxillary anterior teeth, and seeking treatment from the Department of Periodontics, Nair Hospital Dental College. Patients who had received periodontal treatment in the previous 6 months, with tooth migration resulting from causes other than periodontitis, who had received orthodontic treatment, and in whom diastema was present earlier and remained stable were excluded from the study. Written consent was obtained from each patient and details of the study were explained. The diagnosis of pathologic migration was made by asking patients if they were aware of occurrence of spacing between maxillary anterior teeth in recent years.

The selected patients underwent complete periodontal examination including Plaque Index (PI), Gingival Index (GI), probing pocket depth (PD), and clinical attachment level (CAL). The presence and type of pathologic tooth migration (PTM) in anterior teeth and tooth loss were also evaluated. CAL and PD were measured using a UNC-15 graduated probe (Hu-Friedy) at six sites: mesiobuccal, buccal, distobuccal, mesiolingual, lingual, and distolingual.

Study design

A baseline diagnostic cast (C_0) was made and an intraoral periapical radiograph (IOPA) (I_0) of the tooth concerned was taken by the parallel cone technique to document the status of pathologic migration before treatment. Four weeks following basic therapy of scaling and root planing (SRP) and plaque control measures, another diagnostic cast (C_1) was made and an IOPA (I_1) was taken to document the repositioning after basic therapy. All patients then underwent open flap debridement. Cast C_2 and IOPA (I_2) were performed 3 months after surgery. A comparison of C_0, C_1, and C_2, and I_0, I_1, and I_2 was made to determine the degree of repositioning after surgical therapy. The stability of repositioning was determined after 6 months (C_3 and I_3) by comparing C_3 and I_3 with C_2 and I_2.

Measurement of pathologic migration on cast

The baseline diagnostic cast (C_0) of both arches was measured for pretreatment pathologic migrations in

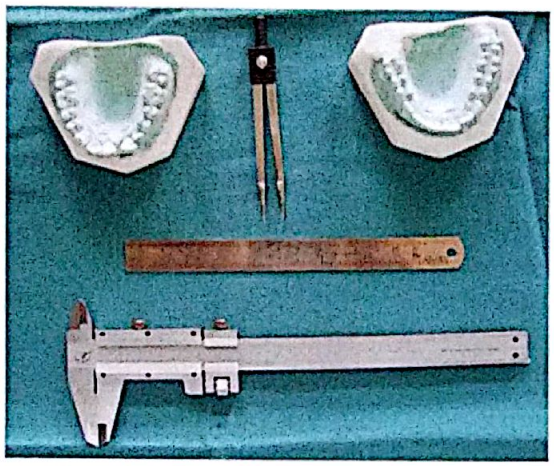


Fig 1 Armamentarium used for measuring pathologic migration on casts.

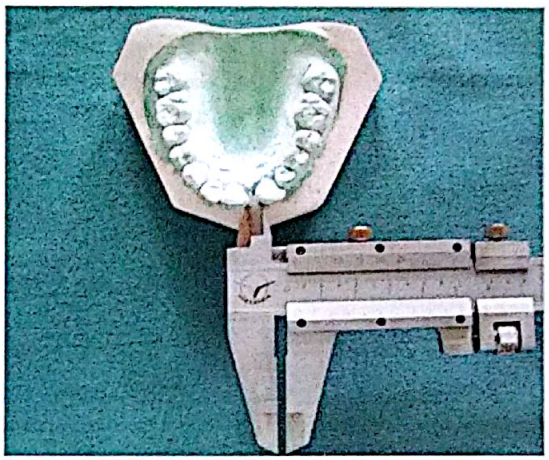


Fig 2 Measurement of mesiodistal distance using vernier caliper.

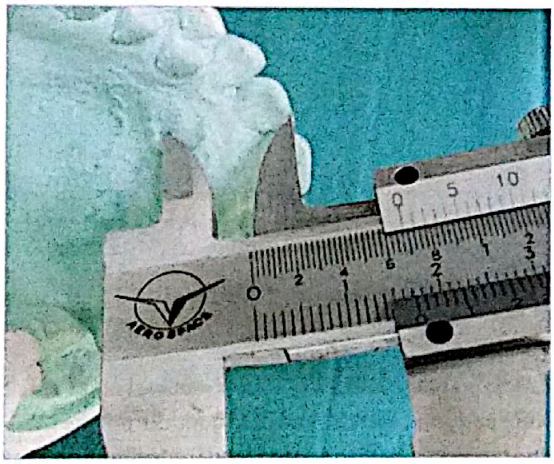


Fig 3 Measurement of labiopalatal distance using vernier caliper with palatal rugae as the reference points.

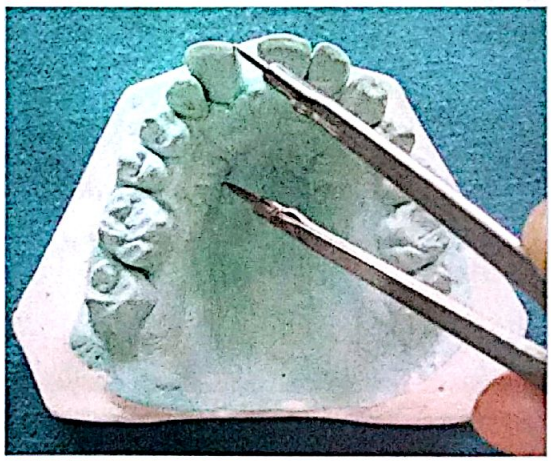
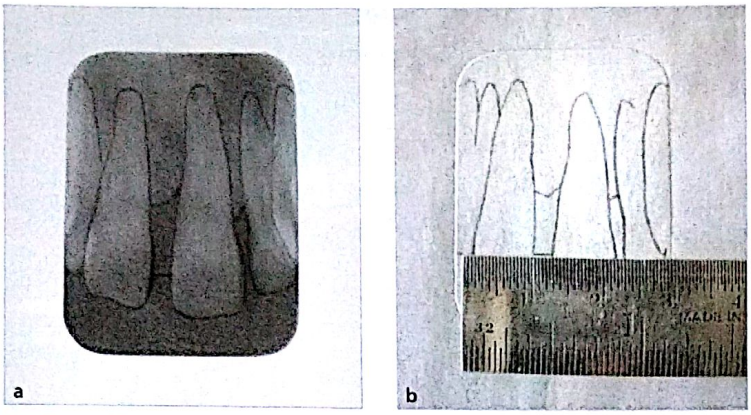


Fig 4 Measurement of labiopalatal distance using two-point divider in cases of deep palate.

two dimensions: mesiodistal and labiopalatal tooth position (Fig 1). The mesiodistal space (MDD) between pathologically migrated teeth and adjacent teeth was measured by vernier caliper between the highest points on the mesial/distal surface convexities (Fig 2). Anteroposterior tooth position was measured using palatal rugae as the reference points on the diagnostic cast (Fig 3). Studies have shown that the medial points of second and third palatal rugae appear to be suitable anatomic points for use as reference landmarks for longitudinal cast analysis in the transverse and anteroposterior planes.[10] The mesial end of the second palatal rugae was marked (R) on the diagnostic cast and the distance between the mesio-incisal angle and R was measured using vernier caliper in millimeters and was denoted as labiopalatal distance (LPD). For patients with a deep palate, LPD was measured using the aid of two-point divider (Fig 4).

Radiographic evaluation of pathologic migration

The MDD on radiographs was measured from the highest point on the convexity of the mesial surface of the migrated tooth to the point on the convexity of the



Figs 5a and 5b Measurement of mesiodistal distance on radiographs using tracing paper and metallic ruler.

Fig 6 Preoperative right lateral view showing flaring of central incisor.

Fig 7 Preoperative right lateral view showing diastema between central and lateral incisor.

Fig 8 Postoperative right lateral view showing closure of diastema after 3 months.

Fig 9 Postoperative left lateral view showing closure of diastema after 3 months.

mesial/distal surface of the adjacent tooth by using tracing paper, a millimeter ruler, and an x-ray illuminator (Fig 5).

Surgical treatment

All patients 4 weeks after initial treatment were given surgical therapy. The surgical therapy consisted of routine open flap debridement. All patients were routinely prescribed 0.2% chlorhexidine rinse twice daily for 7 days. The patients were followed for 3 months after completion of surgical therapy.

An example of a clinical case is shown in Figs 6 to 12.

Evaluation of stability of repositioning

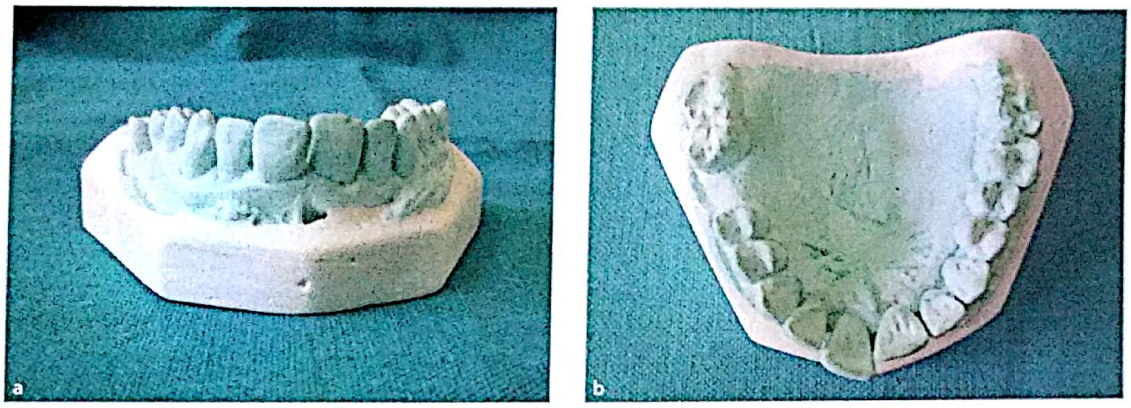
All patients after completion of the surgical phase were placed in the maintenance phase. During this phase oral hygiene instructions were reinforced and if necessary supragingival scaling and/or occlusal adjustment were performed. At the end of 6 months from the baseline, patients were recalled and repositioning was assessed by comparing cast C_3 and IOPA I_3 with the previous set of cast and IOPA.

Statistical analysis

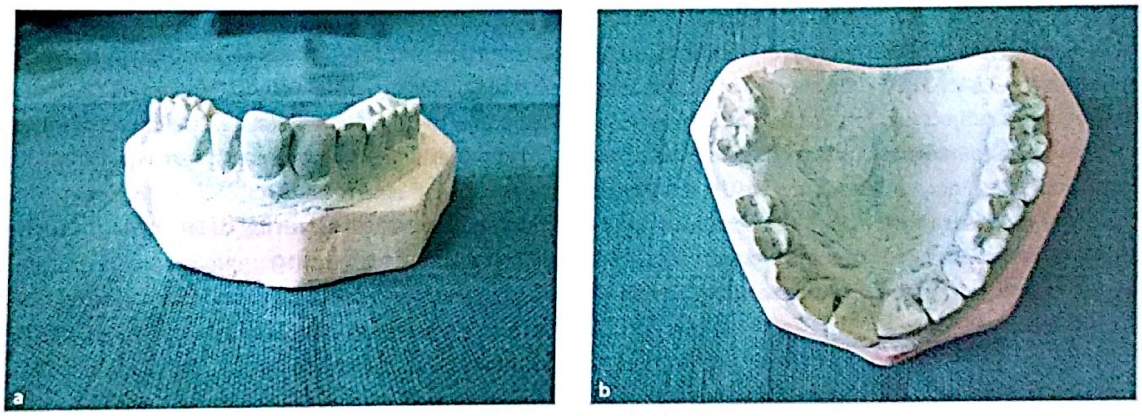
The collected data were subjected to *t* test, standard deviation (SD), and analysis of variance (ANOVA) test.[11]

RESULTS

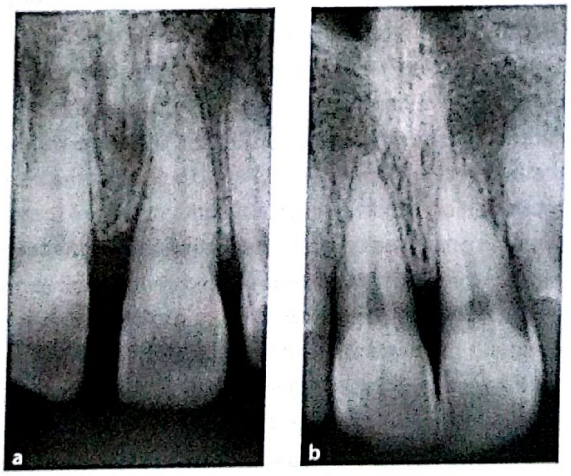
Twenty-five patients (16 women and 9 men) with 52 pathologic migration sites participated in the study. The patients' ages ranged from 21 to 43 years old with a mean age of 30.08. It was observed that the prevalence of pathologic migration was 50.98% in central incisors,



Figs 10a and 10b Cast at baseline: *(a)* anterior view, *(b)* occlusal view.



Figs 11a and 11b Cast 3 months after surgery: *(a)* anterior view, *(b)* occlusal view.



Figs 12a and 12b Radiographs at *(a)* baseline, and *(b)* 3 months after surgery.