

An Overview of Retention & Stability in Orthodontics

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Abstract

Despite the rapid development of therapeutic armamentaria, the major challenge of retaining the achieved orthodontic correction lies ahead. Stability has become a prime objective in orthodontic treatment, for without it either ideal function or ideal esthetics, or both, may be lost. The requirements of retention are often decided at the time of diagnosis and treatment planning. The retention depends on what is accomplished during treatment. The present article briefs the view points of various researchers based on their experience and research. This will aid the clinicians consider various approaches to plan the treatment and achieve fairly stable orthodontic treatment results.

Keywords : Retention, Stability, Relapse.

Introduction

Relapse of orthodontically treated case is orthodontists' worst nightmare.

Orthodontists have long been aware of the fact that teeth that have been moved in or through bone by mechanical appliances have a tendency to return to their former positions. It is the purpose of the retention to counteract this tendency.

The patient expects following the time & money invested stability of the desired alignment achieved at the end of treatment.

Retention in orthodontics can be grossly stated as the holding of teeth in ideal esthetic & functional positions.

Instability of the occlusion following orthodontic treatment may be divided into two general categories :

1. Changes related to growth, maturation and aging of the dentition and the occlusion.
2. Changes related to inherent instability of the occlusion produced by the orthodontic therapy.

Changes related to growth may be uncoordinated growth of the maxilla & the mandible. Continued growth that causes certain patterns like a Class II, Class III, deep bite or open-bite problem is a major cause for

relapse & need careful management during retention. Changes related to maturation include increased crowding of lower incisors. Aging of the dentition is also correlated with increased incidence of periodontitis, which may be accompanied by spacing & flaring of anterior teeth.

The second category of relapse can be directly attributed to the instability of the occlusion produced by orthodontic treatment itself. Such changes may be relatively localized & may present over shorter periods after debonding. It may involve a more generalized occlusal pattern - for example, recurrence of crowding, recurrence of cross bites, opening of extraction sites & deepening of corrected deep bite.

History of Retention

Different philosophies have developed & they are collectively applicable in the present day assumptions of relapse.

1. **The Occlusion School** - Kingsley stated "The occlusion of the teeth is the most potent factor in determining the stability in a new position".
2. **The Apical base School** : In the middle 1920s, Axel Lundstorm suggested that the apical base was one of the most important factors in the maintenance of corrected occlusion. McCauley suggested that the intercanine width and the intermolar width should be maintained as originally presented, to minimize retention problems. Strang further seconded this theory. Nance noted that the arch length may be permanently increased to a limited extent.
3. **The mandibular incisor School** : Grieve and Tweed suggested that the mandibular incisors must be kept upright and over basal bone.
4. **The Musculature School** : Rogers introduced the consideration of the necessity of establishing proper functional muscle balance.

Since stability of occlusion is a major goal of orthodontic treatment, proper diagnosis & treatment planning is of utmost

importance. Some important factors causing relapse are the elastic recoil of the gingival fibres, incomplete periodontal fibre reorganization, pressure from the cheeks, lips & tongue and also non-elimination of cause of malocclusion & improper occlusion at the end of the treatment.

Bishara¹ found that the percentage of overbite relapse was greater than that of overjet relapse.

Shapiro² found that Class II, Division 2 cases showed greater ability to maintain intercanine width increases in the lower arch than Class. II, Division 1.

Herberger³ stated that there is reduction in intercanine width with age in patients both treated by extraction or non-extraction approach.

Little⁴ found that irrespective of Angle's classification of the initial malocclusion, amount of crowding, age or sex, all cases showed a decrease in arch width and arch length with time.

Berg⁵ found that the tendency to relapse was slightly greater in class II, Division 2 than class II, Division 1 cases.

Many of the post-treatment changes such as crowding of the mandibular and maxillary incisors, relapse of the overbite & overjet and return toward a previous Class II malocclusion can be explained as being primarily due to post-treatment growth changes. However, other long-term changes such as relapse of a single rotated tooth or an anterior open bite, spacing of the teeth & so on may be explained as primarily due to more local factors, including inability of the periodontal fibers to reorganize, compromised airways & lack of adaptability of the soft tissues.

Bjork found in his implant study that teeth migrate as the skeletal pattern changes with growth. Even in non-growing adults migrations occur.

Stability of deep overbite correction : studies indicate that relapse occurred in most cases which could be minimized by achieving incisor intrusion than molar extrusion & by achieving a proper interincisal angle.

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Stability of cases treated with premolar extractions : The lower incisor crowding took place in both extraction as well as non-extraction cases. In adults, spaces reopen unless the retainer is worn consistently, hence Proffit advocates fixed retainer in adult patients.

Stability of dental arch alignment : success at maintaining satisfactory alignment was less than 30% according to reports by Little. Arch length & width reduction with concomitant crowding continued upto 20 to 30 years of age & the rate of change seemed to diminish after the age 30. According to Proffit, if more than 2 mm of forward repositioning of the lower incisors occurred during treatment, permanent retention will be required.

Stability after orthognathic Surgery According to Proffit, the maxilla can be moved up quite successfully but can be repositioned downward with less predictability. The mandible can be moved up or down anteriorly but cannot be moved down at the gonial angle with stability. Larger amount of jaw repositioning seemed to be prone to greater relapse.

To reduce the tendency of relapse, various authors have put forward their ideas : **Gorman's twelve keys to stability**

1. Whenever possible, allowing the lower incisors to align themselves either through serial extraction or the use of a lip bumper in the early mixed dentition.
2. Over correction of lower incisor rotations as early in treatment as possible.
3. Reproximation of incisors early in treatment & again at retention enhances stability.
4. Avoiding increase in the intercanine width during active treatment.
5. Extraction of bicuspid in cases where mandibular arch discrepancy is 4mm or

greater, except where facial esthetics dictates otherwise.

6. The more a tooth is moved, the more likely it is to relapse. Hence over correction is advocated.
7. Uprighting lower incisors to at least 90° whenever the profile permits.
8. Creating a flat occlusal plane during treatment & overcorrection of overbite.
9. Supracrestal fiberotomy for severely rotated teeth.
10. Retention of the lower arch until all growth is complete.
11. Retainers must be placed the same day appliances are removed.
12. Recognizing that compromise is often necessary in the interest of facial esthetics & that sometimes lifetime retention is necessary.

He concludes, following these keys will certainly not eliminate relapse. The only sure way is to prescribe lifetime retention for everyone.

Alexander enumerated the treatment goals as

1. Balanced soft tissue profile.
2. Non-extraction treatment whenever possible.
3. Mandibular incisors upright on basal bone.
4. Good interincisal angle.
5. Normal root artistic positioning (normal tip angulation).
6. Mandibular molars upright.
7. Cuspids not expanded.
8. Normal overbite & overjet.
9. Class I cuspids cuspid protected occlusion.

Summary

To improve stability several different approaches have been recommended. Of these approaches, over-correction of Posterior occlusion, as well as overjet &

overbite are most common. Placing the lower incisors upright over the basal bone without changing the lower arch form & treating the case to perfect intercuspation. Following treatment, it has been further recommended that the teeth be retained long enough to allow bone and adjacent soft tissue to reorganize. Extended periods of retention, in some cases until growth is terminated & even permanent retention have been suggested to achieve a long term stability.

Alongwith the measures to prevent relapse and improve stability certain other factors should be considered while planning retention, like; the rapidity of correction, the health of the tissues involved, the cause of particular malocclusion, cell metabolism and atmospheric pressure etc.

No form of treatment guarantees absolute stability, nor does a well-treated case treated by the highest standards by itself assure stability.

To conclude, it can be said that retention is not a separate problem or phase of orthodontics but it is and will continue to be a problem to be considered in diagnosis and treatment planning. As Oppenheim so aptly phrased it, "Retention is the most difficult problem in orthodontia; in fact, it is *the* problem".

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