



“ Relapse” The Inevitable Phenomenon in Orthodontics –A Review

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ABSTRACT

Orthodontic treatment is involved with correction of irregular dental positions and skeletal structures. Not only challenges are faced during active treatment but also after the treatment the biggest challenge is retention. The retention is important as there is tendency of teeth to go back to their original position. This is defined as relapse. A lot many factors contribute to relapse which must be kept in mind while making treatment plan and also while selecting retainer. Growth of the patient, occlusal conditions, muscular balance, third molar eruption are some of the common causes. In this review article we try to study the etiology of relapse and various factors affecting it.

Keywords: Relapse, late mandibular growth, Arch form, transseptal fibres , Third molars

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INTRODUCTION

Achieving stable results at the end of active treatment is the utmost goal of orthodontic treatment. There is no treatment mechanics that can assure the stability of results nor does a well finished case guarantee stability. Relapse was defined by Moyers as returning back of the corrected malocclusion towards the original malocclusion. While planning treatment for the patient, factor responsible for relapse must be given equal importance as treatment mechanics .All orthodontic patients must be informed regarding the post treatment relapse because it is inevitable. Individualized retention protocols for every patient must be followed .There are number of factors which contribute to reappearance of treated malocclusion[1-2] .

ETIOLOGY OF RELAPSE

Relapse of orthodontic treatment would imply failure of the whole exercise of orthodontic therapy which was conducted for 2 year .It leads to both dissatisfaction among patient and doctor. A number of factors contribute to tendency of relapse such as changes in bone, tension of periodontal ligament, dysfunction of the endocrine system, occlusal changes, growth pattern, discrepancies of tooth size etc (Fig 1). A thorough knowledge of all these factors is important to plan adequate retention protocols for the patient.

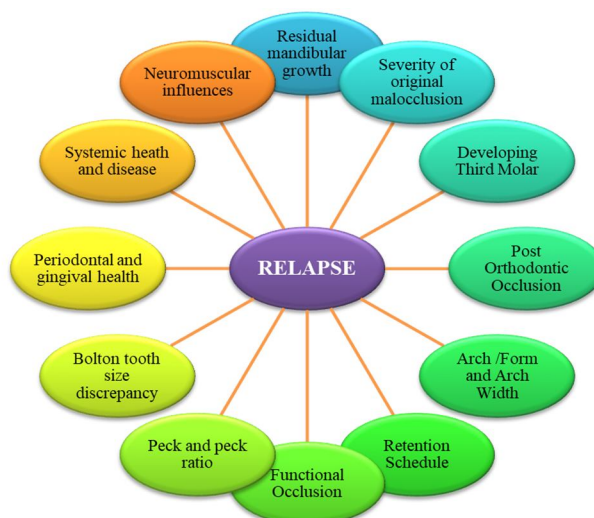


Fig.1: Factors associated with relapse of orthodontic treatment

Late mandibular growth

High pressure is created in anterior region due to late mandibular growth. The growth of mandible is faster as compared to maxilla. Lower incisors respond to this by moving lingually as they are under the restraining effect of maxilla. As a result the lower incisors are retroclined and thus crowding in lower anterior occurs. In a study by Lundstrom [3] on 25 twin pairs of age 12 to 15 years and 23 to 26 years, it was observed that crowding and gnathion growth were not related. In another study by Richardson [4] lower incisor inclination changes and incisal edge position in relation to maxillary plane was studied in 51 patients of age between 13 to 18 years. They found that there was incisor proclination of one degree and 1 mm displacement.

Growth of face and Development of occlusion

Whenever due to growth the skeletal relation between maxilla and mandible changes, there is dental compensation to maintain the occlusion. In some cases the dental compensation has reached its limit and cannot go beyond like in a growing Class III case. Study done by Nanda and Nanda [5] concluded that in skeletal deep bite cases, peak of growth occurs around 2 years after as compared to in open bite cases. Thus in deep bite patients, increased duration of retention is advocated.

Dimension of Mandibular incisors

People who have larger mesiodistal width of incisors are more prone to crowding. Peck and Peck [6] introduced us to the correlation between dimensions of mandibular teeth and crowding. They said that for crowding free incisors, there was an ideal relationship between ratios of mesiodistal width to faciolingual width of lower incisors. In order to have good stability, they advised reproximation of lower incisors. The work of Peck and Peck was not well supported by many researchers [7-9] found that there was no link between lower incisor crowding and their mesiodistal or faciolingual width. Reproximation of lower incisors was proposed by Boese [11-12]. So that broader contact point of incisor is provided and increased arch length is achieved in anterior region.

Occlusal factors:

Brodie[13] in his study showed that during the process of mastication, there is tendency of lower incisors to retrocline. There is reduction in intercanine width during the act of canine guided occlusion. Proffit [14] found out that occlusal forces can be borne by the periodontal ligament and other structures. Lombardi [15] suggested relation between maxillary canine overcorrection and crowding of lower incisors.

Underlying etiology:

If the cause of malocclusion is not treated while doing orthodontic treatment, then there is high chance of relapse of treatment. There is always tendency of teeth to go back to their original malocclusion pattern, so overcorrection of rotations are always advised. But Little *et al.* [16], noted that in more than half of the cases relapse of rotated teeth occurs in opposite direction.

Arch form alteration:

While treating any orthodontic patient, consideration must be given to maintenance of arch form [17]. In a study by Little *et al.* [18], it was shown that there will be relapse of intercanine and intermolar widths if they are expanded in cases of Angles Class II Div 2 malocclusion. Haas [19] and Sandstrom *et al* [20] concluded that intercanine width of 3 to 4mm and intermolar width of 6mm can be maintained after expansion. Study by Moussa *et al.* [21] found good intercanine and intermolar stability in maxillary arch 8 years after treatment but poor intercanine stability in mandibular arch. De La Cruz *et al.* [22] through their study in 87 patients showed that there is strong tendency of shape of the arch form to go back to its original shape (Fig 2).

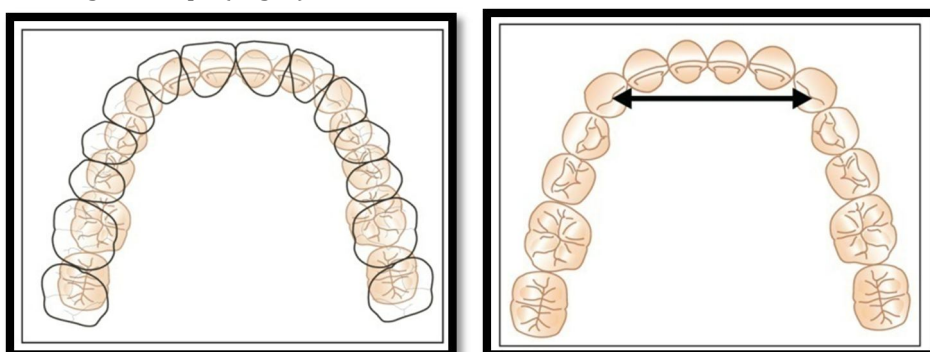


Fig 2 a) Expanded arch during orthodontic treatment b) Relapse of intercanine

Forces of Periodontal ligament :

Proffit explained the phenomenon of active stabilization wherein the periodontal ligament balances the tooth positions. Southard et al.[23]found out that late crowding in the mandibular arch may be attributed to forces of periodontal ligament.

Gingival Fibres:

Transspetal fibres are responsible for relapse of teeth that are rotated[24].Circumferential Supracrestal Fiberotomy was proposed by Brain and Edwards[25-26]where these fibres are cut using the blade to prevent relapse of rotated teeth. Redlich et al.[27]concluded that the entire gingival tissue can be responsible for relapse of rotated teeth instead of only gingival fibres stretch.

Maturation of soft tissues

Frankel and Loffler [28] found out that the Functional regulator appliance helps in maintaining arch length. They said that the shields of the appliance helps in anterioposterior development of lower arch. Woodside *et al* [29] found that there is descend of tongue with age which can result in crowding in the mandibular arch. Cohen and Vig [30] advocated the philosophy that large tongue size may result in anterior crowding

Connective tissue changes:

According to Laskin *et al* [31] , teeth may begin to move due to hormonal changes with age , this can be responsible for crowding .

Environmental factors :

How much an arch can be expanded can be determined by the value of intercanine and intermolar width of the arch. This concept was introduced by Strang [32]. According to Weinstein *et al* [33] there is a balance between position of lower incisors and muscular forces, and their position must not be changed during orthodontic treatment. Reitan [24] stated that if lower incisors are tried to move in labial or lingual direction, then there is high chances of their relapse.

Third molars :

Studies have found that when level of incisor crowding was compared in cases of impacted, missing , extracted or erupted third molars, no difference was found[34]studies showed that between 13 to 17 years , there was anterior movement of first molars and this was correlated with crowding in the lower arch.

CONCLUSION

Understanding of various factors responsible for relapse of orthodontically treated teeth is very important as it helps in planning retention regimes for patients. Relapse and retention must be given equal importance as given to treatment mechanics used during orthodontic therapy. All efforts must be done to prevent relapse. The patient must be given adequate retention so that chances of relapse are minimized.

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