PLANNING ORTHODONTIC STABILITY

*HAMEEDULLAH JAN MARWAT, BDS, MCPS, FCPS (Pak)

ABSTRACT

We all agree that the optimal results achieved after orthodontic treatment constitute the gold standards for stability. We are all aware that a given malocclusion may have different problems, each of which may have a different potential for instability. If timely attention is not paid to the underlying potential problem, relapse will be likely to occur and thus whole orthodontic outcome will lead to failure.

INTRODUCTION

In general, there should be harmony between muscle balance and tooth position. Occlusal equilibration should be considered on all finished cases. Strained gingivae are a sign of tooth imbalance, and interproximal reduction can help resolve it. Also, stability is correlated with age. Moving teeth from their pretreatment positions through expansions may be feasible in the very young, but doubtful in the adult.

We know that length and width typically decrease as crowding increases. Proper mandibular alignment can be seen in very few patients, thus demonstrating marked crowding many years after the removal of retainers. These changes continue well into the patients' growth decline phase and beyond, but the rate of change diminishes substantially after age 30.

Some people divide these problems into various "planes of space" - perimeter, vertical, transverse, and anteroposterior. For example, in the vertical plane of space, a patient could have an open bite or a deep overbite. Both of these would have differing potentials for instability and may require different modes of retention.

These pessimistic findings should not generate a negative attitude among orthodontic community. Instead, they should stimulate even greater efforts to provide the best possible results for their patients by paying more attention. The key to this failure practice of orthodontics is to reevaluate the finished cases and learn from your previous mistakes. In this way one becomes able and bold enough to overcome all his professional weaknesses.

DISCUSSION

Multiple factors which are causing broken contact points and derangement in the integrity of the maxillomandibular arches are to be determined right at the outset of the treatment. If these potential hazards are not brought under control, restoration of an optimal occlusion will be next to impossible.

Several studies of the maturation of untreated normal occlusions demonstrate that children with normal occlusions can develop noticeable mandibular incisor crowding during adolescence and young adulthood. Interestingly, the increased crowding tends to be located largely in areas of broken contact points. This indicates that slightly broken contact points in both untreated and treated cases may be starting points for later crowding.

These points will provide some guidelines on how improvements can be made towards better orthodontics stability.

Undercorrection of Rotations

A common mistake in orthodontics is incomplete correction of all rotations in the original malocclusion. Slight undercorrections of previously rotated teeth are not easy to detect clinically. Fine details can only be detected during and towards the end of treatment by careful comparison with the pretreatment study models. Furthermore, a small contact point has the potential for slippage and subsequent rotations of the teeth.

Placing incisors outside the canines

The mandibular anterior region is the most common area for post-treatment relapse and crowding.

* Col, Classified Orthodontist, Armed Forces Institute of Dentistry, Rawalpindi. Email: huj100@hoil.com
Moderate crowding can be masked if the four incisors are positioned as a block outside the mesial contacts of the mandibular cuspids.

**Early correction of Rotations**

Some clinicians claim that early treatment is the best answer to incisor stability. This may be related to the stage of development of the transseptal fibers. Kusters and colleagues showed that the transseptal fibers do not develop until the cementoenamel junctions of erupting teeth pass the bony border of the alveolar process. Therefore, decoration of teeth just after emergence in the mouth implies correction. When the corrected teeth erupt further, a normal anatomical arrangement of the transseptal fibers can develop.

**Transverse Relapse**

Many authors have demonstrated the importance of avoiding an increase in "normal" mandibular intercuspid width during orthodontic treatment. In most studies, this width has been found to decrease from post-treatment to post-retention, even when minimal expansion occurred during therapy. Apparently, the greater the increase in this dimension during treatment, the greater the decrease after treatment.

**Maxillary Archform**

Some excellent recent investigations have indicated that not only the mandibular intercuspid distance, but also the patient’s pretreatment mandibular archform, should constitute a guide to arch shape. Customizing mandibular archforms appears to be necessary in many cases to obtain optimum long term stability.

**Maxillary Expansion**

The evaluation of skeletal expansion is problematic and there is no scientific evidence to indicate that an orthodontist can induce a stable enlargement of maxillary basal bone that exceeds normal growth.

As already mentioned that the best guide to future dental and archform stability may be the patient’s pretreatment mandibular intercuspid width and mandibular archform. The maxillary archform should be respected, but frequently has to be adapted to occlude properly with the mandibular teeth. Fullness of smile should not be sought through lateral expansion and tipping of the maxillary dentition, but rather through adjustment of the crown torque to the most esthetic appearance.

**Vertical relapse**

Excessive anterior overbite is a common characteristic of many malocclusions. Deep overbite may be caused by overeruption of the maxillary incisors, overeruption of the mandibular incisors, or a combination of both. To achieve ideal functional and esthetic orthodontic results, it is important to determine which teeth are overerupted, to analyze the lower lip-maxillary incisor relationship, and to establish an optimal interincisal angle.

**Vertical Relapse and Mandibular incisors**

**Crowding**

The long-term stability of deep overbite correction is not will clear. In many cases, the deep overbite returns as the maxillary and/or mandibular incisors overerupt following appliance removal. According to several authors, the maintenance of overbite is related to the axial inclination of the incisors. If the maxillary and mandibular incisors are positioned too upright relative to one another, they will have an increased tendency to overerupt after appliance removal. It has been seen that the available space for the mandibular anterior teeth decreases as overbite increases. If the deep bite returns in a treated malocclusion, the incisal edges of the mandibular incisors will occlude against a labiobuccally thicker portion of the maxillary incisors. This will restrict their space and produce either mandibular incisor crowding and/or spacing of the maxillary incisors.
Mandibular First Bicuspid Extractions, and Anterior Crowding

When mandibular first bicuspids have been extracted as part of an orthodontic treatment plan, it is not uncommon for the mandibular cuspids to be retracted too far. Excessive retraction can easily occur if class II elastics are not worn properly, or if the first and second molars do not move mesially as much as expected. Next, the maxillary and mandibular incisors will move too far back, increasing the need for anterior crown and root torque. Therefore, mandibular first bicuspid extraction cases can end up with larger interincisal angles causing anterior vertical relapse and mandibular incisor crowding. Undoubtedly, one reason for selection the mandibular first bicuspids for extraction is their diminutive lingual cusp compared to that of the second bicuspid.

To correct and maintain the correction of an excessive overbite, the orthodontist should intrude the overerupted teeth and establish an ideal lower lip-to-maxillary incisor relationship and interincisal angle. When mandibular bicuspid extractions are necessary, the second bicuspids are often a better choice than the first bicuspids. Orthodontic treatment then becomes easier and more predictable with regard to achievement of proper anterior torque of the maxillary incisors, and undesired flattening of the facial profile.

Effects Of Third Molars On Erupting Teeth

The relationship between erupting third molars and late mandibular crowding is a controversial subject. Mesially directed force is considered by some as the most important cause of late mandibular crowding in the early teen-agers. However, the causes of reduced arch dimensions may vary from person to person, and several factors acting at different stages of development may contribute to late mandibular crowding.

A more fruitful approach to the controversy may be to look at the effects of erupting second and third molars on the continued eruption pattern of the mandibular first molars. Schwarze, using computer analysis of three-dimensional tooth movements in relation to the third palatinal rugae, showed less mesial movement of the first molars when the third molars were extracted between 12 and 22 years of age. Mandibular third molar eruption or extraction may affect the continued eruption path of the mandibular second and first molars. If pressure from an erupting third molar changes the path of first molar eruption to a more mesial direction, and if the incisors do not come forward to the same extent, mandibular anterior crowding will result.

Prolonged Retention

Based on information available in the literature, it appears prudent to prescribe a number of years of fixed retention; it also appears worthwhile to retain the mandibular arch until all growth is over. In an extensive overview of the clinical consequences of adult craniofacial growth, Behrents staged that for ultimate stability, the retention period for both adolescent and adult patients should be indefinite. As a general treatment policy, however, he did not consider this to be practical. Instead, based on the level of growth activity and the maxillomandibular adjustments that had occurred, he recommended retention for females until their early twenties and for males into their mid-twenties. Studies of late facial growth have shown continued eruption of the teeth into the third and possibly the fourth decades of life. Arch length and width reductions with concomitant crowding, which may continue into the third decade and beyond in both treated and untreated subjects, may be regarded as a normal physiological phenomenon. Without long-term retention of orthodontically treated adolescents and young adult patients, various degrees of anterior crowding may be expected as part of the normal maturation process. According to Riedel, permanent retention is indicated primarily for expansion (particularly in the mandible), generalized spacing, advanced periodontal cases, marked median diastemas, and severe rotations in adults.

Fixed Retainers

From a theoretical perspective, prolonged retentions recommended in adolescents to help withstand the effects of the postpubertal growth period. Whenever prolonged retention is required, it is important that simple, safe, and hygienic device is to be used.

CONCLUSION

The high prevalence of relapse may be due to the following reasons, which are to be controlled and
monitored throughout the orthodontic treatment time period if fruitful & rewarding results are to be expected:

- Incomplete correction of initial malocclusion
- Relapse of the treatment result, due to deliberate lateral expansion, return of perverted habits, tongue and orofacial muscle activity, unfavorable growth pattern, inadequate retention, or imbalances between mandibular posture and occlusal forces.
- Proclining mandibular incisors during treatment.
- Inadequate interdigitation of posterior teeth and lack of vertical contact in the anterior region in open-bite cases.
- Postpubertal growth activity after the retention period.

Key procedures to be adapted in maintaining optimal stability include:

- No CO-CR discrepancy
- Always respect the original mandibular archform
- Ensure a small interincisal angle by obtaining adequate torque of the maxillary incisors
- Use fixed retainers in adolescent as well as adult patients

REFERENCES