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A Perspective On Finishing In Class II Molar Relationship

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Abstract:

Finishing and detailing is one of the most difficult phases in orthodontic treatment. This finishing phase is not a separate phase in itself but rather it completely depends on the previous two phases namely aligning/leveling and space closure. It is important that we finish a case properly in order to ensure stability and to establish a harmonious relationship with adjacent structures. The aim of this article is to provide comprehensive knowledge about finishing in Class II molar relationship and its effect on stability of teeth and adjacent structures.

Keywords: Finishing, Detailing, Class II molar relationship, Orthodontic treatment

INTRODUCTION

Finishing can be defined as "The final stage of fixed appliance orthodontic treatment during which final detailing takes place to idealize individual tooth position".[1] This is the final stage of active orthodontic treatment and is dependent on the previous stages. In order to reduce the workload during finishing stage, care must be taken during bracket placement as also by using low levels of forces during the course of treatment.

Angle did not prefer a separate phase for finishing as he debanded immediately after space closure and relied on nature to accomplish finishing. Tweed Merrifield, however, recommended over correction in order to compensate for relapse that might happen, an opinion eschewed by Raymond P. Begg too. Andrews' six keys of occlusion, namely, Key I- Interarch relationship, Key II- Crown angulation, Key III- Crown inclination, Key IV- Absence of rotations , Key V- Tight contacts, Key VI- Curve of spee, later, became the criteria for finishing a case in proper occlusion. Roth, however, insisted on gnathological finishing which included - centric relation closure, mutually protected occlusion and elimination of excursive interferences.[2]Kessel[3], opinionated that single-arch extraction was a justifiable method of treatment of Class II malocclusion in non growing patients above 12 years with the attainment of correction of the severe pretreatment overjet to a normal overjet and a Class I canine relationship. Bishara[4] and Proffit [5] documented cases where molars were left in Class II relationship at the end of orthodontic treatment. It would be prudent to speculate that it is the dentoalveolar and not the skeletal characteristics that determine whether a Class II malocclusion should be treated with a 2 or a 4 premolars extraction strategy.

BOLTON'S RATIO

Bolton had reiterated the importance of the maintenance of a proper maxillary and mandibular tooth size and proportion for a normal occlusal relationship. The tooth size ratio in the anterior teeth is therefore applied clinically. Ideally, 3 maxillary anterior teeth occlude with 3.5 mandibular anterior teeth in each quadrant for a normal overjet, overbite and coincidence of the midline. The maxillary anterior teeth have a larger mesiodistal dimension than the mandibular anteriors. In the mandible, the posterior teeth form 91% value in the overall ratio implying that the mandibular posterior teeth are larger mesiodistally than the maxillary posteriors. Five maxillary posterior teeth (from first premolar to third molar) occlude with 4.5 mandibular posterior teeth when third molars are present. If the third molars are not considered, 4 maxillary posterior teeth (first premolar to second molar) occlude with 3.5 mandibular posteriors. A major finishing consideration in the horizontal plane is the coordination of tooth fit between the anterior and posterior segments. The anterior and posterior teeth fit well with little or no adjustment required in approximately 20% of cases. However, in approximately 60% of cases as the finishing stage approaches the crowns of the upper anterior teeth do not occupy enough space mesio-distally relative to the crowns of the lower anterior teeth.[6]In order to achieve a good finish of the occlusion it is important that the treatment be planned in such a way that the Bolton's ratio is maintained. Hence, the importance of Bolton's ratio has now led it to be considered as the seventh key of occlusion.

FINISHING IN CLASS II MOLAR RELATIONSHIP

Extraction of only 2 maxillary premolars and subsequently finishing with Class II molar relationship is usually indicated when there is only a cephalometric discrepancy indicating Class II but no crowding in the mandibular arch. On the other hand, extraction of the 4 premolars and finishing in a Class I molar relationship is indicated primarily for crowding in the mandibular arch, a cephalometric discrepancy, or a combination of both, especially so in growing patients.[7] Few studies have shown that patient satisfaction with camouflage treatment is similar to that achieved with surgical mandibular advancement [8] and that treatment with two maxillary premolar extractions gives a better occlusal result than treatment with four premolars extractions.[9]

ADVANTAGES OF 2 MAXILLARY PREMOLAR EXTRACTION

According to Janson G et al (2007), obtaining a Class I molar relationship in the 4-premolar extraction protocol required more anchorage reinforcement and more patient compliance than maintaining Class II molar relationship in the 2-maxillary-premolar-extraction protocol. Treatment time was also shorter in the 2-maxillary-premolar protocol than in the 4-premolar-extraction protocol. Records and study models of all patients who were finished in bilateral Angle's Class II molar relationship were considered in the study and they were divided into 2 groups. One group were those who were treated with 2- premolar extraction and the other group were those treated with 4- premolar extraction. The final occlusal success rates between the two treatment protocols was assessed. The result of this study was similar to that of other studies. It suggested that treatment difficulty increased when a full-cusp Class II molar relationship was to be completely corrected. As the average mesiodistal diameter of the premolars is 7 mm and the anterior teeth be distalized through this distance, extracting only the 2 maxillary premolars for treating the Class II malocclusion required anchorage reinforcement too to avoid mesial movement of the posterior segment. The study concluded that appliances that provided anchorage reinforcement if extraoral, required patient compliance too for a successful treatment result.[10]In complete Class II therapy without premolar extractions, the need for anchorage reinforcement is even more greater because the posterior and anterior segment must be distalized 7 mm to achieve a Class I molar relationship. Therefore, a 7 mm of distalization of the posterior segment and the anterior segment sums to a total of 14mm of distalization which is twice the amount

required for Class II correction with extraction. Consequently, the need for anchorage reinforcement is twice as great and the treatment success too depends on patient compliance. In a growing patient, the probability of success is considerably increased because the extraoral appliances for anchorage reinforcement used to distalize the maxillary teeth also redirects the maxillary growth restricting its anterior displacement aiding in the Class II correction in conjunction with the normal anterior displacement of the mandible during growth. The growth potential is more important in Class II patients who are treated by nonextraction treatment mechanics because these patients require more distalization of the maxillary teeth. Therefore the absence of growth in adults is a great limitation for a nonextraction treatment approach. The compliance necessary for treatment success varies according to patient age and malocclusion severity. As a 2 maxillary premolar extraction protocol in the Class II malocclusion treatment reduced by half the compliance required from the patient, this study showed show that a greater occlusal success rate and a shorter treatment time could be expected with this protocol, increasing treatment predictability even when used in patients with reduced growth potential or in severe malocclusions. Certain reluctance still persists in the literature for the 2 maxillary premolar extraction Class II treatment in growing patients, thereby restricting its application probably to the non-growing patients only. This approach appears to be a conditioned attitude rather than a decision based on scientific evidence, since orthodontic treatment results during the growth period are predominantly dentoalveolar regardless of orthodontic technique or treatment protocol. There is evidence to justify the 2 maxillary premolar extraction protocol during the pubertal growth period as it required less patient compliance. Moderate patient compliance with extraoral headgear or functional appliance could be still insufficient to successfully treat by non-extraction a complete Class II malocclusion, though it might be suitable for a 2 maxillary premolar extraction protocol. Janson G et al (2010) [11] performed a study to check the long term effects of the long-term stability of the 2 maxillary premolar extraction protocol. They concluded that the time after treatment did not influence the stability between the 2 groups. Most relapses occur in the first year post treatment with the occlusion tending to stabilize after that except for displacement of the mandibular incisor contact points which tended to increase over the years. It has been reported that in a 2 maxillary premolar extraction protocol for camouflaging a Class II malocclusion, the nasolabial angle increases as the upper lip falls back subsequent to anterior teeth retraction. However, the amount of retraction of the lower lip is observed to be much less, a feature desirable in such a treatment protocol for a Class II maloclussion.[12]

DISADVANTAGES OF 2 MAXILLARY PREMOLAR EXTRACTION

Mailankody J [13] argued that the nature's design of posterior tooth size agreed with normal (Class I) intercuspation for balanced functioning as the best form-and-function interrelationship. He eschewed that if the molar is finished in a Class II occlusal relationship, the distal half of the distal most mandibular molar will not have a functional occlusal contact and though they don't supra erupt their stability and equilibrium would be questionable. Long term studies on patients finished in Class II molar relationship and their implications on TMJ should be an area of credible research in the near future as few authors have reported that finishing in Class II could cause TMJ problems.[14,15] On the other hand, few authors have also reported that the molars could be finished in a Class II relationship without unfavorable sequelae.[16,17]

CONCLUSION

Finishing in a Class II molar relationship by extracting the 2 maxillary premolars only is an acceptable form of orthodontic treatment planning as it reduces treatment duration with desirable stability of the occlusion with not

much deterioration of the profile esthetics. However, care should be taken to see the canines are finished in a Class I relationship for a stable functional occlusion.

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