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Original Research

Comparison of en masse retraction and two-step retraction in the maxillary and mandibular arches during the orthodontic space closure

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ABSTRACT:

Background: The closing of extraction spaces can be performed using two main retraction techniques: en masse retraction (ER) or two-step retraction (TSR). The present study was conducted to compare ER and TSR in the maxillary and mandibular arches during the orthodontic space closure phase without auxiliary anchorage device. **Materials & Methods:** 60 subjects with class I bimaxillary protrusion malocclusion with mild to moderate crowding in the upper and lower incisors was divided into 2 groups of 30 each. Group I comprised of ER patients and group II had or the TSR patients. The amount of posterior anchorage loss in the molars and the retraction of the incisors between ER and TSR was recorded. **Results:** In group I and II, in maxillary incisors, value of tipping was -10.4 and -11.8, crown/vertical was -1.8 and -1.4, apex/vertical was -1.48 and -1.50, crown/horizontal was -4.50 and -4.64 and apex/horizontal was -1.96 and -1.20 respectively. The difference was non- significant (P> 0.05). In group I and II, in mandibular incisors, value of tipping was -9.62 and -9.86, crown/vertical was 0.68 and 0.76, apex/vertical was 1.98 and 1.92, crown/horizontal was -4.62 and -4.86 and apex/horizontal was -1.4 and -1.5 respectively. The difference was non- significant (P> 0.05). **Conclusion:** The amount of retraction of incisors and anchorage loss of molars between ER and TSR was comparable.

Key words: Anchorage, en masse retraction, two-step retraction.

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INTRODUCTION

The closing of extraction spaces can be performed using two main retraction techniques: en masse retraction (ER) or two-step retraction (TSR). For space closure achieved by ER, incisors and canines are retracted in just one step and as if it were a single block.[1] In TSR, the first step involves independently retracting the canines until they reach full contact with the second premolar; then they are incorporated into the posterior block of teeth composed of the second premolar and first and second molars. In the second step, this posterior block is used as an anchorage unit to retract the incisors.[2]

The en-masse retraction of the anterior teeth after first premolar extraction has been practiced in the Begg and Tip-Edge edgewise techniques for many years.[3] In the straight wire appliances, the en-masse retraction of maxillary anterior teeth was first presented by Andrews, and then it has been used routinely by Bennett and McLaughlin in their preadjusted appliance system. It might be expected to lose posterior anchorage, so the use of anchorage devices has been emphasized.[4]

There is only one study conducted without the use of anchoring devices. However, in that study, the movement of the molars was evaluated from lateral cephalograms, which may have induced measurement errors because of superimposition of contralateral molars. In lateral cephalograms, bilateral objects are projected on the same plane.[5] Degree of distortion of the lateral structures depends on facial morphology and is also influenced by the angle between the lateral part of the mandible and the film. Therefore, lateral cephalograms do not have sufficient accuracy to evaluate posterior tooth movement, and the measurements are less reliable than assessments,

previously shown to be adequate, using oblique cephalometric radiographs taken at 45 degree.[6] The present study was conducted to compare ER and TSR in the maxillary and mandibular arches during the orthodontic space closure phase without auxiliary anchorage device.

MATERIALS & METHODS

The present study was conducted in the department of Orthodontics. It comprised of 60 subjects with class I bimaxillary protrusion malocclusion with mild to moderate crowding in the upper and lower incisors of both genders. All patients were informed regarding the study and their written consent was obtained.

Data pertaining to patients such as name, age, gender etc. was recorded. All patients were divided into 2 groups of 30 each. Group I comprised of ER patients and group II had or the TSR patients. All patients underwent lateral cephalometric radiographs and oblique cephalometric radiographs at before retraction (T1) and after space closure (T2). The amount of posterior anchorage loss in the molars and the retraction of the incisors between ER and TSR was recorded. Results thus achieved were statistically analysed. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	En masse retraction (ER)	Two-step retraction (TSR)
M:F	18:12	14:16

Table I shows that group I had 18 males and 12 females and group II had 14 males and 16 females.

Table II Assessment of variables

Teeth	Variables	Group I	Group II	P value
Upper Incisor	Tipping	-10.4	-11.8	0.12
	Crown/vertical, mm	-1.8	-1.4	0.43
	Apex/vertical, mm	-1.48	-1.50	0.16
	Crown/horizontal, mm	-4.50	-4.64	0.81
	Apex/horizontal, mm	-1.96	-1.20	0.15
Lower Incisor	Tipping	-9.62	-9.86	0.18
	Crown/vertical, mm	0.68	0.76	0.21
	Apex/vertical, mm	1.98	1.92	0.25
	Crown/horizontal, mm	-4.62	-4.86	0.31
	Apex/horizontal, mm	-1.4	-1.5	0.98

Graph I Assessment of variables

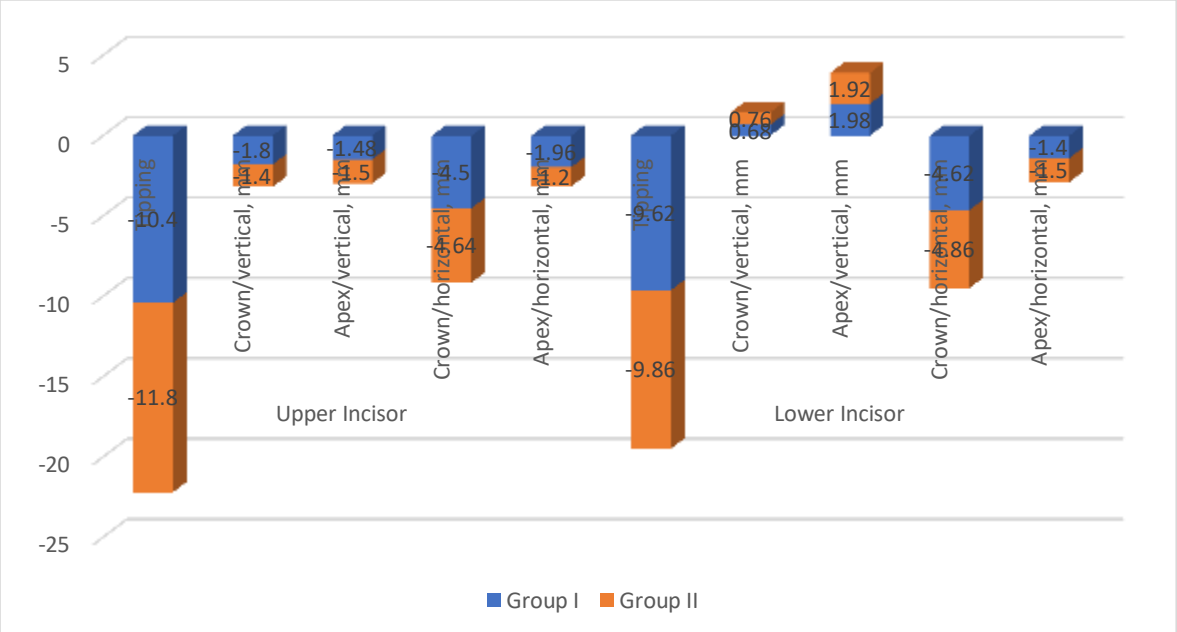

Table II, graph I shows that in group I and II, in maxillary incisors, value of tipping was -10.4 and -11.8, crown/vertical was -1.8 and -1.4, apex/vertical was -1.48 and -1.50, crown/horizontal was -4.50 and -4.64 and apex/horizontal was -1.96 and -1.20 respectively. The difference was non- significant (P> 0.05). In group I and II, in mandibular incisors, value of tipping was -9.62 and -9.86, crown/vertical was 0.68 and 0.76, apex/vertical was 1.98 and 1.92, crown/horizontal was -4.62 and -4.86 and apex/horizontal was -1.4 and -1.5 respectively. The difference was non- significant (P> 0.05).

DISCUSSION

The en-masse retraction of the anterior teeth after first premolar extraction has been practiced in the Begg and Tip-Edge edgewise techniques for many years.[7] In the straight wire appliances, the en-masse retraction of maxillary anterior teeth was first presented by Andrews, and then it has been used routinely by Bennett and McLaughlin in their preadjusted appliance system. It might be expected to lose posterior anchorage, so the use of anchorage devices has been emphasized.[8] Because adult patients typically want to improve their dental aesthetics in a short time with satisfactory results, many techniques to accelerate orthodontic tooth movement have been explored in the literature, such as surgical, mechanical (e.g., reducing friction when moving teeth using special brackets), pharmacological, and physical methods. One of the most common modes of surgical intervention is corticotomy-assisted orthodontics. Corticotomy is defined as osteotomy of the cortical bone only, leaving the medullary vessels and periosteum intact.[9] The rapid tooth movement in corticotomy happens because of increased bone turnover in response to the surgical intervention, which in turn presents less resistance to tooth movement, so it offers an advantage to adult patients by way of reduction in the orthodontic treatment time. Also, piezoelectric surgery is a new minimally invasive version of corticotomy, which uses a piezotome to cause bone injury in order to stimulate rapid tooth movement. Piezoelectric surgery can be done with or without elevation of flaps.[10] The present study was conducted to compare ER and TSR in the maxillary and mandibular arches during the orthodontic space closure phase without auxiliary anchorage device.

In present study, group I patients were treated with en masse retraction (ER) and group II with two-step retraction (TSR). Group I had 18 males and 12 females and group II had 14 males and 16 females. Schneider et al[11] compared en masse (ER) and two-step retraction (TSR) during space closure. Forty-eight adult patients with bimaxillary protrusion who were planned for treatment with extraction of four first premolars were enrolled. Neither incisor nor molar crown movements showed any significant differences between the ER and TSR. There were no significant differences in the tipping of incisors and molars between the two groups.

We found that in group I and II, in maxillary incisors, value of tipping was -10.4 and -11.8, crown/vertical was -1.8 and -1.4, apex/vertical was -1.48 and -1.50, crown/horizontal was -4.50 and -4.64 and apex/horizontal was -1.96 and -1.20 respectively. The difference was non- significant (P> 0.05). In group I and II, in mandibular incisors, value of tipping was -9.62 and -9.86, crown/vertical was 0.68 and 0.76, apex/vertical was 1.98 and 1.92, crown/horizontal was -4.62 and -4.86 and apex/horizontal was -1.4 and -1.5 respectively.

Khlef et al[12] evaluated the efficacy of accelerated and non-accelerated methods of en-masse retraction of the upper anterior teeth in terms of skeletal, dental, and soft-tissue variables, as well as the duration of retraction or overall orthodontic treatment. Eight articles (six RCTs and two CCTs) were included in this review, and only five articles were suitable for quantitative synthesis. The en-masse retraction caused a decrease in the SNA and ANB angles with no significant differences between the different en-masse retraction methods. Using temporary skeletal anchorage devices (TSADs) gave significantly better results in terms of posterior anchorage in comparison with conventional anchorage (standardized mean difference (SMD) = –3.03 mm, p <0.001).

CONCLUSION

Authors found that amount of retraction of incisors and anchorage loss of molars between ER and TSR was comparable.

The limitation of the study is small sample size.

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