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Original Research

A comparative analysis of en masse retraction and two-step retraction during the orthodontic space closure

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ABSTRACT:
Background: En masse retraction (ER) and two-step retraction (TSR) are the two primary retraction strategies that can be used to close extraction spaces. The present study was conducted to compare En masse retraction (ER) and two-step retraction (TSR) during the orthodontic space closure phase without auxiliary anchorage device. **Materials & Methods:** 70 patients with class I bimaxillary protrusion malocclusion of both genders were divided into 2 groups of 35 each. Group I patients underwent En masse retraction and group II patients underwent two-step retraction. The amount of posterior anchorage loss in the molars and the retraction of the incisors was recorded. **Results:** Group I had 15 males and 20 females and group II had 17 males and 18 females. In maxillary incisors, value of tipping was -10.6 and -11.2, crown/horizontal was -4.54 and -4.60 and apex/horizontal was -1.91 and -1.27, crown/vertical was -1.7 and -1.5, and apex/vertical was -1.42 and -1.51 in group I and II respectively. In mandibular incisors, value of tipping was -9.52 and -9.82, crown/horizontal was -4.52 and -4.82, apex/horizontal was -1.5 and -1.6, crown/vertical was 0.65 and 0.72, and apex/vertical was 1.92 and 1.94 in group I and group II respectively. The difference was non- significant (P> 0.05). **Conclusion:** The degree of molar anchoring loss and incisor retraction between ER and TSR were similar.
Key words: Anchorage, two-step retraction, en masse retraction

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INTRODUCTION

En masse retraction (ER) and two-step retraction (TSR) are the two primary retraction strategies that can be used to close extraction spaces. Incisors and canines are retracted in a single motion, as if they were a single block, to achieve space closure by ER.[1] The canines are separately retracted in the first stage of TSR until they make complete contact with the second premolar. After that, they are integrated into the posterior block of teeth, which is made up of the second premolar, first, and second molars. This posterior block serves as an anchorage unit to retract the incisors in the second stage.[2]

For many years, the Begg and Tip-Edge edgewise methods have involved the en masse retraction of the anterior teeth following the extraction of the first premolar. Andrews was the first to propose the en-masse retraction of maxillary anterior teeth with straight wire appliances, and Bennett and McLaughlin followed suit with their preadjusted appliance technique. Since it is reasonable to anticipate losing posterior anchoring, anchorage device use has been highlighted.[3]

There is just one study that wasn't done with anchoring devices. But in that investigation, lateral cephalograms were used to assess molar mobility, which could have led to measurement inaccuracies

due to the superimposition of contralateral molars. Bilateral objects are projected onto the same plane in lateral cephalograms.[4] The degree of lateral structural distortion is determined by the angle formed by the mandibular lateral portion and the film, as well as by the morphology of the face. As a result, oblique cephalometric radiographs recorded at a 45-degree angle provide assessments that have been demonstrated to be sufficiently accurate for evaluating posterior tooth movement, while lateral cephalograms are less accurate overall.[5] The present study was conducted to compare En masse retraction (ER) and two-step retraction (TSR) during the orthodontic space closure phase without auxiliary anchorage device.

MATERIALS & METHODS

The present study was conducted among 70 patients with class I bimaxillary protrusion malocclusion of both genders. All patients were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. All patients were divided into 2 groups of 35 each. Group I patients underwent En masse retraction and group II patients underwent two-step retraction. 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 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	15:20	17:18

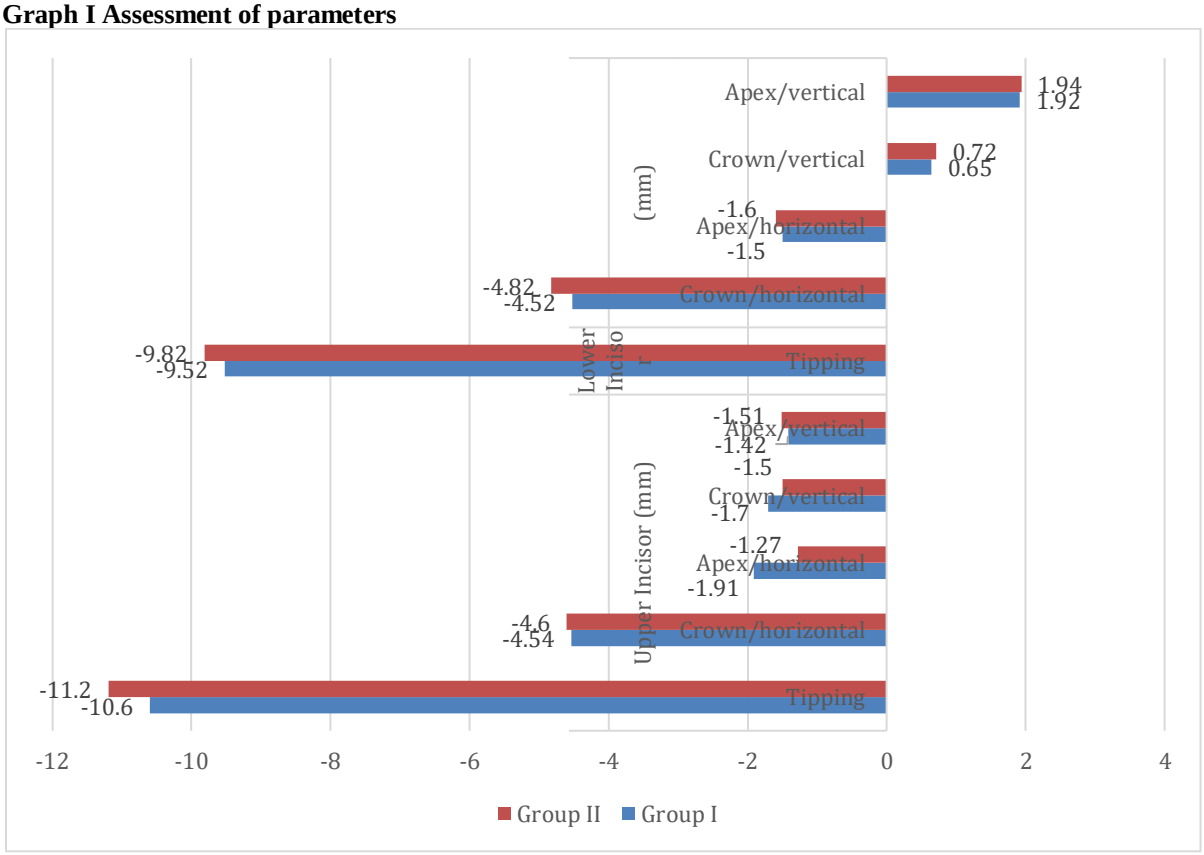
Table I shows that group I had 15 males and 20 females and group II had 17 males and 18 females.

Table II Assessment of parameters

Teeth	Variables	Group I	Group II	P value
Upper Incisor (mm)	Tipping	-10.6	-11.2	0.19
	Crown/horizontal	-4.54	-4.60	0.84
	Apex/horizontal	-1.91	-1.27	0.65
	Crown/vertical	-1.7	-1.5	0.48
	Apex/vertical	-1.42	-1.51	0.19
Lower Incisor (mm)	Tipping	-9.52	-9.82	0.56
	Crown/horizontal	-4.52	-4.82	0.38
	Apex/horizontal	-1.5	-1.6	0.92
	Crown/vertical	0.65	0.72	0.72
	Apex/vertical	1.92	1.94	0.91

Table II, graph I shows that in maxillary incisors, value of tipping was -10.6 and -11.2, crown/horizontal was -4.54 and -4.60 and apex/horizontal was -1.91 and -1.27, crown/vertical was -1.7 and -1.5, and apex/vertical was -1.42 and -1.51 in group I and II respectively. In mandibular incisors, value of tipping was -9.52 and -9.82, crown/horizontal was -4.52 and -4.82, apex/horizontal was -1.5 and -1.6, crown/vertical was 0.65 and 0.72, and apex/vertical was 1.92 and 1.94 in group I and group II respectively. The difference was non- significant (P> 0.05).

Graph I Assessment of parameters



DISCUSSION

For many years, the Begg and Tip-Edge edgewise methods have involved the en masse retraction of the anterior teeth following the extraction of the first premolar. Andrews was the first to propose the en-masse retraction of maxillary anterior teeth with straight wire appliances, and Bennett and McLaughlin followed suit with their preadjusted appliance technique.[6] Since it is reasonable to anticipate losing posterior anchoring, anchorage device use has been highlighted. Numerous methods, including surgical, mechanical (e.g., reducing friction when moving teeth using special brackets), pharmacological, and physical methods, have been investigated in the literature to accelerate orthodontic tooth movement because adult patients typically want to improve their dental aesthetics in a short amount of time with satisfactory results.[7]

The use of corticotomy-assisted orthodontics is among the most popular forms of surgical intervention. A corticotomy is an osteotomy that solely removes cortical bone, sparing the periosteum and medullary arteries.9. Adult patients can benefit from corticotomy by having their orthodontic treatment take less time because of the enhanced bone turnover that occurs as a result of the surgical intervention.[8] This greater bone turnover also results in reduced resistance to tooth movement. Additionally, a novel minimally invasive variation of corticotomy called piezoelectric surgery employs a piezotome to injure bone and trigger fast movement of teeth. Elevation of flaps can be performed either way during piezoelectric surgery.[9] The present study was conducted to compare En masse retraction (ER) and two-step retraction (TSR) during the orthodontic space closure phase without auxiliary anchorage device.

We observed that group I had 15 males and 20 females and group II had 17 males and 18 females. In terms of skeletal, dental, and soft-tissue factors, as well as the length of the retraction or orthodontic therapy as a whole, Khlef et al[10] assessed the effectiveness of both expedited and non-accelerated methods of en-masse retraction of the upper front teeth. Out of the eight papers that made up this review—six RCTs and two CCTs—only five could be used for quantitative synthesis. There were no appreciable variations in the SNA and ANB angles following the en-masse retraction among the various en-masse retraction techniques. When compared to traditional anchorage, the use of temporary skeletal anchorage devices (TSADs) produced noticeably superior posterior anchorage outcomes (standardized mean difference [SMD] = –3.03 mm, p <0.001).

We found that in maxillary incisors, value of tipping was -10.6 and -11.2, crown/horizontal was -4.54 and -4.60 and apex/horizontal was -1.91 and -1.27, crown/vertical was -1.7 and -1.5, and apex/vertical was -1.42 and -1.51 in group I and II respectively. In mandibular incisors, value of tipping was -9.52 and -9.82, crown/horizontal was -4.52 and -4.82, apex/horizontal was -1.5 and -1.6, crown/vertical was

0.65 and 0.72, and apex/vertical was 1.92 and 1.94 in group I and group II respectively. En masse (ER) and two-step retraction (TSR) were contrasted by Schneider et al[11] during space closing. We enrolled 48 adult patients with bimaxillary protrusion who were scheduled to have four first premolars extracted as part of their treatment. There were no discernible variations between the ER and TSR in the motions of the incisor or molar crowns. The two groups' incisor and molar tips did not differ significantly from one another.

Al-Sibaie et al[12] evaluated skeletal, dental, and soft tissue changes following anterior teeth retraction. One hundred and thirty-three patients with an upper dentoalveolar protrusion were evaluated and 80 patients fulfilled the inclusion criteria. Randomization was performed using computer-generated tables; allocation was concealed using sequentially numbered opaque and sealed envelopes. Fifty-six participants were analysed (mean age 22.34 ± 4.56 years). They were randomly distributed into two groups with 28 patients in each group (1:1 allocation ratio). A bodily retraction (-4.42 mm; $P < 0.001$) with a slight intrusion (-1.53 mm; $P < 0.001$) of the upper anterior teeth was achieved in the mini-implants group, whereas upper anterior teeth retraction was achieved by controlled palatal tipping in the TPA group. When retracting anterior teeth in patients with moderate to severe protrusion, the en-masse retraction based on mini-implants anchorage gave superior results compared to the two-step retraction based on conventional anchorage in terms of speed, dental changes, anchorage loss, and aesthetic outcomes.

The limitation of the study is small sample size.

CONCLUSION

Authors found that the degree of molar anchoring loss and incisor retraction between ER and TSR were similar.

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