

**Authors:**

**Sasha Pervin** – Trust Grade Child Dental Health, Newcastle Upon Tyne Hospitals NHS Foundation Trust, Newcastle

**Sarah Rolland** – Senior Clinical Lecturer/Hon Consultant in Orthodontics, Centre for Oral Health Research, Newcastle University

**Greig Taylor** – Academic Clinical Fellow/StR in Paediatric Dentistry, Centre for Oral Health Research, Newcastle University

Corresponding Email: [sasha.pervin@hotmail.co.uk](mailto:sasha.pervin@hotmail.co.uk)

**Abstracted from**

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**Address for correspondence:** School of Dentistry, University of Dundee, Nethergate, Dundee DD14HN, UK Email: Mumenrizk@gmail.com

**Question**

The review aims to compare en masse and two-step retraction methods during orthodontic space closure regarding anchorage preservation and anterior segment retractions and their effect on the duration of treatment and apical root resorption.

**Data sources**

MEDLINE, Scopus, Web of Science, PubMed, and the Cochrane Central Register of controlled Trials (CENTRAL). Handsearching of references lists of included studies.

**Study selection**

Randomised controlled clinical trials (RCTs) and prospective controlled clinical trials (pCCT's), of orthodontic patients treated with pre-adjusted fixed appliances, requiring space closure in the maxillary arch, comparing en masse retraction and two-step retraction. No initial restriction on language or date of publication. Retrospective studies were excluded.

**Data extraction and synthesis**

Data extraction was performed independently by two reviewers, using customized data extraction forms, and any disagreement resolved by third reviewer. Cochrane risk of bias tool was used to assess the quality of RCT's. The Newcastle- Ottawa scale was used to assess the quality of pCCT's. A random effects model was used in anticipation of heterogeneity.

**Results**

Eight studies (four RCTs; four pCCTs) involving a total of 334 patients were included. Two RCTs were considered to be at low risk of bias and two at high risk of bias. Three pCCTs were considered to be of high quality and one of low quality. Four studies contributed to the meta-analysis; one pCCT and three RCT. There was a statistically significant difference in favour of en masse/miniscrew combination for anchorage preservation Std.Mean Difference (SMD) = - 2.55 mm (95%CI; - 2.99 to - 2.11 and Upper incisor retraction SMD = - 0.38 mm (95%CI; - 0.70 to - 0.06). Narrative synthesis suggests that en masse retraction requires less time than two-step retraction with no difference in the amount of apical root resorption.

**Conclusions**

En masse and two-step retraction are effective forms of space closure, with en masse being superior in anchorage preservation and incisor retraction if used in conjunction with miniscrews, when compared to two-step retraction with conventional anchorage. En masse treatment duration is less; however, no differences are noted in apical root resorption. Limited evidence suggested anchorage reinforcement with headgear produces similar results with both retraction methods.

## Commentary

Orthodontic space closure is often required after extraction to close interdental spaces and improve occlusal relationships. Space closure is commonly achieved by either two-step retraction, where the canine is moved distally as a single unit, followed by the four incisors, or en masse; where the anterior six teeth are moved as one segment<sup>1</sup>.

This systematic review is the first to compare en masse against two-step retraction techniques. The PICO question was well designed with a primary outcome to assess anchorage loss and incisor retraction reported. Secondary outcome measures, treatment duration and amount of apical root resorption, were provided. Inclusion/exclusion criteria were clearly reported. Six studies were excluded for language reasons and by excluding these studies, it may have potentially led to some relevant papers being excluded, which is recognised as a limitation by the authors.

In total, 2092 records were identified, 1293 duplicates were removed and 1227 were excluded on initial screening. 66 full-text articles were reviewed with eight studies being included in the review. Reasons for exclusion were given. Assessment of bias was carried out appropriately for each study; however, an overall quality of the findings using an approach such as GRADE does not appear to have been conducted.

Data extraction was performed independently by two reviewers, with disagreements being resolved by a third reviewer, overseen by another author. It would have been interesting to see how often the third reviewer was required.

Key characteristics of the included studies are provided in a table, which allows the reader to compare and contrast studies at ease. In the body of text, comparison between studies are made on the type of anchorage reinforcement used for space closure, as these very much differed between studies. This approach is clear and makes it easier for the reader to understand and consider each of the options. Meta-analysis was undertaken on four studies, using a random-effects model, as it was anticipated a degree of heterogeneity. I<sup>2</sup> were provided and the results of the meta-analyses were displayed in a forest-plot.

The authors report that many of the studies did not report significant differences in retraction; however, pooled data did find a significant difference, although, a difference of - 0.38 mm is unlikely to be considered clinically important. The authors briefly discuss how the differences in outcome measures across the studies were addressed in their review but do not expand how it may have affected the overall significance of the pooled result. En masse appears to be superior in anchorage preservation and incisor retraction, if used in conjunction with miniscrews, when compared to two-step retraction combined with conventional anchorage methods. This led the authors to recommending that en masse retraction aided with the use of miniscrews as anchorage reinforcement, should be used in maximum anchorage cases. This recommendation appears to be supported by the findings of this review, however, is based on a small number of studies. Despite these recommendations and findings, the authors report overall that en masse and two-step retraction are equally effective in orthodontic space closure.

## References

1. Felemban NH, Al-Sulaimani FF, Murshid ZA, Hassan AH. En masse retraction versus two-step retraction of anterior teeth in extraction treatment of bimaxillary protrusion. *Journal of Orthodontic Science*. 2013;2(1):28-37. doi:10.4103/2278-0203.110330.