Are there more adverse effects with lingual orthodontics?

Abstracted from

Ata-Ali F, Ata-Ali J, Ferrer-Molina M, Cobo T, De Carlos F, Cobo J.

Adverse effects of lingual and buccal orthodontic techniques: A systematic review and meta-analysis.
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Address for correspondence: Fadi Ata-Ali, University of Oviedo, Catedratico Jose Serrano St 10, Oviedo 33006, Spain. E-mail: losataali@hotmail.com

Question: Are lingual fixed orthodontic appliances associated with greater or fewer adverse effects than buccal appliances?

Data sources PubMed, Embase, Cochrane Library and LILACS database, review of references cited in included articles and a manual search of leading orthodontic journals. No language restrictions were imposed in the search. Study authors were contacted when necessary.

Study selection Randomised controlled trials (RCTs) and controlled clinical trials (CCTs) in healthy patients that directly compared the adverse effects following treatment using buccal and lingual appliances. Studies involving single arch or dual arch appliances were considered. Studies on patients with systemic diseases, animal studies and in vitro studies were excluded. The primary outcomes of interest to the authors were a list of adverse effects: pain, caries, eating and speech difficulties and oral hygiene.

Data extraction and synthesis Two authors reviewed the titles and abstracts of all studies identified through the search without blinding to names of authors or publication dates. Selected articles from searches were evaluated independently by two authors against established inclusion criteria, disagreements were resolved by consensus or by consulting a third author. Two authors independently assessed the risk of bias using the Cochrane Collaboration's tool (randomised trials) and the Newcastle-Ottawa Scale for non-randomised studies. The level of agreement between the authors was assessed using the Cohen kappa statistic. A meta-analysis was performed to provide pooled effect estimate (expressed as odds ratio) as well as 95% confidence interval. The outcomes of interest were pain, caries, eating difficulties, speech difficulties and deficient oral hygiene. Heterogeneity was quantified using I2 statistic and potential causes explored. Publication bias was assessed using a funnel plot.

Results Eight articles were included; three RCTs and five CCTs. One RCT was considered to be at high risk of bias, one moderate risk and one low risk. Of the non-randomised studies, four were low risk and one was high risk of bias. Six studies involving a total of 131 patients were included in a meta-analysis. The lingual appliance was associated with significant pain in the tongue (OR=28.32, 95% CI 8.6-93.28), difficulty in maintaining oral hygiene (OR=3.49, 95%CI 1.02-11.95) and greater speech difficulty (OR = 9.39, 95% CI 3.78-23.33) compared to buccal appliances. On the other hand, patients with lingual appliances had decreased pain in the lips and cheeks. There was no difference between the two appliances with regards to caries risk.

Conclusions Limited available evidence indicates that lingual orthodontic appliances are associated with increased pain in the tongue, speech difficulties and difficulty in maintaining oral hygiene.

Commentary

This review addresses a clearly focused question: 'In healthy patients with malocclusions, are lingual orthodontic appliances associated with more adverse effects than buccal appliances?' Clinically important, patient-centred outcomes of pain, speech and eating difficulties were considered in this meta-analysis.

The authors performed a comprehensive literature search and appropriately restricted the included studies to randomised controlled trials (RCT) and controlled clinical trials (CCT) involving buccal and lingual orthodontic appliances. The authors also manually searched the leading orthodontic journals.

The authors used the Cochrane risk of bias assessment tool to assess bias in the included RCT studies, which is appropriate. However, the authors used the Newcastle-Ottawa Scale to assess the risk of bias in CCTs. The Newcastle-Ottawa Scale (NOS) is a tool recommended by the Cochrane Collaboration to assess risk of bias in observational studies (case control and cohort studies) and not necessarily controlled clinical trials.[1] A more appropriate tool would have been 'Risk Of Bias In Non-randomised Studies of Interventions (ROBINS-I). The types of non-randomised studies of interventions (NRSIs) that can be evaluated using this tool include controlled trials in which intervention groups are allocated using a method that falls short of full randomisation.[2]

The authors used three pre-specified criteria to arrive at eight studies (three RCTs and five CCTs) to be included in the SR. They excluded two studies because of inadequate follow-up duration (two to four weeks). Since follow-up period was not one of the pre-defined screening criteria for study selection, the decision to exclude two articles from the MA seems arbitrary. This is particularly relevant given the fact that one of the included studies[3] reported that the adaptation time was 30 days for most patients on braces (100% for the labial appliance and 90% for the lingual appliance). One of the excluded studies[4] had a four week follow-up and should not have been excluded based on follow-up duration alone.

As reported by the authors, there exists another MA of the same topic published in 2013 by Long *et al.*[5] The current MA is nearly identical to the 2013 MA in terms of PICO, final studies included for MA and overall results. The study by Galvão *et al.* 2008, was in Portuguese and the authors took the effort to translate the article into English. Since the Galvão study was not a part of the 2013 MA, including this study in the current meta-analysis could have significantly improved the overall strength of evidence.

Practice points

- Lingual orthodontics appliances, though aesthetically better compared to buccal appliances, are associated with higher levels of discomfort, speech difficulties and oral hygiene issues for longer duration. Informing patients about these disadvantages could help the patients make an informed decision.
- It would be interesting to compare the treatment outcomes and adverse effects of traditional buccal appliances with other appliances that offer clear aesthetic benefits (like Invisalign® or ceramic braces).

Parthasarathy Madurantakam[1] and Satish Kumar[2]

[1]Department of General Practice, VCU School of Dentistry, Richmond, Virginia, USA.

[2]Department of Periodontics & Preventive Dentistry, University of Pittsburgh School of Dental Medicine, Pittsburgh, Pennsylvania, USA

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