EFFICACY OF CLEAR ALIGNERS IN CONTROLLING ORTHODONTIC TOOTH MOVEMENT

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In recent years, increasing numbers of adult patients have sought orthodontic treatment and expressed a desire for esthetic and comfortable alternatives to conventional fixed appliances. The possibility of using clear overlay orthodontic appliances was introduced in 1946, when Kesling devised the concept of using a series of thermoplastic tooth positioners to progres- sively move misaligned teeth to improved positions. In 1997, Align TechnologyG (Santa Clara, Calif) adapted and incorporated modern technologies to introduce the clear aligner treatment (CAT) as we know it, rendering Kesling's concept a feasible orthodontic treatment option. Although CAT has been cited as a safe, esthetic, and comfortable orthodontic procedure for adult patients, only a few investigations have focused on the predictability of orthodontic tooth movement (OTM). In 2005 Lagrave`re and Flores-Mir published a review in which only two studies met their inclusion criteria related to Invisalign therapy efficacy. The authors stated that no strong conclusions could be made regarding the treatment effects of this kind of orthodontic treatment. Thus, clinicians who plan to use CAT on their patients have to rely on their clinical experience, the opinions of experts, and limited published evidence.

The present systematic review was undertaken to update the knowledge of the available evidence about CAT and to answer the following clinical research question: «Is CAT effective in controlling the orthodon- tic movement in non-growing subjects?»

Objective: To assess the scientific evidence related to the efficacy of clear aligner treatment (CAT) in controlling orthodontic tooth movement.

Materials and Methods: PubMed, PMC, NLM, Embase, Cochrane Central Register of Controlled Clinical Trials, Web of Knowledge, Scopus, Google Scholar, and LILACs were searched from January 2000 to June 2014 to identify all peer-reviewed articles potentially relevant to the review. Methodological shortcomings were highlighted and the quality of the studies was ranked using the Cochrane Tool for Risk of Bias Assessment.

Results: Eleven relevant articles were selected (two Randomized Clinical Trials (RCT), five prospective non-randomized, four retrospective non-randomized), and the risk of bias was moderate for six studies and unclear for the others. The amount of mean intrusion reported was 0.72 mm. Extrusion was the most difficult movement to control (30% of accuracy), followed by rotation. Upper molar distalization revealed the highest predictability (88%) when a bodily movement of at least 1.5 mm was prescribed. A decrease of the Little's Index (mandibular arch: 5 mm; maxillary arch: 4 mm) was observed in aligning arches.

Conclusions: CAT aligns and levels the arches; it is effective in controlling anterior intrusion but not anterior extrusion; it is effective in controlling posterior buccolingual inclination but not anterior buccolingual inclination; it is effective in controlling upper molar bodily movements of about 1.5 mm; and it is not effective in controlling rotation of rounded teeth in particular. However, the results of this review should be interpreted with caution because of the number, quality, and heterogeneity of the studies.