Commentary

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Is the use of clear aligners a real critical change in oral health prevention and treatment?

G. Galluccio

DS, DDS - Associate Professor of Orthodontics and Clinical Gnatology, Department of Oral and Maxillo Facial Sciences, Faculty of Medicine and Dentistry, Sapienza University of Rome

Abstract

The introduction, in the late years of the last century, of clear aligners therapy (CAT) has drastically changed the approach' perspective to orthodontic treatment. Both patients and clinicians' expectations appear to be addressed with clear aligner therapy achieving an aesthetic appearance and fewer side effects, mainly due to the difficult maintenance of proper oral hygiene in the conventional fixed approach.

Research has partially confirmed these key points of CAT but similarly revealed several limitations to the overall benefit of this treatment. Both the aforementioned key points of the CAT are currently under discussion: the aesthetic appearance is not uniform, due to the presence in some cases of extensive need for attachments, and the better periodontal conditions are certainly present in the CAT but mainly limited to the short term.

This critical review of the state of the art clarifies the gray areas, such as to inform the researcher with the aim of elaborating an adequate study design in order to evaluate the advantages and limitations of this orthodontic approach. ***Clin Ter 2021; 172 (2):113-115. doi: 10.7417/CT.2021.2295***

Key words: *Clear Aligners, orthodontic aligner, treatment outcome, oral hygiene, aesthetics*

The development of clear aligners approach has deeply changed the number of possible treatment alternatives in clinical orthodontics. Corresponding changes has been established in the patient awareness of this therapy, perceived as more esthetic, efficient and safe for the oral health (1).

Since the introduction in 1998 of Invisalign, the first owner orthodontic technique using a series of aligners generated with CAD-CAM system able to slowly drive the teeth gradually into the right position, promises of a global change, both for the orthodontist and the patient, have been claimed (2).

The main change and advantages claimed for the use of clear aligners are related to the aesthetic aspect of the aligners, able to avoid the social complains of the patients wearing a conventional orthodontic fixed appliance, the possibility to perform correct procedures of oral hygiene since the aligners are removable, and therefore to avoid the onset of decays or periodontal affections, and finally the shortening of the treatment time with a comparable final result.

The related advantages of this newel technique and procedures have been claimed primarily from the companies and needed a quite long time to be confirmed or negated from the literature. This process is obviously still totally in action.

Nevertheless, pointing out of the literature evidence results seems essential for the clinician and the researcher so much that they can correctly choose both clinical uses of these devices and possible further studies aimed to clarify and improve this treatment strategy.

The predominant manufacturing companies' choices of the commercial denomination always recall the idea of "invisible", "clear" or "ethereal" with the aim to underline to patients and clinicians the low visibility of the intraoral devices. The constituent materials are in fact characterized from the transparency, more or less depending on the product, but are consistently confirmed from the laboratory analysis (3,4).

The transparency is the key to fulfill other two goals of this treatment choice: visibility and correlated compliance. The cooperation of the patient is in Clear aligners treatment (CAT) is requested for a total of at least 400 hours of use for each aligner, that means about 20 hours a day before the planned change of the aligner. Due to the possible decay of the elastic properties (5), the cooperation is crucial to the progression from one aligner to the following one.

But though the visibility of the appliance is one of the principal concerns, this seems to be not the only one factor decisive to gain the correct use because, especially in the adolescents, the basic personality traits seem to play a more important role in this aspect (6). Bringing the action to the insertion of compliance control devices into the aligners seems not to change significantly in this aspect (7).

These variables, therefore, suggest the need for a careful choice of candidates to this treatment on a base of previous deeper personality analysis, not considering them automatically compliant because of the aesthetic characteristics of

Correspondence: Prof. Gabriella Galluccio, Sapienza Università di Roma, Viale Regina Elena 287/a,00161 Roma
Tel. (+39) 06 49976641, (+39)3473300169 - F(+39) 06 49976635. E-mail: gabriella.galluccio@uniroma1.it

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the devices, moreover in consideration that also children and adolescents seem not to be immune to anxiety and stress - able to deeply influence the offered compliance to the treatment - mainly linked to behavior related response, and sometimes also related to the onset of craniomandibular disorders (8). The possibility of correct compliance is mostly challenging in cases of developmental disability (9).

Some studies in adults, evaluating the oral health-related quality of life (OHRQoL) and pain level in the initial stage of treatments of patients with clear aligners versus fixed appliances, indicate a lower level for both the aspects for the patients in CA treatment (10). In a recent literature revision, on the other hand, the conclusions relative to OHRQoL in clear aligners therapy compared with fixed appliances therapy are still inconclusive, and a strong need of high-quality RCT studies is evident (11).

A shared strong advantage, claimed for the CA therapy, is the easier maintenance of a good level of oral health, due to the possibility of appliance removing, eliciting a better attitude and behavior towards oral health (12).

The level of tooth brushing and the consequent plaque deposition and the frequency of food intake result to be reduced in the CAT, provided that a oriented oral health procedures instruction is administered during the treatment (13) but in a prospective randomized clinical trial comparing the level of oral hygiene of patient in treatment with CA or fixed appliance (FA), both with conventional brackets (CB) or self-ligating brackets (SLB) - the last type also claimed as better for this aspect (14) - no statistically significant difference was found among the three groups after 18 months of therapy (15).

Among the possible negative collective effects of the orthodontic treatment, particularly of the FA treatment, is is there also the develop of surface damage, notably the develop of white lesions (16), and the deterioration of the periodontal status of the patient.

The develop of white spot lesions (WSLs) seems though to be more complex to be analyzed. If a significant lower number of WSLs is developed in patient in CA treatment compared to traditionally treated patients, an important variable is the treatment durations, in addition to the type of treatment (17), that is usually shorter in CAT patients, mainly for the kind of initial malocclusions candidate to this approach. Surprising, the dimension of the WSLs seems to be wider in CAT patients although reduced in number and severity (18).

Periodontal status of the orthodontic patients is one of the major concern for the clinician, due to the need of not induce damages but possibly to maintain or improve the initial conditions, avoiding inflammatory processes in presence of orthodontic forces (19). Also in this case, however, the better performance of CA is not completely confirmed from the literature; better periodontal indices are reported for CA and SLB groups versus CB (20), slightly lower microbial colonization and risk of caries development (21), slightly decreasing microbial diversity but with a positive relatively stable levels of periodontal conditions during the first stage of treatment (22). Currently, the maintenance of a good level of periodontal health seem to be surely easy in CAT, provided that a constant support is conducted from a dental hygienist (23) and as long as correct cleaning procedures of the aligners are realized to minimize the effects of microbial colonization (19, 24).

If visibility therefore strong affect the patient and clinician's choice of the preferred therapy, the research is still evaluating the potential of correction in different malocclusion conditions. Some particularly difficult corrections, often requiring multidisciplinary approach, such as syndromes affecting the craniofacial structures (25), or deep dental impactions (26), are still of a questionable approach with CAT, or at least requires the increase of treatment times or extensive appeal to auxiliaries or multiple attachments, heavily depriving the CA therapy of the main aspect of esthetic perceptions (27).

In conclusion, the introduction of clear aligners therapy has surely pushed clinicians and researchers to a consistent change in the orthodontic approach and in extensive studies aimed to discriminate between the claiming of the companies and the reality of treatment potential (28-30). Still extensive studies are though required to establish the rules and the limits of this extraordinary treatment option, considering all the cited field of doubt.

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