



Pain Level in Clear Aligners and its Effects in Speech- Literature Review

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ABSTRACT: In place of traditional braces for orthodontic treatment, clear aligners are becoming more and more popular because of their aesthetic appeal and convenience. Nonetheless, many patients report experiencing pain and discomfort, particularly during the initial adjustment period or when switching to a new set of aligners. The aligners' pressure, which shifts teeth into their desired positions, primarily causes this discomfort. Research shows that pain levels usually peak within the first 24 to 48 hours after starting a new aligner and gradually subside over time. Various factors, including an individual's pain threshold, the complexity of tooth movements, and the fit of the aligners, contribute to differences in pain intensity. Moreover, clear aligners can impact speech, especially during the early phases of treatment. Patients frequently experience temporary lisping or challenges in articulating certain sounds because of the thickness and placement of the aligners. Although these speech changes are generally mild and improve as patients adapt, they can lead to short-term discomfort in social and professional situations. In conclusion, both the pain and speech issues associated with clear aligners are typically manageable and tend to diminish as treatment progresses, although they may influence patient compliance and satisfaction during the initial adjustment phase.

KEYWORDS: Clear aligner discomfort, Orthodontic pain, Speech impairment, Aligners adjustment period, Lisping with aligners.

INTRODUCTION

Orthodontics focuses on aligning teeth, closing gaps, addressing crowding, and correcting malocclusions (imperfect bites). While orthodontic treatment involves diagnosing and studying tooth positions, patients seek orthodontic care for more than just teeth straightening. Clinically, individuals may present with issues like speech impediments, discomfort, regressing gums, headaches, cramping in the muscles, chipped teeth, unequal tooth spacing, and other anomalies in the mouth [1].

Clear aligners have revolutionized orthodontics by providing a contemporary alternative to traditional braces, effectively achieving straighter teeth and an aligned smile. This innovative treatment is favored for its discreet appearance, comfort, and ability to correct dental misalignments. Unlike braces with brackets and wires, clear aligners are nearly invisible, removable, and custom-fit to snugly cover teeth, significantly reducing the physical irritation often associated with traditional braces [2]. Polymerized thermoplastic resins, including polyurethane (PU), polyethylene terephthalate (PET), polyethylene terephthalate glycol (PETG), and polyvinyl chloride, are the components of clear aligners [3].



A key factor influencing patient experience with clear aligners is the level of discomfort or pain during treatment. Typically, discomfort arises from the pressure on teeth as they gradually shift position, particularly noticeable after switching to a new set of aligners or following adjustments. However, compared to braces, which can irritate gums and cheeks with their brackets and wires, clear aligners generally offer greater comfort [4]. maintain control over specific tooth movements by means of tooth-colored attachments [5].

It is well documented that patients experience pain after the initial placement of archwires in fixed appliances, with comparisons made between multistrand stainless steel and superelastic NiTi archwires. However, the difference in pain perception between clear aligners and fixed appliances is less clear. A recent systematic review found that patients using Invisalign generally report lower levels of pain compared to those with fixed appliances during the initial days of treatment. However, the review did not quantify the extent of this difference [6]. Patients in orthodontics who use clear aligners report lower levels of discomfort and dental anxiety. Acetaminophen may be given to patients to help with aligner pain, especially if they have higher GAD-7 scores [7].

Speech adaptation is another consideration for patients using clear aligners. Initially, individuals may experience minor changes in speech patterns, such as slight lisp or adjustments in pronunciation as the tongue adjusts to the aligners. These changes are usually temporary and diminish as patients become more accustomed to wearing them.

The smallest unit of speech that differentiates one word from another is known as a phoneme. Research has shown that certain phonemes, such as /ch/, /dz/, /sh/, /f/, /s/, and /t/, can be impacted during orthodontic treatment, affecting pronunciation and conversation. For adult patients, speech difficulties caused by orthodontic appliances can negatively impact their social and professional lives, particularly in careers involving public speaking. Concerns about potential speech deterioration may influence their choice of orthodontic appliance [2].

This article explores the evolution, benefits, and clinical applications of clear aligners in orthodontics, focusing on pain levels and their impact on speech. By understanding these aspects, patients can make informed decisions about choosing clear aligners as their preferred orthodontic option, ensuring a smoother path to achieving a confident, aligned smile. The accompanying PI and GI-associated oral microbial populations show that the usage of CA produced superior oral health index outcomes than FA [8].

REVIEW

METHODOLOGY:

We carried out a thorough search using both manual and electronic approaches, reviewing reputable databases such as Google Scholar, PubMed, Science Direct, and Wiley. Our search was not limited by any demographic criteria. To ensure optimal results, we employed various relevant keywords, including "clear aligner," "speech," "pain," and "orthodontic appliance."

Pain Associated with Clear Aligners:

With a moderate level of certainty, it seems that orthodontic patients treated with clear aligners experience less pain compared to those with fixed appliances during the early days of treatment. However, after this period (up to 3 months), no significant differences in pain levels were observed. The malocclusion complexity in the studies reviewed was mild. While pain is an important factor, the predictability and technical outcomes of the treatment are more critical, especially since the difference in pain appears to diminish after the first few months of orthodontic treatment [4].

After a month of orthodontic treatment using clear aligners, the subjects' masseter basal activity initially decreased. After three months of medication, this impact usually returns to baseline levels [9]. Additionally, the specific malocclusion types were not thoroughly detailed in the individual studies, which could influence variations in pain levels [10].

Speech Impairments with Clear Aligners:

Speech is significantly affected by Invisalign clear aligner orthodontic therapy; even after two months of treatment, patients' speech does not return to baseline levels, despite some adaptation [11]. Mostly affected phonemes were fricative alveolar consonants [12]. Clear aligners had a more pronounced effect on speech, likely due to increased occlusal vertical dimension. Overall, the findings underscore the immediate impact of orthodontic treatment on soft tissue and speech, suggesting avenues for further research on individual variations and long-term outcomes. Both clear aligners and fixed labial appliances significantly affected subjective speech production, with clear aligners showing a more pronounced impact [13].



Adaptation and Adjustment Period:

Orthodontic aligners resulted in mild to moderate speech impediments, with adaptation time when compared to fixed lingual orthodontic appliances, which showed more speech impediment and greater difficulty adapting [14]. Clear aligners represent a modern approach in orthodontics, offering advantages such as increased comfort, improved aesthetics, and greater convenience. This research sought to evaluate and compare the levels of pain, anxiety, and the effects on oral health-related quality of life (OHRQoL) between adult patients undergoing treatment with clear aligners and those with traditional fixed appliances, particularly during the early phase of their orthodontic treatment. The findings revealed that patients using clear aligners reported significantly lower pain, experienced less anxiety, and had a better OHRQoL compared to individuals with fixed braces. This suggests that clear aligners may offer a more comfortable and less stressful treatment option during the initial stages of orthodontic care [15]. Pain severity had a notable impact on the oral health-related quality of life (OHRQoL) in adult patients undergoing clear aligner treatment. However, despite the pain's intensity or duration, patients reported high levels of satisfaction. Compared to those with fixed appliances, clear aligner patients experienced better OHRQoL and a shorter treatment duration [16].

Impact on Patient Compliance and Satisfaction:

In the short term, CAT leads to tooth pain and soreness in the masticatory muscles, which have minimal clinical significance. Increased frequency of oral behaviors is associated with greater soreness in the masticatory muscles during CAT. More research is required to investigate the medium- and long-term impacts of CAT [17]. As interest in aesthetic appearance increases, aligners have become a viable alternative to traditional fixed orthodontic treatments, particularly for adult patients. The current study found that the primary motivation for patients was the aligner's invisibility, with the main expectation being an enhancement of self-confidence. High levels of satisfaction were reported regarding various treatment aspects, including dental aesthetics, facial aesthetics, comfort, and ease of maintaining hygiene. However, despite the benefits of aligner therapy, our study also identified several drawbacks, including issues with speech and discomfort [18]. Regardless of the length or intensity of the pain, great levels of patient satisfaction were noted [19].

During the initial stages of therapy, individuals receiving treatment with clear aligners seem to experience less pain than those receiving treatment with fixed appliances. Unfortunately, there was not a thorough description of the type of malocclusion, which could have generated a disputed outcome. Considering the degree of certainty, the outcome should be interpreted cautiously, and it is advised that further thorough methodological research be done.

Speech impairment is a socio-psychological as well as a physical side effect of orthodontic therapy. Speech impairment was observed in this comprehensive examination regardless of the orthodontic appliance. However, some differences were observed, such as the degree of speech obstructions, duration, sound errors, speech timing, etc.

CONCLUSION

In conclusion, while clear aligners may offer advantages in terms of reduced pain and faster recovery of speech, both appliance types are associated with notable impacts on patients' speech. Clinicians should be aware of these potential side effects and communicate them to patients during treatment planning, ensuring that individuals are fully informed of the possible functional and social consequences of orthodontic therapy. To further recognize these results and offer more precise recommendations for orthodontic treatment choices, further research using an adequate approach is needed.

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