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## Examination of pain level in different orthodontic treatments

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### Abstract

Different levels of pain are expressed by patients undergoing various orthodontic treatment methods. This study aims to review the literature on the different types of pain observed in various orthodontic treatments. The presence of pain or the fear of potential pain due to orthodontic treatment often leads to patients discontinuing treatment. Changes in pain levels or fear of pain affect the quality of life of patients. Depending on a patient's pain threshold and fear of pain, different orthodontic treatments may be preferred. Reviewing the types of pain observed in different orthodontic treatments in the literature can assist in selecting the appropriate orthodontic treatment for patients and support the continuation of treatment. In orthodontic treatment with removable appliances, low levels of continuous pain can be observed in the jaws where the appliance is applied. In orthodontic treatments with removable functional appliances, stronger but intermittent pain may occur. Orthodontic treatment with clear aligners is associated with less pain compared to fixed orthodontic treatments.

**Keywords:** Orthodontic treatment; Pain; Fixed orthodontic treatment; Removable orthodontic treatment.

### 1. Introduction

In recent years, the constant search for aesthetic appearance has led to an increase in orthodontic treatment with clear aligners. Recent studies have shown that patients treated with clear aligners are satisfied with the aesthetic results [Flores-Mir et al., 2018]. Different levels of pain are expressed by patients undergoing various orthodontic treatment methods. This study aims to review the literature on the different types of pain observed in various orthodontic treatments.

Clear aligners, which offer an aesthetic option for orthodontic treatment, have some limitations. These include difficulties in achieving rotations, vertical movements, ideal occlusal contacts, and torque control. Furthermore, a study evaluating the results of orthodontic treatment with clear aligners and conventional braces found that treatment with fixed appliances was superior to that with clear aligners [Djeu et al., 2005].

Despite fixed appliances being the most effective traditional method for orthodontic treatment for many years, with good treatment efficiency, some studies have highlighted negative side effects of this technique. For example, fixed orthodontic treatments have been observed to increase dental plaque accumulation [Tufekcia et al., 2013]. Another common issue is pain experienced during fixed orthodontic treatment, with 91-95% of patients encountering pain at different stages of the treatment [Scheurer et al., 1996].

Pain is a complex experience triggered by harmful stimuli, and understanding pain patterns during orthodontic treatment is essential because pain is one of the main factors affecting patients' quality of life [Krukemeyer et al., 2009]. Additionally, fear of pain is a major reason for discontinuing orthodontic treatment, with previous studies indicating that 8-30% of patients discontinue treatment due to pain experienced in the early stages [Lew, 1993].

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Some studies in the literature [Almasoud, 2019] have observed high pain levels within the first 24 hours after the initiation of fixed orthodontic treatment. This pain is most pronounced one day after the placement of the initial arch wires. Additionally, some studies in the literature indicate that pain is more intense during the first three days and gradually decreases by the seventh day. This pain pattern is explained by discomfort caused by the compression of the periodontal ligament, leading to ischemia, edema, and the release of inflammatory mediators within the first 24-48 hours. This explains the pain observed during the first week following the application of orthodontic forces [Dray, 1995].

Although it is argued that similar pain patterns exist between fixed and clear aligner treatments, higher levels of pain have been observed during the early stages of treatment with clear aligners. This may be due to the greater mechanical forces applied at the start of treatment with clear aligners. Many patients, understanding that pain can affect their quality of life and lead to poorer oral hygiene and psychosocial effects, use analgesics to relieve the pain caused by orthodontic treatment [Yassir et al., 2022]. The perception of orthodontic pain stems from changes in blood flow caused by orthodontic treatment, and the use of analgesics can reduce the inflammatory process and, consequently, pain levels. Medication use during orthodontic treatment has been found to be higher among patients with fixed appliances compared to those using clear aligners [Jones, 1986]. However, pain is a subjective experience and can be influenced by various factors. Studies suggest that pain may be related to a person's personality and that patients who are more informed about orthodontic treatment and have more positive attitudes report lower pain levels during treatment. Therefore, it is recommended that professionals inform patients about any potential discomfort during orthodontic treatment and guide them on ways to alleviate it [Doll et al., 2000].

Fixed orthodontic treatment is typically activated once a month, while clear aligners are changed every 15 days. It seems reasonable to think that patients treated with clear aligners report lower pain levels with each activation, though they may experience pain for a longer duration. The lower pain levels in patients treated with clear aligners could be associated with the removable appliances causing less tension, pressure, sensitivity, and pain compared to fixed devices [Dray, 1995].

In orthodontic treatment with removable appliances, low levels of continuous pain can be observed in the jaws where the appliance is applied. In orthodontic treatments with removable functional appliances, stronger but intermittent pain may occur. Pain is observed differently in fixed orthodontic treatments compared to removable orthodontic treatments. Orthodontic treatment with clear aligners is associated with less pain compared to fixed orthodontic treatments. Patients can remove clear aligners to relieve pain [Polat, 2007].

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## 2. Results

Another factor related to the pain pattern is the type of malocclusion included in the studies. Some studies have not sufficiently reported their inclusion criteria [Flores-Mir et al., 2018], while those that have selected patients with mild or moderate malocclusions. The type of malocclusion is crucial in the pain pattern, as the more severe the malocclusion, the more it affects patients in terms of pain-related scales, psychological discomfort, and social problems [Sun, 2017].

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## 3. Discussion

Overall, existing systematic reviews indicate that patients treated with clear aligners experience lower pain levels than those treated with fixed orthodontic appliances, particularly in the early days of treatment. Studies also note that the presence of pain varies according to individual patient characteristics. However, it is believed that the difference in pain patterns does not emerge after the first few months of orthodontic treatment. Furthermore, the types of malocclusion should be thoroughly defined, as differences in malocclusion may affect pain patterns and lead to contentious results. More research on different pain patterns in various orthodontic treatments would provide further insights into pain management.

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