



A Thorough Literature Evaluation of Orthodontic Therapy in Periodontitis Prone Patients

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

The goal is to look through the literature for clinical scientific facts on the impact of orthodontic treatment on periodontal status in periodontitis prone people. The effects of orthodontic banded attachments on periodontal disease and, more particularly, the bacteria present at the gingival edges, are examined in this paper.

This is a review focuses on important advancements in orthodontic methods and microbiological advances that have aided in the clarification of orthodontic appliance interrelationships and gum disease (periodontitis). Suggestions for how they may be improved are given, as well. As well as focusing study on specific regions. This review focuses on interrelation between malocclusion and periodontal diseases and relationship between periodontal diseases and accumulation of bacterial film around the orthodontic appliances which leads to periodontal changes or gum diseases. Study focuses on issues caused due to orthodontic bands and the focuses and shows the gingival changes caused by the orthodontic appliances. It also shows the microbiology responsible of the periodontal diseases caused. The main objective of the study is to evaluate the prevalence of gum diseases in patients with malocclusions and patients with corrected malocclusion with the help of orthodontic appliances. The review also focuses on how to prevent periodontal diseases during

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orthodontic correction. And shares the measures taken to prevent periodontal diseases during orthodontic corrections. The specificity of the cause and effect is explained in the below given review article. The specific issue caused by the orthodontic appliance is well explained in the review article.

Keywords: Periodontal diseases; gingival diseases and orthodontic appliances/adverse consequences.

1. INTRODUCTION

One of the most widely acknowledged reasons for orthodontic therapy is to extend the life of a person's teeth. Orthodontic treatment for malocclusions and dentofacial anomalies may allow for better oral hygiene practice, [1] while research in this area is limited. This location yields contradictory findings. Addy² and Griffiths indicating that plaque builds up more near irregularities Straight teeth are more anterior than crooked teeth [2]. A big epidemiological study was conducted. In a similar investigation, it was discovered that dental misalignment causes problems. Caused a minor yet large rise in plaque. However, gingivitis is not one of them. Alexander and his colleagues conducted a prior research. Also discovered that only when the patients Oral hygiene was average, as was tooth position. Gingival health is influenced. Malhygiene is a term used describe a state of poor oral hygiene. Gingival health does not appear to be affected by alignment [3]. Beagrie and James discovered no link between pos Periodontal disease and anterior tooth abnormalities, Despite the fact that this was a research with people who were in high health, Oral hygiene is very important if the therapy causes the supporting tissue to deteriorate, This might jeopardize periodontal health long-term. Life expectancy, and then it becomes difficult to justify treatment. Several studies have looked into the impact of orthodontic therapy on periodontal health. In general, these long term research focused on examining the effects throughout treatment and for a short duration (up to a year) after therapy (up to 2 years). The majority of researchers believe gingival aberration considered overall caused by appliances are temporary, with no long-term harm to periodontal tissues. Periodontal health is directly influenced by the amount of oral hygiene maintained during therapy. Long term, retrospective studies, spanning at least 10 years, have likewise established that orthodontic therapy does no significant harm. They also show that not having orthodontic treatment has no impact on periodontal disease later in life. Is it

necessary to investigate the matter further because orthodontic therapy provides minimal benefit and has no negative effects on periodontal health? [4]. The diverse assessment methodologies are most likely to blame for this apparent inconsistency. Individual variance is high, according to a research, and some patients have much stronger responses than others. According to Alstad and Zachrisson, up to 10% of treated patients suffer much greater destruction than the norm. Some of the studies that have looked at whether orthodontic appliances induce periodontal disease have found that they do. If therapy may result in such a dramatic loss of periodontal health in a tiny number of patients, it would seem crucial to understand why this occurs and how to avoid iatrogenic harm [5]. Bacterial biofilm has long been recognised as the principal causative aspect in the onset and advancement of gingival disease (gingivitis) and periodontitis. Certain periodontal diseases are linked to certain microorganisms or groups of bacteria. The gingival crevice and periodontal pocket are known to harbour a wide range of bacterial organisms. Some of these microorganisms are considered to have a role in periodontal disease, although there is some disagreement over how to interpret the research on the issue. Periodontal disease, according to some, is caused by an excessive buildup of tooth plaque, independent of the bacteria present "unspecified Hypothesis of plaques" The "non-specific plaque theory" states that microorganisms are present. Others, on the other hand, believe there are particular links between certain bacteria and other forms of periodontal disease, a theory known as the "specific plaque hypothesis." Periodontal illnesses are thought to be caused by local actions in the crevicular area, either either by the microorganisms themselves or by the host's reaction to their presence [6]. Is there a link between these problems and orthodontic patients, and should the orthodontist be concerned?. Direct bonding processes were introduced with the development of direct bonding procedures [7]. Orthodontic fixed appliances intrude fewer on the gingiva, lowering

the risk of periodontal injury as a result of appliance installation. Banded attachments, on the otherhand, are still widely utilised on molar teeth, with their borders frequently positioned subgingivally. This might have a part in the development of periodontal disease. When a fixed device is installed, regardless of dental hygiene [8]. The majority of patients develop generalised gingivitis after a short period of time, regardless of whether banded or bonded attachments are utilised. Given that plaque also known as biofilm is the most important causative factor in the development of gingivitis and that appliances appear to favour the development of gingivitis, it's possible that appliances themselves have an impact on plaque population [9]. It indicates that the appliance's "plaque retentive" features, as well as the patients' failure to appropriately clean around them, contribute to the inflammation's development [10].

2. GINGIVAL HEALTH AND ORTHODONTIC BANDS

Gingival enlargement happens shortly after the insertion of a stationary appliance, according to Baer and Coccaro, and usually resolves after the item is removed. Gingival hypertrophy found in people with poor dental hygiene when orthodontic equipment are utilised [11]. The absence of one arm contributed to this patient's poor dental hygiene. After the appliances have been removed. After the device was removed, the degree of oral hygiene did not vary considerably. The gingival irritation and hypertrophy have been significantly reduced. Decalcification of the enamel can be seen on multiple teeth, which is caused by plaque collection along bracket borders. This expansion has been seen by researchers, who believe it explains the rise in probing depth reported following therapy but not with an loss of connection. Interproximally, particularly around posterior teeth rather than anterior teeth, the expansion is greatest. [12]. The existence of subgingival plaque and/or mechanical irritation of the band or cement are etiologic factors, as evidenced by the fact that the disease occurs in individuals with adequate dental hygiene. This enlargement improves quickly once the bands are removed, confirming the theory that the bands are a contributor. Although placing bands above gingiva may make cleaning easier and lessen the risk of harm to gingival health, most supragingival edges of bands become subgingival as a result of gingival growth. In conclusion, it is well known that wearing

orthodontic bands jeopardises gingival health. During treatment and upon debond, the degree of gingivitis surrounding banded teeth is typically seen in comparison to the rest of the mouth. After the appliances are detached, gingival health returns to pretreatment level [13]. If loss of clinical attachment is defined as injury to the periodontal tissues, then the placing of bands on teeth may cause some iatrogenic injury as attachment may be removed from the tooth while banding [14-20].

3. ORTHODONTIC BAND AS A ETIOLOGIC FACTOR FOR GINGIVAL AND PERIODONTAL PROBLEM

Shortterm issues may arise during treatment, or longterm issues may arise after treatment has ended. Although gingival expansion is prevalent around banded teeth, particular gingival issues appear to be rare during therapy. Periodontal issues can arise during orthodontic treatment, but they are uncommon. Clinical connection is lost during treatment, according to several research. The duration of followup in these cases is frequently insufficient (3 months) provide conclusive evidence of periodontal damage. It appears that the gingivae return to health after a year of active treatment when patients are examined. A 2year monitoring period revealed that a tiny percentage of people have a large mean loss of 1 to 2mm attachment, highlighting how greatly people differ. Periodontal disease is a slow-moving illness that might take years to manifest. Is it true that changes in the bacterial ecosystem during orthodontic treatment have an impact on the long-term development of periodontal diseases?. It does not appear to be the case, based on the evidence. Individuals who had fixed appliance therapy between the ages of 12 and 35 were compared to similarly untreated controls by Sadowsky and BeGole. There was no statistically major difference in the overall prevalence of periodontal disease, according to the researchers. They discovered that orthodontically treated participants had a higher prevalence of mild to moderate periodontal disease than other control subjects after a thorough investigation. They came to the conclusion that orthodontic therapy didn't cause any major injury or benefit to the periodontal structures. Polsonetal came to the same result, claiming that orthodontic therapy during adulthood didn't have any detectable effect on later periodontal health. All of the individuals in the previous trials received treatment during their teens. Is there a greater risk for them in the

change to a pathological flora during therapy, thereby generating or accelerating periodontal disease, since more adults are subgingival currently seeking treatment?. There have been studies which compare the microbiological and periodontal responses of teenagers and adults. Adults are generally better orthodontic patients than teenagers, with greater supragingival plaque management. Three theories have been proposed as to why this is the case. Adults must first decide whether or not they want treatment for themselves, and then shoulder the economic burden. Second, their clinical crowns are longer, and their attachments are faraway from the gingiva. Third, puberty causes elevated hormone levels in teenagers, which can lead to increased gingival inflammation. Adults and children, it appears, are both at danger of developing a pathogenic bacterial eco-system subgingivally. Adults, on the other hand, appear to be better at controlling supragingival plaque and have minor levels of pathogenic subgingival microbiota. The evidence suggests that they are no more at risk than teenagers of having periodontal illness later in life, but further longterm research are required to confirm this. Individuals with a lack of periodontal support may be more vulnerable to orthodontic therapy. These people are frequently treated to straighten their crooked front teeth. The facts suggests that those with poor periodontal support can move their teeth successfully without jeopardising their periodontal health. To preserve healthy gingival tissue during therapy, these patients must have stopped periodontal disease and receive frequent dental hygiene teaching and periodontal maintenance. However, teeth with severe periodontal disease (probing depth > 6 mm/advanced furcation involvement) may experience more periodontal breakdown and eventually lose their teeth during treatment.

4. PERIODONTAL DISEASE AND OCCLUSION

The objective of this review is not to go into great depth about the relationship among plaque accumulation, periodontitis initiation, and occlusal trauma. Nonetheless, occlusion disruption during orthodontic treatment is likely to cause jiggling stresses over several of the teeth, but only temporarily. These types of forces may be beneficial in orthodontics since there is evidence that intermittent forces are more successful at initiating bone remodelling than static or continuous stresses. Periodontally, the connection between these jiggling pressures and

periodontal deterioration has piqued people's interest. It has been able to develop controlled procedures to investigate single and episodic traumatic episodes, as well as their consequences, using animal models. Poisson's great review objectively evaluated the evidence and concluded that trauma does not appear to be the exclusive cause of periodontal deterioration. Chronic periodontitis and trauma may result in additional periodontal breakdown when combined. Even with the presence of continued occlusal damage, osseous regeneration and Reduced tooth mobility can be detected if the marginal inflammation is healed. Clearly, the interaction of occlusal pressures and inflammation during orthodontic treatment, the emphasis on resolving existing periodontal problems rather than managing tooth movement appears to be quite useful [21-49].

5. PERIODONTAL DAMAGE PREVENTION IN ORTHODONTICS

Plaque formation and the subsequent inflammatory response are thought to be exacerbated by a insufficient oral hygiene practises combined with the usage of appliances which are fixed. Gingival inflammation has shown to be controlled by preventing plaque accumulation. To maintain good gingival health throughout orthodontic treatment, it seems self-evident that adequate physical plaque control is required. Prophylactic regimens for children receiving orthodontic treatment have been recommended and have been demonstrated to be effective to manage good oral hygiene. Despite adequate oral care, orthodontic appliances produce considerable gingival growth within the mouth. Band placement might take anywhere from one to two months. This suggests that processes other than supragingival plaque management could be at play. This includes irritation caused by mechanical devices. As a result, a preventive programme has advantages, but it takes time, dedication, and money. According to Zachrisson, the orthodontist could take advantage of the exceptional chance to improve the dental awareness and the oral hygiene of the patient by providing frequent oral hygiene teaching and enthusiasm, which would maximise the treatment's benefits for a longer duration. Indeed, Davies et al found that children who had undergone orthodontic treatment had decreased levels of plaque and gingivitis than children who did not receive treatment in their research on the effects of orthodontic therapy on plaque and gingivitis. They blamed it on the fact

that they showed up for treatment rather than the treatment itself. Are there any other techniques to prevent the impact of banding attachments on the gingiva besides dental hygiene?. A harmful bacterial flora develops over overhanging restorations, according to Lang et al, and a similar population has been found in conjunction with orthodontic bands. It's reasonable to infer that the banding And bonding is acting like an overhanging restoration, forming a subgingival ledge around which a shift to periopathogenic microorganisms can occur. Using wellfitting bands or setting band edges supragingivally can help to reduce this. Bonding attachments avoids this issue, and research comparing the effects of banded and bonded attachments on gingival health show that direct bonding is superior. This study suggests that bonding attachments during treatment is better for periodontal health than banding, although the long-term benefit is unknown. Placing any attachment on the tooth, on the other hand, jeopardises the gingival health. Bonded attachments may wreak havoc on orthodontic treatment. The posteriorly visible rise in failure rate (20 to 30%) of these attachments is related to isolation and occlusal loading issues. Currently, technological restrictions prevent all teeth from being bonded. The effect of banded cements on the subgingival bacterial population and gingival health has been discussed but not explored. Excess cement must be removed from the gingival margins before any restoration, such as a crown or inlay, may be put. Any surplus cement would function as a ledge or unevenness on the surface, allowing plaque to gather. The chemical characteristics of the cement and their potential effects on periodontal health and the population of subgingival bacteria do not appear to have been studied. Fluoride-leaching bond cements are routinely utilised.

6. CONCLUSIONS AND SUMMARY

The goal of this study was to look at the microbial environment in the gingival sulcus of orthodontically banded teeth, as well as any indication of short duration or long duration effects from banding. Evidence suggests that the subgingival microorganisms shifts to a peropathogenic community shortly after band installation, with increase level in anaerobic rods, notably Prevotella and Bacteroides species, fusiform bacteria, and spirochetes. These changes in subgingival microbiology appear to be replicated clinically in most individuals, with increased gingival inflammation and gingival expansion independent of dental hygiene level.

Patients with poor oral hygiene have more noticeable alterations. Evidence suggests that the subgingival microflora shifts to a periopathogenic community shortly after band implantation, with increases in anaerobic rods, mainly Prevotella and Bacteroides species, fusiform bacteria, and spirochetes. These changes in subgingival microbiology appear to be replicated clinically in most individuals, with increased gingival inflammation and gingival expansion independent of dental hygiene level. Patients with poor oral hygiene have more noticeable alterations. Is this gingivitis likely to proceed to periodontitis, resulting in irreparable damage to the supporting tissues?. It appears that this is not the case. Although certain investigations have revealed that the connective tissue connection is lost in some cases, it is usually minor. Orthodontic therapy has no visible influence on periodontal health, according to long-term research.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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