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ORIGINAL ARTICLE

The effect of orthodontic bands or tubes upon periodontal status during the initial phase of orthodontic treatment

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KEYWORDS

Periodontal parameters;
Fixed appliances;
Orthodontic bands;
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Abstract *Introduction:* Orthodontic bands cause periodontal inflammation. In theory, the use of a buccal tube (bond) instead of a band should prevent or minimize periodontal changes because the bonds are positioned away from the gingival margins.

Objective: The primary aim of this study was to investigate the periodontal status of orthodontic bands compared with bonds in the first three months of orthodontic treatment.

Materials and methods: Twenty-four orthodontic patients (mean age = 12.6 years) were enrolled in this Randomized Controlled Trial (RCT). Using the cross-mouth technique, bands and bonds were used in opposite quadrants. Periodontal parameters including the presence or absence of Bleeding On Probing (BOP) and Probing Depths (PDs) were taken at the start and three months into treatment.

Results: Bands caused a statistically significant change in the Bleeding On Probing (BOP) ($P = 0.001$ and 0.021) and bonds displayed a statistically insignificant change in the Bleeding On Probing (BOP) ($P = 0.125$ and 1.00) for the upper and lower arch. The difference in Probing Depths (PDs) between bands and bonds was also statistically significant ($P = 0.001$).

Conclusion: Molar bands are associated with greater periodontal inflammation compared with molar bonds in the first three months of fixed orthodontic treatment.

1. Introduction

The effects of using orthodontic bands or orthodontic bonded attachments on periodontal disease have been investigated. Gingival inflammation and hyperplasia may occur quickly after the placement of a fixed appliance such as orthodontic bands (Baer and Cocarro, 1964; Zachrisson and Zachrisson,

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1971; Kloehn and Pfeifer, 1974; Sandere, 1999; Naranjo et al., 2006), and the development of these problems appears to occur more frequently in interproximal sites and more commonly in posterior teeth compared with anterior teeth (Zachrisson, 1976).

Four possible reasons may cause this phenomenon (increase in the gingival inflammation associated with orthodontic bands) (Atack et al., 1996). First, orthodontic bands mechanically irritate gingival tissues. Second, chemical irritation may occur due to the cement used to retain the band, which is in close proximity to the gingival tissues. Third, a greater risk of food impaction and hence posterior gingival and periodontal irritation may occur. Finally, patients may have a tendency to clean their anterior teeth more effectively than their posterior teeth.

A trial (Boyd and Baumrind, 1992) assessed the difference between banded and bonded teeth regarding plaque accumulation, gingival inflammation and loss of attachment. In this trial, no significant differences were observed in gingival inflammation between maxillary and mandibular banded and bonded teeth during the pre-treatment phase. However, during the course of the treatment, both maxillary and mandibular banded teeth showed significantly greater plaque accumulation and gingival inflammation than the bonded molars. In addition, three months after the removal of the fixed appliance, the banded maxillary molars continued to show greater levels of gingival inflammation and loss of attachment compared with the bonded molars.

Researchers have also investigated supra- and subgingival plaque associated with bands in more detail. An early study (Diamanti-Kipioti et al., 1987) evaluated the changes occurring in the subgingival microflora in children following the placement of orthodontic bands. The samples were collected from subgingival plaque, and the patients were followed up for a period of four months. The results showed an increase in the percentage of black-pigmented Bacteroides in these children.

Another study (Huser et al., 1990) conducted a clinical trial in which the clinical and microbiological parameters of the test sites where the orthodontic bands were fitted were compared with the control sites where no bands were fitted. The authors showed that an increase in the percentage of spirochetes, motile rods, filaments and fusiform occurred in the group with the bands compared with the group with no bands. An impressive three-year longitudinal study using specific culture methods demonstrated that young orthodontic patients harbor *Actinobacillus actinomycetemcomitans* to a significantly greater extent than matched controls (Paolantonio et al., 1997).

Overall, the added advantages of using bonds and not bands are as follows: (1) maintaining a large stock of various sized bands is unnecessary; (2) a separation appointment is not needed and (3) the extensive pain associated with the separation visit does not occur (Ngan et al., 1994). Therefore, every effort should be made to prevent or at least reduce these potential treatment effects of bands, especially in medically compromised individuals (Burden et al., 2001 and National Institute for Health and Clinical Excellence, 2013). Therefore, the aim of this study was to compare the changes in the clinical periodontal parameters associated with banding and bonding teeth during orthodontic treatment.

2. Materials and methods

The North Somerset and South Bristol Research Ethics Committee in the UK granted ethics committee approval for the present study. Twenty-four consecutive patients, 12 females and 12 males, aged 11–14 years [Mean (SD) age = 12.6 ± 1.01 years] about to begin orthodontic treatment with fixed appliances were included in the study. The age group was chosen to obtain a homogenous sample of patients likely to have similar oral hygiene practice and no potential age-related differences in oral flora.

Exclusion criteria included patients requiring arch expansion or distalization of molars with auxiliary appliances because these additional appliances may interfere with oral hygiene practices. Furthermore, patients with systemic diseases and patients on antibiotics for less than three months before the start of treatment were excluded to not disturb the oral flora, which may influence the results.

The selected participants and their parents were provided information about the study, and informed consent was obtained. This study was a cross mouth controlled clinical trial, and the randomization was performed using a random number table and sealed envelopes (Fig. 1). This randomization permitted the assignment of molar bands and bonded molar tubes to opposing contra-lateral quadrants of the mouth (Fig. 2); therefore, in this cross-quadrant design, each patient was his/her own control. Clinical assessment of periodontal health, including the presence or absence of Bleeding On Probing (BOP, Lang et al., 1986) and Probing Depth (PD) measurements using UNC15 Probe (Hu-Friedy, Chicago, IL, USA),

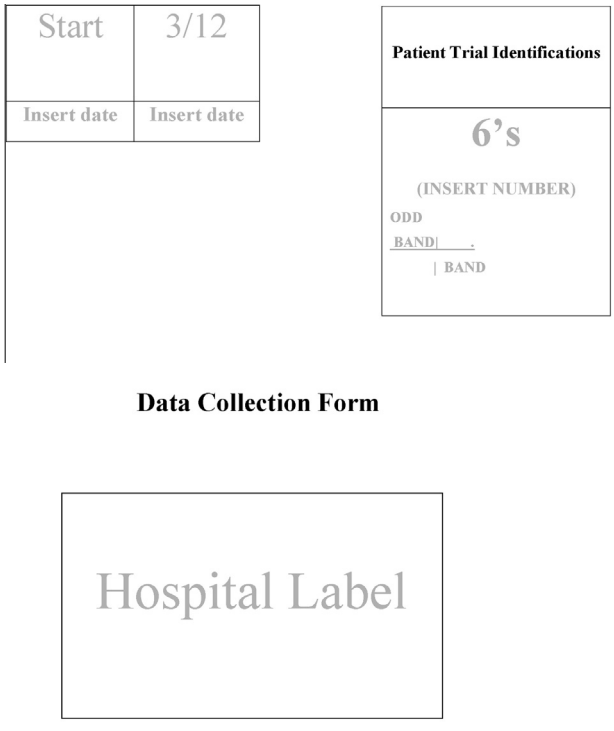

Figure 1 A diagram showing the random number table and a system of sealed envelopes to ensure the randomisation process in this cross mouth trial.