

Decontamination of tried-in orthodontic molar bands

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SUMMARY Molar bands are commonly used to retain orthodontic attachments on posterior teeth and due to the variation in the size of such teeth, it is usually necessary to 'try in' several bands before the correct one is selected. A possible concern with re-using such bands is the lack of cross-infection control, even following autoclaving, due to the presence of one or more small bore lumen (the archwire and headgear tubes). The aim of this experiment was, therefore, to determine whether such bands could be successfully decontaminated so that they could be re-used without a cross-infection risk.

Two hundred orthodontic molar bands that had previously been tried in patients' mouths, but not cemented into place, were tested. Each band was decontaminated using an enzymatic cleaner/disinfectant and then sterilized using either a downward displacement ($n = 100$) or a vacuum cycle autoclave ($n = 100$). Following autoclaving each band was inoculated into brain heart infusion culture broth and incubated at 37°C for 5 days. None of the decontaminated bands exhibited growth after 5 days. It would appear that, using this methodology, there is little risk of a cross-infection hazard occurring with the re-use of previously tried-in and decontaminated molar bands.

Introduction

In orthodontic clinical practice the attachments on posterior teeth are commonly welded to stainless steel bands and cemented into position within the mouth. Unlike directly bonded attachments, where one size fits all, bands have to be selected according to the size of the tooth to which they are to be cemented. During appliance placement several bands may be tried in the mouth before the appropriate size is selected.

Orthodontic bands are CE marked and intended for single use only. What is unclear is whether simply trying in a band for sizing purposes, within the mouth, constitutes a single use. If this was the case, then the re-use of such bands would invalidate the CE mark and may represent a cross-infection hazard. As each band costs €18–24 the financial implications of not using previously tried-in bands are significant in the longer term.

The aim of this investigation was, therefore, to evaluate a method of decontaminating tried-in orthodontic molar bands to see whether their re-use would indeed represent a cross-infection control hazard.

Materials and methods

One hundred upper and 100 lower consecutive, stainless steel orthodontic molar bands (3M Unitek, Monrovia, USA), which had been tried in the mouth and rejected because they were the wrong size, were collected and stored over a period of several weeks. The upper molar bands had double buccal tubes and the lower bands single buccal tubes.

Following collection and storage, the bands were first cleaned by immersion in an enzymatic disinfectant (Gigasept Enzymatic, Shulke and Mayr, Hamburg,

Germany) for 15 minutes, followed by rinsing in running water for 1 minute. Each was then visually inspected for obvious signs of residual contamination, e.g. plaque, blood or food. If contamination was present, the band was once again rinsed with water until no residual contaminant was visible.

The bands were then divided into two groups of 100 bands, with each group containing 50 upper and 50 lower molar bands. One group was then autoclaved for 3 minutes at 134°C in a conventional downward displacement bench top autoclave (Instaclave, Burtons of Maidstone Ltd, Kent, UK) and the other group was sterilized in a vacuum bench top autoclave (Zenith, Prestige Medical, Blackburn, Lancashire, UK) for 3 minutes at 134°C. On completion of the cycle, each band was aseptically placed into 9 ml of brain heart infusion broth (Oxoid, Basingstoke, Hants, UK) and incubated at 37°C for 5 days. This was in order to provide a suitable environment for the recovery of a large number of oral bacterial species.

Ten positive controls were also included by inoculating the broth with five upper and five lower contaminated, but untreated, bands. Ten uninoculated broths were included as negative controls to confirm the sterility of the broth culture medium. There were, therefore, 220 specimens in total.

Results

All 200 test cultures remained clear after 5 days' incubation. Nine of the 10 positive controls showed dense growth after 24 hours' incubation. The 10 negative controls remained clear after 5 days' incubation (Figure 1).



Figure 1 Culture bottles following 5 days' incubation. Left to right: test band, negative control, positive control.

Discussion

Previous studies on the decontamination of orthodontic bands have artificially contaminated bands using laboratory cultures and have used either ultrasonic cleaning followed by autoclaving (Thompson and Bogues, 1977; Hohlt *et al.*, 1990), dry heat sterilization (Bednar and Gruendeman, 1990) or glass bead sterilization (Smith, 1986). Although these methods of sterilization were successful in each case, the contamination procedures used may not replicate the clinical scenario, with its complicating factor of protein contamination. Current practice suggests that the bench top steam sterilizer is the only acceptable method for achieving safe sterilization within the dental surgery environment (British Dental Association, 2000).

A recent study demonstrated that following decontamination of Siqveland matrix bands in the dental surgery (Lowe *et al.*, 2002b), there was a high level of residual contamination (Lowe *et al.*, 2002a). The presence of residual restorative materials and dental cements may compromise the subsequent decontamination process.

In the current study, the orthodontic bands were contaminated with oral secretions, blood and plaque but not with cement, as they had only been tried in and not cemented into position. The enzymatic cleaning agent, containing a protease, a lipase and amylase, was therefore used in order to breakdown and aid the removal of residual proteins, fats and carbohydrates in addition to acting as a disinfecting agent. Following steam sterilization in either the downward displacement or the vacuum cycle bench top sterilizer, it was not possible to recover any viable bacteria using a sensitive qualitative culture technique. This technique, however, produced a culture in nine of the 10 positive controls.

As most common viruses such as herpes, hepatitis and HIV are equally as heat labile as bacteria (Marsh and Martin, 1999), it is concluded that this is a safe method of decontaminating previously tried-in orthodontic

bands. As prions are not found in blood or saliva, they were not considered to be a significant risk factor (World Health Organization, 1999).

Conclusion

The decontamination of orthodontic bands contaminated with oral secretions is safely achieved using an enzymatic cleaning agent and a bench top steam sterilizer. As such, the re-use of previously tried-in molar bands should not constitute a cross-infection hazard.

Some manufacturers of orthodontic bands are considering removing the single use label from their bands within the UK. This current report would suggest that this is a legitimate course of action and that there should be no additional risk to the patient or legal liability to the manufacturer or operator.

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