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MDS DISSERTATION:

ASPECTS OF DENTAL AIR TURBINE HANDPIECE LUBRICANTS
AND STERILIZATION
Abstract

There are a number of aspects of dental air turbine handpiece use which have not been investigated in previous work. For example, the amount of lubricant discharged from handpieces and the influence of this on the discharge of potentially infective bacteria have not been studied. Furthermore, air turbine handpieces are known to be difficult instruments to sterilize and the effect of different packing methods on their sterilization is unknown. The aims of the present work were to report on the discharge of lubricant from dental air turbine handpieces and to discuss its clinical significance; to investigate the effect of lubricating oil on bacteria discharged from the handpiece; and to compare the efficacy of different methods of sterilization.

Two experiments were performed to investigate the amount of oil discharged from turbine handpieces. In Experiment 1, the discharge of lubricant from a handpiece which was run on air at its manufacturer’s recommended pressure was traced over a 40 minute period. In Experiment 2, the actual amounts of oil discharged from handpieces of seven different brands were measured over 240 minute periods.

Both experiments showed that there was continuous discharge of lubricant over the entire test periods. Analysis of the data from Experiment 2 allowed an equation to be developed which described the oil discharge behaviour of the handpieces.
In Experiment 3, droplets from ten air turbine handpieces were collected immediately after clinical procedures by running the handpieces over blood agar plates. After lubrication the handpieces were operated and droplets of oil discharged from them were collected also on blood agar plates. All the plates were then cultured under aerobic and anaerobic conditions. The number of samples showing growth of bacteria and number of bacterial colonies were compared between groups before and after oiling. No significant differences were found between the two groups, indicating that lubricant did not significantly reduce the discharge of bacteria from the handpieces.

In Experiment 4, 40 air turbine handpieces of the same brand were divided into groups according to the method of packing (paper bags or perforated trays) and type of autoclave used (with or without exhaust/drying phase). Samples were taken on blood agar plates as before. The number of samples showing bacterial growth and numbers of bacterial colonies from the handpieces were compared. Hence the efficacy of sterilization of the two autoclaving machines and the influence of packing methods on air turbine handpiece sterility were investigated. No significant differences were found between the four groups. However, it was considered that larger sample sizes would be needed before it could be confirmed that the different sterilization methods were equally safe.

It was concluded from the first two experiments that, after air turbine handpiece use, tooth surfaces should be degreased (using, for example, a detergent solution) if bonding technique are to be employed. Alternatively handpieces which are designed to operate without lubrication should be used. The results of the remaining experiments indicated
that lubrication does not significantly reduce the numbers of bacteria discharged from handpieces but that, although the different methods of autoclaving tested appeared to be equally effective, further work would be required to confirm this.