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Comparative evaluation of two different cold Sterilization techniques on carbide burs and diamond points

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Abstract---Background: Infection control is a major issue in medicine and dentistry because of concern over communicable diseases transmitted in health care settings. The present study was conducted for comparatively evaluating various Cold Sterilization Techniques on Carbide Burs and Diamond Points. Materials & methods: The present study was conducted for comparatively evaluating various Cold Sterilization Techniques on Carbide Burs and Diamond Points. Two disinfectant solutions were used: 2% glutaraldehyde and 5.2% sodium hypochlorite. Carbide group formed Group A while diamond burs formed the group B. Collection of total 40 tooth samples was done .i.e. 20 samples in each group ; further both the study groups consisted of two subgroups each as per the type of disinfectant solution. The bacterial count was evaluated for both before and after disinfection. All the results were recorded and analysed by SPSS software. Results: Sodium hypochlorite sterilization technique was slightly better in comparison to Glutaraldehyde technique. Also carbide burs were associated with less microbial growth. Conclusion: Sodium hypochlorite sterilization technique and carbide burs were slightly better for clinical usage.

Keywords---Cold, Sterilization, Burs, Diamond.

Introduction

Infection control is a major issue in medicine and dentistry because of concern over communicable diseases transmitted in health care settings. Both dental personnel and patients are always at risk of communicating diseases during treatment. It is a century old observation that disease may spread between

patients and staff and amongst patients through a variety of channels. The use of effective infection control procedures in the dental office will prevent cross contamination that may extend to dentist, dental staff, dental technician and patients.¹⁻³

The term bur is applied to all rotary cutting instruments that have bladed cutting heads which remove the tooth structure either by cutting or by abrading. In restorative dentistry, there exists a range of cutting instruments namely from steel burs to carbide burs to diamond abrasives. Bur selection is probably based on several factors: tradition, shape, clinical procedure being done, substrate being cut, their method of sterilization and disposal. The rationale for bur selection and its application is not addressed in the literature or in standard operative and prosthodontic texts. More over, this selection is complicated by the availability of these dental drill in different sizes and coarseness. Bur selection and use are complicated by the fact that cutting efficiency tends to decrease as bur wears out and as debris accumulates on the bur.⁴⁻⁷ Hence; the present study was conducted for comparatively evaluating various Cold Sterilization Techniques on Carbide Burs and Diamond Points.

Materials & Methods

The present study was conducted for comparatively evaluating various Cold Sterilization Techniques on Carbide Burs and Diamond Points. Two disinfectant solutions were used: 2% glutaraldehyde and 5.2% sodium hypochlorite. Carbide group formed Group A while diamond burs formed the group B. Collection of total 40 tooth samples was done .i.e. 20 samples in each group ; further both the study groups consisted of two subgroups each as per the type of disinfectant solution. Each sample has two burs collected from same patient. One acts as control group, which means only microbial count was determined without disinfection. The other one would be determined with microbial count before and after disinfection. Each sample has two burs of which one is control group which is immersed directly in the BHI broth of about 2 mL in 5 mL test tube. Another bur was immersed directly in BHI broth. After stirring for 2 minutes, sample was removed with sterile tweezers and then immersed in 2 mL of disinfectants. The bacterial count was evaluated for both before and after disinfection. All the results were recorded and analysed by SPSS software.

Results

While using Glutaraldehyde sterilization technique, among group A specimens, total CFU before and after treatment was 78 CFU/mL and 3 CFU/mL respectively while among group B0specimens, total CFU before and after treatment was 612 CFU/mL and 22 CFU/mL respectively. While using sodium hypochlorite technique, among group A specimens, total CFU before and after treatment was 85 CFU/mL and Nil CFU/mL respectively while among group B0specimens, total CFU before and after treatment was 785 CFU/mL and Nil CFU/mL respectively. Hence; while analysing statistically, it was seen that sodium hypochlorite sterilization technique was slightly better in comparison to Glutaraldehyde technique. Also carbide burs were associated with less microbial growth.

Table 1: Glutaraldehyde sterilization technique

Group		Before (CFU/mL)	After (CFU/mL)
Group A	Total specimens (n=10)	Total colonies: 78	After colonies: 3
Group B	Total specimens (n=10)	Total colonies: 612	After colonies: 22

Table 2: Sodium hypochlorite technique

Group		Before (CFU/mL)	After (CFU/mL)
Group A	Total specimens (n=10)	Total colonies: 85	After colonies: Nil
Group B	Total specimens (n=10)	Total colonies: 785	After colonies: Nil

Discussion

Infection control procedure in the office are divided into two major categories depending on the how the procedure interfere with development of disease. They either interferes with spread of disease agent by reducing the contamination or they remove the disease agent after contamination has occurred.⁷⁻⁹

Dental burs are used in clinical dentistry for various procedures some of which includes caries excavation, access cavity preparation and crown reduction. During these procedures burs may become heavily contaminated with necrotic tissue, saliva, blood and potential pathogens and identified as potential vehicle for cross infection. In routine dental practice, adequate disinfection and sterilization has to be focused upon to control cross transmission of infection. The most commonly used methods of sterilization includes soaking of burs in commercially available disinfectors followed by manual cleaning or, using ultrasonic bath or, autoclaving.⁷⁻⁹

While using Glutaraldehyde sterilization technique, among group A specimens, total CFU before and after treatment was 78 CFU/mL and 3 CFU/mL respectively while among group B0specimens, total CFU before and after treatment was 612 CFU/mL and 22 CFU/mL respectively. Gonzaga CC et al evaluated the cutting efficiency of different diamond burs after successive cuts and repeated sterilization in an autoclave. The morphology and grit sizes were analyzed and correlated to cutting efficiency. Ten medium-grit diamond burs of five different manufacturers were investigated (KG, KG Sorensen; TH, Tri-Hawk; KM, Komet; HC, Heico; and FD, Frank Dental). Changes in the cutting efficiency of diamond burs on composite resin blocks were measured after five repeated cuts and after five sterilization cycles. Grit sizes were analyzed by scanning electron microscopy (SEM) and correlated to cutting efficiency. Significant differences were observed for diamond burs ($P < 0.0001$) and condition ($P < 0.0001$). FD presented the lowest mean cut time (21.88s), followed by KM (36.08s). TH (40.18s), HC (41.65s), and KG (42.23s) had the highest cut times. The number of cuts was not statistically significant. New burs had a significantly shorter cutting time (33.38s) when compared with the ones after sterilization cycles (39.55s). A moderate to strong positive correlation was found between diamond size and cutting time (Pearson's coefficient of 0.77). All diamond burs demonstrated lower cutting

efficiency after repeated autoclaving. Cutting efficiency did not decrease as the number of cuts increased.¹⁰

While using sodium hypochlorite technique, among group A specimens, total CFU before and after treatment was 85 CFU/mL and Nil CFU/mL respectively while among group B0specimens, total CFU before and after treatment was 785 CFU/mL and Nil CFU/mL respectively. Hence; while analysing statistically, it was seen that sodium hypochlorite sterilization technique was slightly better in comparison to Glutaraldehyde technique. Also carbide burs were associated with less microbial growth. Sharma S et al evaluated local practioner's knowledge on dental bur selection, its usage, sterilization procedures undertaken and the method of disposal of dental burs in restorative procedures. A Questionnaire proforma was prepared with each question having 4 answers. A total of 20 questions were framed and were sub-divided in to 3 categories namely selection, usage sterilization and disposal. A total 131 out of 150 practioner's answered the questions, a response rate of 87%. Most of the practioner's preferred diamonds (75%) over tungsten carbide (15%) burs. most of the dentists used burs till they were worn out (85%) and many of the dentists agreed that the cutting efficiency of bur decreased with usage (33%). Clinicians usually sterilized burs either once daily (35%) or for every patient (35%). Almost every practioner discarded their worn out burs into dustbin (100%). From the survey they came to know the operators attitude towards one group of burs in terms of cutting efficiency.¹¹

Conclusion

Sodium hypochlorite sterilization technique and carbide burs were slightly better for clinical usage.

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