

Bacterial Contamination of Endodontic Materials Before and After Clinical Storage

Kadambari Padmanabhan

M.D.S. Senior Lecturer, Department of Conservative Dentistry and Endodontics, Priyadarshini Dental College and Hospital, Thiruvallur District, India

Abstract: *The purpose of this paper is to evaluate the bacterial contamination of endodontic materials before and after clinical storage. The paper focusses on (MALDI-TOF MS) matrix-assisted laser desorption/ionization time-of-flight mass spectrometry, in addition to Culture techniques that have been used for the isolation and identification of bacteria for many years*

1. Introduction

Successful endodontic treatment depends on the eradication of microorganisms present inside the root canal system and the prevention of reinfection. All materials and instruments used during endodontic procedures should be bacteria free. (MALDI-TOF MS) is used to identify the bacterial colonies isolated from culturing the samples of the tested materials.

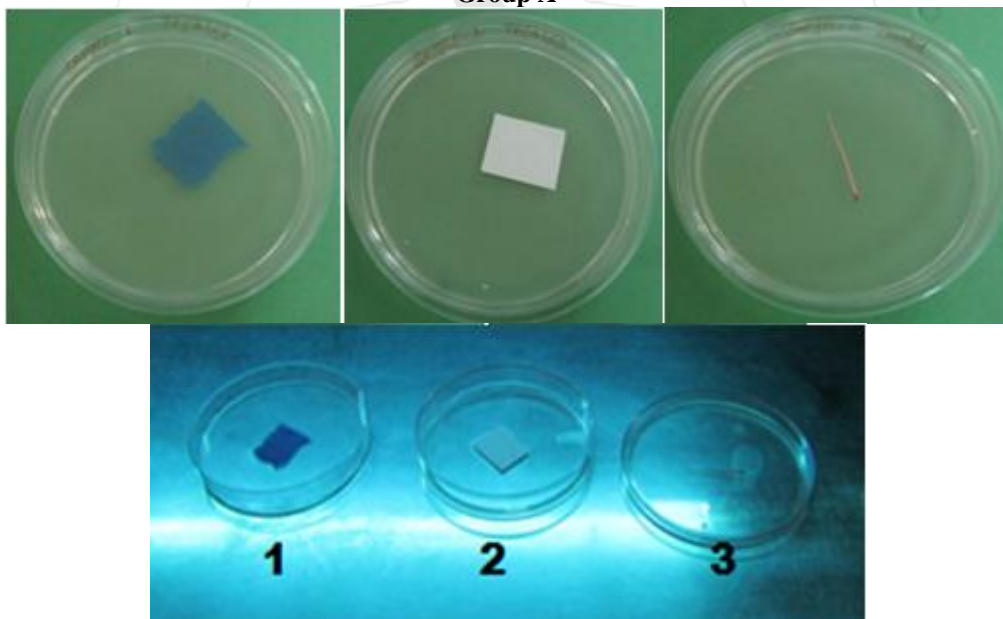
2. Materials & Methods

Group A: Materials (GP, mixing pad & rubber dam sheet) exposed to ultraviolet light for 30 min. (Control group – UV treated) and then placed in the Nutrient agar plate

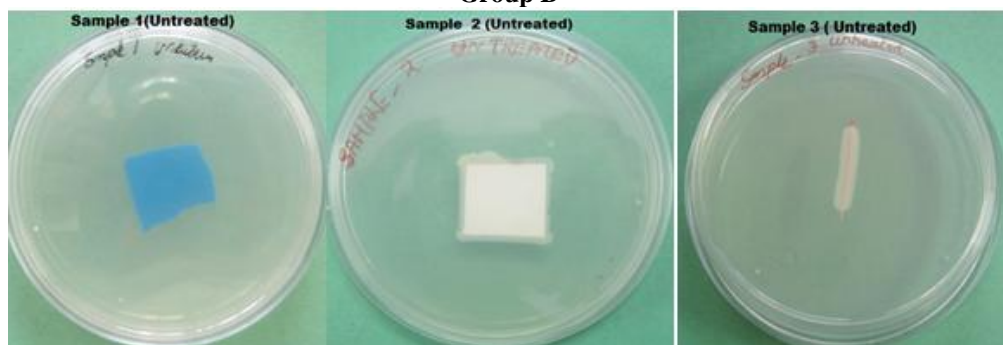
Group B: The materials are directly placed in the Nutrient agar Plate (without UV exposure) Untreated materials (Guttapercha, mixing pad, rubber dam)

Both the sets were incubated at 37°C for 24 hours.

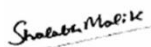
Group A



Group B



3. Result

Test Name	Results	Units	Bio. Ref. Interval
MALDI-TOF-MS BACTERIA IDENTIFICATION @ (Matrix assisted laser desorption ionisation- Mass spectrometry)			
Type of Specimen	Growth plate received		
Report	Kocuria kristinae and Bacillus cereus isolated		
Comments MALDI-TOF MS is a proteomic method for rapid Bacteria species identification. This technique is based upon the detection of highly abundant proteins in a mass range between 2 and 20 kDa by computing their mass (m) to charge (z), m/z values. Thus, a typical spectrum is generated for each microorganism, which is used for comparison with the stored reference spectra and thereby providing identification of correct bacterial species.			
 Dr. Shalabh Malik MD (Microbiology) National Head - Microbiology & Serology - NRL			
-----End of report-----			

Kocuria Kristinae & *Bacillus Cereous* bacterial species were identified in materials that was directly placed in the Nutrient agar plate (without UV exposure) through MALDI TOF- MS BACTERIA IDENTIFICATION.

No bacterial growth were found in the UV treated samples

4. Discussion

MALDI-TOF MS is a soft ionization approach and depends on the comparison of specific mass spectra in the bacterial identification through desorption of bacterial proteins in the form of ions. The time of flight of the ions to reach the detector is dependent on the mass and charge of the ions. Smaller ions travel faster than larger ions, thus providing a mass spectrum profile based on the difference in composition.

Kocuria is a gram positive bacterium and belongs to the family *Micrococcaceae*, having 17 species, of which *K. kristinae* were found to cause human infections. *Kocuria Kristinae* is very difficult to identify by conventional microbiological techniques, but can be recognised by modern automated identification systems.

Bacillus cereus is a Gram-positive aerobic or facultatively anaerobic, motile, spore-forming, rod-shaped bacterium and is widely distributed environmentally.

B. cereus is associated mainly with food poisoning and is being increasingly reported to be a cause of serious and potentially fatal non-gastrointestinal-tract infections. This bacterium is also found to be associated with many other clinical conditions such as anthrax-like progressive pneumonia, fulminant sepsis, and devastating central nervous system infections, particularly in

immunosuppressed individuals, intravenous drug abusers, and neonates.

8% to 20% of gutta-percha cones taken out of their sealed package yielded bacterial growth when cultured on agar plates². Commonly used endodontic consumables such as GP points, rubber dam and paper mixing pads when taken from freshly opened sealed packages, are contaminated. If contamination is suspected, disinfection should be considered. Among the chemicals that have been advocated, are 70% alcohol, sodium hypochlorite, glutaraldehyde, benzalkonium chloride, paraformaldehyde, formocresol, polyvinylpyrrolidone-iodine have been proposed for guttapercha disinfection¹.

5. Conclusion

Among the chemicals that have been advocated, are 70% alcohol, sodium hypochlorite, glutaraldehyde, benzalkonium chloride, paraformaldehyde, formocresol, polyvinylpyrrolidone-iodine have been proposed for guttapercha disinfection.

Use of UV cabinets. It is extensively used to destroy bacteria, virus, mould spores etc. An ultraviolet ray is a band of light with short wavelengths from 2000 to 2950 angstrom units and it possesses the greatest germicidal effects of all ultraviolet wavelengths, particularly at a wavelength of 2537 angstrom units. It is extensively used to destroy bacteria, virus, mould spores etc. It is essential to create and maintain an aseptic chain throughout the course of endodontic treatment to facilitate the eradication of microorganism and for the prevention of reinfection.

References

- [1] Kayaoglu G, Gürel M, Ömürlü H, Bek ZG, Sadik B. Examination of gutta-percha cones for microbial contamination during chemical use. Journal of Applied Oral Science. 2009 Jun;17(3):244-7
- [2] Montgomery S. Chemical decontamination of gutta-percha cones with polyvinylpyrrolidone-iodine. Oral Surgery, Oral Medicine, Oral Pathology. 1971 Feb 1;31(2):258-66.

