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Evaluation of microbial contamination of extraction forceps prior to dental extractions

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ABSTRACT:

Aim: To evaluate the microbial contamination on extraction forceps prior to dental extraction. Introduction: Nosocomial infections or hospital acquired infections are most commonly affecting the patients. Transmission of diseases from one patient to another can occur as a result of reusing instruments without proper disinfection or sterilisation. Using an infected instrument foes not only affect patients but also dentist and dental staff by producing cross infection like Hepatitis B[1] and C[2], tuberculosis[3], HIV, infective endocarditis etc. Especially when instrument involves blood contact like extraction forceps, elevators, endodontic files, burs etc. It is important sterilize instruments properly to avoid cross contamination and infection spread.

Materials and method: A sample size of 20 extraction forceps is included. Swabs are collected immediately prior to extraction and cultured in nutrient agar. Data was collected and statistically analysed.

Results: The average colony count of 6.1 CFU is seen in total 20 samples taken. The colony count is quite low suggestive of good sterilization protocol followed by the institution.

Conclusion: Although there was minimal number of colony forming unit in the extraction forceps. There is high chance that the organism can be pathogenic and can create many postoperative complications like infective endocarditis, abscess, dry socket etc. As said prevention is better than cure. It is better to maintain a good sterilization protocol which will reduce the risk of cross contamination and maintain good asepsis.

Keywords: Autoclave, Extraction forceps, infection control, microbial growth, swabs.

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INTRODUCTION

Nosocomial infections or hospital acquired infections are most commonly affecting the patients. According to the Harvard Medical Practice Study II found that a single type of nosocomial infection is surgical-wound infection which constituted the second-largest category of all. Many sterilization techniques have been developed within years to free the instruments from pathogenic organisms after every use. Diseases may be transmitted by indirect contact when dental instruments contaminated by one patient are reused for another patient without adequate disinfection or sterilization between uses. Using an infected instrument does not only affect patients but also dentist and dental staff by producing cross infection like hepatitis B[1] and C[2], tuberculosis[3], HIV, infective endocarditis etc. Especially when the instrument involves blood contact like extraction forceps, elevators, endodontic files, burs etc. It is important to sterilize instruments properly to avoid cross contamination and infection spread.

Depending on the possible risk for infection in link with their use, dental instruments, devices, and equipment are categorized by the Centers for Disease Control as critical, semi critical, or noncritical:

CRITICAL INSTRUMENTS: Surgical instruments that are involved in direct soft tissue or bone penetration are considered as critical items. It includes scalpels, periodontal probes, ultrasonic scaler tips, and other surgical instruments. Since they come in direct contact with surgical site, they have high risk of transmission of infection, and it is mandatory to adequately sterilise these instruments.

SEMI CRITICAL INSTRUMENTS: Instruments that come in contact with the oral mucosa, having low risk of infection transmission, including mouth mirror, restorative instruments, dental airotor handpiece, impression trays etc. are considered as Semi critical instruments. These instruments should be subjected to high level disinfection.

NON CRITICAL INSTRUMENTS: Items that contact only the intact skin, having least risk of infection transmission, are considered as Non critical items. They include blood pressure cuff, pulse oximeter, radiograph cone etc. It is sufficient to clean the area first, then disinfect it with an EPA-registered hospital disinfectant. An EPA-registered hospital disinfectant with a tuberculocidal claim, typically an intermediate-level disinfectant, should be used when the item is clearly contaminated with blood or OPIM. Certain non-critical patient care items can be difficult to clean or disinfect without damaging the surfaces; as a result, using disposable barrier protection on these surfaces may be a better option.

Sterilization: Sterilization is a process where in the surface is made free of pathogens, including the spores and vegetative forms. Many types of sterilization techniques are available. They are classified into physical and chemical agents. Some are incineration, hot air oven, steam under pressure, radiations, ultrasonic and sonic vibrations, sunlight etc. Most commonly used method of sterilization for steam under pressure or autoclave.

Autoclave: The principle of the autoclave is that the water boils in an autoclave or steam steriliser when its vapour pressure reaches the same level as the atmosphere outside. The temperature at which water boils also raises when the pressure inside a closed vessel increases. Saturated steam has a piercing quality. Steam condenses into water and releases latent heat when it comes into contact with a cooler surface, killing any germs that may be present.Most frequently used at 121 degree Celsius at 15 minutes of holding time.

Infection control and maintaining high standard sterilization protocol is highly stressed in current practice of dentistry.[4] Improper sterilization practice can lead to transmission of various fatal diseases. It may lead to cross contamination.[5] Transmission of infection can occur in possible ways:

1. Patient to dental worker.
2. Dental worker to patient
3. Patient/ dental workers to community
4. Patient/dental workers to family members.

Infections spread through many things including aerosol, droplets, saliva, blood, plasma etc. Aerosol can cause acute respiratory syndrome or SARS[6], Pneumonia[7] and pulmonary diseases[8]. Blood can cause Hepatitis B[9,10], HIV[11], Hepatitis C etc.

Disinfection:Destruction of pathogenic microorganisms or their toxins or vectors by direct exposure to chemical or physi -cal agents. Commonly used disinfectants in dentistry are hydrogen peroxide, glutaraldehyde, ethyl or isopropyl alcohol alcohols etc. The aim of the study is to evaluate the microbial count on extraction forceps prior to dental extraction.

MATERIALS AND METHOD

Sample collection: 20 sample size were collected from a private dental college. Swab sample is taken immediately prior to extraction from the autoclaved extraction forceps. Sampling is selected near the beaks of the forceps. Break the seal round the tube containing the swab. Remove the swab from the tube and rub and roll it firmly several times across the sampling area. Return the swab into the tube and label the sample. Send the sample to the laboratory for analysis.

Microbiological analysis: The samples obtained were inoculated in culture plates of nutrient agar. The plates were incubation for 24 hours followed by analyzing the colonies count.

Data analysis: The data is collected and statistically analysed. Data is collected in form of colony forming unit. The total sample collected was taken average of the colony formed.

RESULTS

The average colony count of 6.1 CFU is seen in total 20 samples taken. The colony count is quite low suggestive of good sterilization protocol followed by the institution.

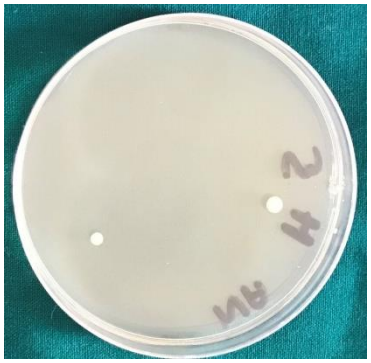

FIGURE-1 Colonies formation after 24 hours incubation

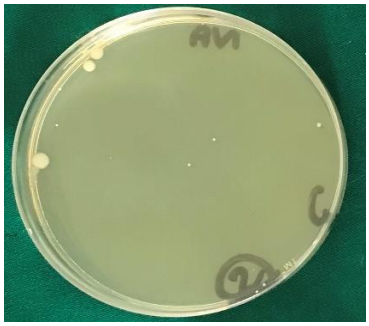

FIGURE -2 Colonies formation after 24 hours incubation

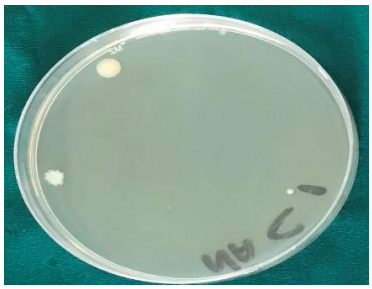

FIGURE-3 Colonies formation after 24 hours incubation

DISCUSSION

Many researchers have proved that dental environment is prone to microbial contamination can be either pathological or nonpathological. If they are pathological, can lead to many infection and disease. Williams et al, 1998[12] conducted a study comparing bacterial contamination of same dental institution from 1976 to 1998. They found slight difference in bacterial count in 1998 with lesser colonization from head lights, light handle covers and clinic jacket cuffs. Hence proved that even after years of having advanced sterilization protocol there was still bacterial contamination seen even if it showed statistical difference. A epidemiology study done in 1989, in this study they proved the presence of bacteria in multiple dose vial of local anaesthesia and heparin. They concluded that the bacterial contamination was due to the when the vacuum in the vial removed cells and bacteria from the syringe that had entered the tip because of a back pressure in the syringe during use.[13] Swaminathan et al in 2013[14] concluded in their review that aerosol plays an important role in contaminating environment which can produce hazardous effect on patient and the dentist. Amad et al in 2017[15] collected swab from headscarves during performing restorative dentistry with or without rubberdam. They found bacterial colony forming unit from the headscarves. This in turn prove the contamination level in dental office by contaminating the headscarves. Nejatidanesh et al in 2013[16] in their study showed different levels of bacterial colony forming units in different part of face like nose, eyes, zygoma etc. Dental practice presents opportunities for cross-contamination. The dentist's face is at high-risk of infection transmission. Which can in turn cause cross infection from dentist to patient and vice versa. Many researches have been done to bring out various methods and technology in field of sterilization and improve maintaining asepsis environment. Molinari et al. 2000[17] suggested application of precautions such as multiple aseptic procedures, latex gloves[18,19], masks[20], protective eyewear, clinic coats, automated instrument decontamination devices, time-efficient heat sterilization modalities, chemical disinfectants, waste management procedures and single-use disposable items have created a safer environment for dental workers and patients.

CONCLUSION

Although there was minimal number of colony forming unit in the extraction forceps. There is high chance that the organism can be pathogenic and can create many postoperative complications like infective endocarditis, abscess, dry socket etc. As said prevention is better than cure. It is better to maintain a good sterilization protocol which will reduce the risk of cross contamination and maintain good asepsis.

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