

Upgrading Sterilization in the Orthodontics Practice: A Review

Abstract

In today's orthodontic practice, disease control must undergo major reevaluation and restructuring. The knowledge of the natural history and treatment of many highly transmissible diseases to which orthodontic personnel are at high risk is changing rapidly. Recently a great deal of attention has been devoted to the spread of hepatitis b and aids viruses and the high risk of contamination of these viruses during the dental operations has made orthodontists more aware of the necessity of sterilization and disinfection. Finally, the most important ingredient to any change is in the orthodontic office staff that they must be enlightened, trained, and supervised by the orthodontist to effectively and efficiently switch from the old to the new.

Key Words

Cross-infection; instruments; orthodontic practice sterilization

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INTRODUCTION

Sterilization is one of the most important methods in the dental office so that the orthodontic experience for the patient can be both fulfilling and completely safe. "Is the destruction of all microbial forms including viruses"^[1-4]

PATHWAYS of Cross Contamination

Routes and modes by which infection may spread in the dental clinic (Fig. 1).^[5]

Sterilization of Materials in Orthodontic Office

There are various method and sterilization machine used but most popularly used in dental office are Ultrasonic cleaning unit, Desktop autoclave sterilizer, Dry heat sterilizer, Ultraviolet cabinet, Chemical immersion or Cold sterilization, Glass bead sterilization.^[1,2,6-8]

Ultrasonic Cleaning Unit

Solutions with anti-rust compositions and enzyme based for breakdown of contaminants and particles is recommended. Pre-cleaning cycles last for 5-15 minutes (Fig. 2).

Desktop Autoclave Sterilizer

Conventional method involves holding time of 15 minutes for 121° c, Rapid cycle involves 134° c for 3 minutes and cooling down period is of 40 minutes to 1 hour (Fig. 3).

Dry-Heat Sterilizer

It causes oxidative destruction of bacterial protoplasm at a temperature range of 160 ° c (320 ° F) for 2 hours to achieve complete sterilization and Rapid Dry - Heat sterilization involves cycles at temperatures of 190 ° c (375 ° F) for 6 to 12 minutes (Fig. 4).

UV Cabinet

Dental instrument and orthodontic pliers with 6

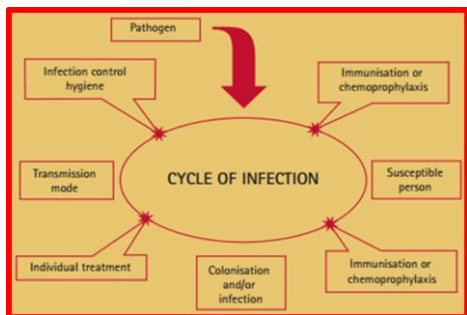


Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

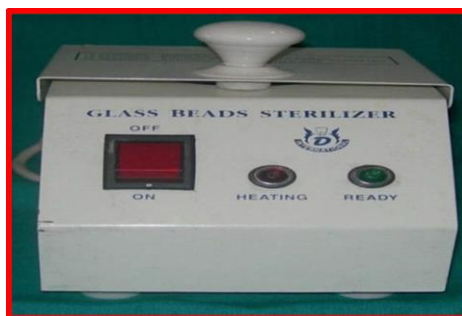


Fig. 6



Fig. 7



Fig. 8

exposures of 5 minutes duration and the optimum wavelength for U V radiation is 260nm during peak emission. The range of 254 nm is suitable for adequate sterilization (Fig. 5).

Glass Bead Sterilization

Sterilize the orthodontic bands and plier tips. They use small glass beads ranging from 1.2 to 1.5mm in diameter. The heating range is 217° c to 332° c for 3-5 seconds but not exceeding 250° c. Protocol involving molar band sterilization reported spore effectiveness at 226° c after 45 seconds for a single band (Fig. 6).^[6]

Chemical immersion or cold sterilization

Suitable for heat-sensitive items, 2% acidic glutaraldehyde and chlorine dioxide are commonly used. Most of the bacteria and virus are killed within 10 minutes. Sterilization time for instrument with 2% acidic glutaraldehyde is 10 hours without dilution and with chlorine dioxide is 6 hours.^[13]

Orthodontic Plier Sterilization

High quality stainless steel:- dry heat, autoclave, chemical vapor, ethylene oxide. **Low quality** stainless steel:- dry heat, chemical vapor, ethylene

Blood Borne Pathogens And Other Disease Agents

MICROORGANISM	DISEASE
Hepatitis B (HBV)	Hepatitis B
Hepatitis C (HCV)	Non -a non-B, hepatitis
Hepatitis D (HDV)	Delta hepatitis
Herpes simplex type I	Oral herpes, Herpetic Whitlow ,Herpatic keratitis
Herpes simplex type II	Genital herpes
HIV	AIDS & ARC
Neisseria gonorrhoeae	Gonorrhoea
Treponema pallidum	Syphilis
Pseudomonas aeruginosa	Wound infections, abscesses
Staphylococcus aureus	Wound infection, abscesses
Clostridium tetani	Tetanus

Micro Organisms Transmitted By Inhalation

Micro organism	Disease
Varicella virus	Chicken pox
cytomegalovirus	Infections in infants
Measles (rubeola)	Measles and mumps
Influenza virus	Influenza and common cold
Rubella virus	German measles
Myobacterium tuberculosis	Tuberculosis
Sterptococcus pyogens	Oral abscesses, rheumatic fever & endocarditis

Candida albicans

candidosis

oxide. Ultrasonic cycle for 5 to 12 minutes, rinsing with distilled water. Remove excess moisture thorough drying with compressed air (Oil-Free). Lubrication of Plier joints and cutting surfaces with silicone based lubricants. Sterilization protocol using a Dry-Heat Sterilizer at 190° c for 6 to 12 minutes with the placement of pliers in an open (Fig. 7a & Fig. 7b).^[3,10]

Molar Bands

- Ultrasonic cycle for 5 minutes depending on the capacity of the unit.
- Rinsing with distilled Water.
- Remove excess moisture through drying with Compressed Air (*Oil-Free*). .
- Sterilization protocol using a Dry-Heat Sterilizer at 190 ° c for 6 minutes.^[12]

STORAGE**Impression trays**

- Aluminium or chrome plated: heat or gas sterilization
- Custom acrylic trays: disinfect by NaoCl or iodophor
- Plastic trays: ethylene oxide sterilization or disinfection by NaoCl or iodophor^[13]

Dental Cast

ADA recommends disinfection of stone cast by immersing in 1:10 NaoCl or an iodophor

Orthodontic marking pencil

Conventional orthodontic pencil can not be autoclave, gas sterilization can be used for alcohol containing permanent markers if possible always use disposable marker.

Elastomeric Ligatures and Chains

Single patient packs are the best insurance against cross-contamination risks at present and where this is not feasible as in the case of e-chain spools, it is

better to cut a little extra than required and discard the rest.

Orthodontic Wire

- TMA WIRE : Ethylene oxide ; autoclaving
- NiTi wire : Ethylene oxide
- STAINLESS STEEL WIRE : autoclave dry heat ; ethylene oxide^[4,8]

Alginate impression and Orthodontic Appliances

1% sodium hypochlorite, & 2% glutaraldehyde but not more than 10 minutes. Spraying aerosols are not recommended for their unevenness and additional inhalation risk.

Floor Covering

Should be impervious and non-slip . Carpeting must be avoided it should be Seam free and easy to clean.

Disposal of clinical waste

Clinical waste sacks must be no more than three quarter full. Sharp waste (needle and scapel blades) must sealed in puncture proof container and disposed properly.

INFECTION CONTROL PRACTISES FOR THE DENTAL OFFICE

Barrier Techniques

Gloves

- Contact with body fluids, mucous membranes touching contaminated surfaces or items.
- After removal of gloves, wash hands, reglove.
- Repeated use by disinfection unacceptable.

Heavy rubber

(Utility gloves) – Cleaning instruments and environmental surfaces. Allergy to latex or cornstarch – nylon glove linens. Polyethylene gloves – avoid contamination of objects

Protective Clothing

Gowns, aprons, lab coats. Should not be worn outside work area.

Masks

Surgical masks – face, oral mucosa, nasal mucosa protection. Changed when soiled or wet.

Protective Eyewears

Eye protection from spatter of body fluids. OSHA Standard – Should have solid side shields.

Limiting Contamination

- High volume evacuations
 - Proper patient positioning
 - Rubber dams.
- } Avoid spatter

Avoid contact with charts, telephones cabinets during treatment. Use 2nd pair of gloves or sheet of plastic wrap or foil.

HANDS

Hand Washing

Washed at start of day, before gloving, after removal of gloves, after touching objects.

Routine procedures – soap and water. Surgical procedures – Antimicrobial hand scrub. Care must be taken when working with sharp object such as needle stick injury.

HANDLING OF SHARP INSTRUMENTS AND NEEDLES

- Recap syringe needles.
- Disposable needles should not be bent or broken after use.
- Forceps used to handle sharp items.
- Discarded into puncture resistant biohazard containers.

OPERATORY SURFACES

- Counter tops
- Light handles
- X ray unit heads
- Amalgamators
- Cabinet and drawer pulls
- Tray tables
- Chair switches
- Cover with plastic wrap, aluminium fact absorbent paper.
- Changed between patients.

DISPOSAL OR WASTE MATERIALS

Gloves, masks, wipes, paper drapes:

- Handled with gloves, discarded in impervious plastic bags.

Blood, disinfectants, sterilants

- Carefully poured into a drain connected to a sanitary sewer system.

Sharp items, needles, blades, scalpels

- Puncture- resistant containers marked with biohazard label.

Human tissue

- Same as sharp items, but diff. containers.^[3,5,7,8]

CONCLUSION

Elastomeric Ligatures and Chains are best single used. Current recommendations involve the immersion of alginate impressions and Orthodontic materials for not more than 10 minutes .The same infection control procedure must be used for all patients. Work surfaces should be impervious and easy to clean and disinfected .All autoclaves must be regularly serviced and maintained. Single use should be used whenever possible. All waste in the practice should be segregated. All staff understand the principle of personal protection.

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