

Cleaning, lubrication and sterilisation of turbines and dental handpieces

Turbines and dental handpieces are very delicate instruments

Maintenance of turbines and dental handpieces requires special attention. All rotating instruments are very delicate and complicated devices.

In clinical evaluations of high-speed handpieces, cleaning and lubrication have been demonstrated to be the most critical factors in determining performance and durability. Manufacturer's instructions for cleaning, lubrication, and sterilization should be followed closely to ensure both the effectiveness of the process and the longevity of handpieces.

Over time, the internal channels of turbines and handpieces will become coated with a so-called biofilm, consisting of organic material and different types of microorganism. The biofilm will also harbour particles that have been retracted into the internal parts of the instruments from the oral cavity. These particles consist of ground enamel, dentin, amalgam, composite... If cleaning/disinfection and lubrication are not carried out regularly between every patient when the rotating instruments have been used, the deposit accumulated inside the instruments will have a devastating effect on the function of all internal moving parts. This will of course also have a devastating effect on all preparations carried out with faulty and malfunctioning instruments.

Debris can have devastating effects

Rotating instruments such as turbines and handpieces require daily maintenance, because of the precision mechanics, moving internal parts and the high strain in the rotating instruments. The daily maintenance of the system in the clinic is important, especially with respect to cleaning, disinfection and lubrication. A basic recommendation is that the manufacturer's directions should always be followed and the recommended agents should be used.

Particles of debris in the internal lumens of rotating instruments can have devastating effects on their function. It is also important that the compressed air is of the highest possible quality.

Dental handpieces, triplex syringes, ultrasonic scalers and cross infection

Dental handpieces, triplex (three-way) syringes and ultrasonic scalers also require particular attention when it comes to infection control. In dentistry most drilling procedures require water for flushing and cooling. Three-way syringes, rotating instruments and ultrasonic scalers generate very fine aerosols which the patient may inhale during treatment. The aerosol and the microorganisms this may contain can thus enter deep into the patient's respiratory tract.

Possible retention of both bacteria and virus

Microorganisms from the oral cavity are drawn into this equipment in several ways. It has been demonstrated in several studies that contamination of the insides of high-speed dental turbines occurs and that bacteria as well as viruses may remain infectious when expelled from such turbines during subsequent use. Contamination takes place every time the turbine stops rotating with the bur in contact with an external fluid.

Although no epidemiologic evidence implicates these instruments in disease transmission, studies of high-speed handpieces using dye expulsion have confirmed the potential for retracting oral fluids into internal compartments of the device. This determination indicates that retained patient material can be expelled intraorally during subsequent uses. Studies using laboratory models also indicate the possibility for retention of viral DNA and viable virus inside both high-speed handpieces and prophylaxis angles.

Flushing has no effect

The practice of flushing by running the turbines between patients should be discouraged. In order to remove over 99% of the contaminant from the air chamber, a turbine has to run for more than 4-7 min depending on the type of the handpiece. In order to remove all infective matter after use, these instruments must be cleaned and disinfected internally and externally after every patient.

Automatic devices for cleaning

Adequate external cleaning and disinfection can be achieved in a washer-disinfector complemented by some form of internal cleaning and disinfection. Internal cleaning of handpieces is best done with the aid of specially designed cleaning apparatus which as well as cleaning also lubricates the handpiece. There are commercially available manual and automatic systems for cleaning, disinfecting and lubricating the turbines and handpieces. To achieve sterility of dental handpieces, three-way syringes and ultrasonic scalers they must be treated in an autoclave with pre-evacuation. In some cleaning apparatus it is possible to autoclave the instruments.

Careful evaluation of autoclave process

To achieve sterility of dental handpieces, three-way syringes and ultrasonic scalers they must be treated in an autoclave with preevacuation which effectively evacuates air from inside the instruments before the sterilization process begins. In general all hollow articles/instruments represent a greater challenge for the sterilizer than solid articles/instruments. Dental handpieces are considered as hollow A instruments (according to the standard EN 13060).

Pockets of air in the goods present a problem during sterilization of tubular items. Homogeneous instruments require only the surface of the instrument to be sterilized. Instruments with holes in them have both inner and outer surfaces and the inner surfaces are difficult to access with steam. It is also easy for air to remain entrapped in hollow instruments. Small non-vacuum autoclaves should therefore be carefully evaluated before being used for the reprocessing of hollow instruments such as high-speed turbines.

When the instruments are treated in an autoclave without a prevacuum stage they are regarded as disinfected rather than sterile. Disinfection through immersion in chemical germicides is not an acceptable method.

Quality of lubricants

The choice of lubricant is also very essential for proper maintenance of the rotating instruments. The lubricant must be environmentally friendly as well as non-toxic and non-allergenic, preferably smell- and taste free. The lubricant should also have a good wetting capacity in order to cover all internal moving parts and at the same time not being able to leek out and contaminate the prepared tooth surface. Because of the heat generation during use, the lubricant needs to be heat resistant and not able to evaporate. This is also important during periods when the instruments are not in use – the lubricant should not evaporate (dry-out) during weekends and vacations. Finally the lubricants must be free from particles since the fitting of all internal moving parts is extremely delicate. Even very small contamination of particles could have a devastating effect on the rotating instruments. Some types of oils have the capability to form crystals when in contact with alcohols, water or saliva. Again other types of oils also have a tendency to coagulate when heated up to higher temperatures. The lubricant should therefore be documented safe to use in conjunction with autoclaving of the rotating instruments – steam sterilization at 135°C.

Quality for life

If proper maintenance is carried out at the clinic, this will actually increase the lifespan of the rotating instruments even if sterilising itself actually is a life shortening factor for these instruments.