

Effect of surgical sterilization procedures on orthodontic pliers – A preliminary report

O. George^{1,3}, F. Benoît², C. Rapin³, L. Aranda³, P. Berthod³, P. Steinmetz³, M.P. Filleul^{1,3}

¹: Faculté de Chirurgie Dentaire, Nancy I ²: Service de stérilisation centrale, CHU Nancy-Brabois

³: Laboratoire de Chimie du Solide Minéral, UMR 7555

INTRODUCTION:

Orthodontics² is the part of dentistry and stomatology concerned with the study and treatment of jaw deformities and irregular tooth alignment. Corrective tooth-movement is achieved with a variety of appliances, such as metallic wires or springs shaped with the help of specific pliers. These pliers require surgical sterilization after use in order to conform with compulsory prion-protection rules¹. The aim of this study is to assess the amount of corrosion and wear induced by repeated sterilisation on currently available orthodontic ligature-cutting pliers (fig. 1).



Fig. 1: ligature-cutting pliers.

METHODS:

Materials used were:

- One set of nine ligature-cutting pliers furnished by each of three major orthodontic equipment firms (Dentaurum®, ETM®, RMO®).
- 0.010 inch stainless steel orthodontic ligature wire (Ormco®, Dentaurum®).
- Control sample: one pair of pliers was chosen at random from the set furnished by each firm.
- Experimental sample: the eight remaining pliers of each set were simultaneously subjected to twenty successive full surgical sterilisation procedures. Each sterilisation cycle included three steps:
 - Preliminary disinfection with Ampholysine Plus® 5%. 15 minutes.
 - Machine washing and disinfection in a HELPEX HAMO® T-21 machine (washing with Neodisher® MEDICLEAN, rinsing with Neodisher® MEDIKLAR, hot-air drying). 1 hour.
 - Final sterilisation in a SHAERER ECOSTAR® steriliser. The pliers were brought to a temperature of 134°C maintained for 20 minutes before gradual cooling. 1 hour.

After completion of each of the twenty successive sterilisation procedures, each pair of pliers was used to cut twenty ligature wires. The pliers were then examined at x50 magnification with an Olympus VANOX-T optical microscope and the cutting edges photographed with an Olympus DP 11 camera.

RESULTS:

- Changes in metal coloration appeared at the cutting edges of a variable number of pliers furnished by each firm from the very first cycles (fig. 2). This increased with the number of sterilization cycles.
- The cutting edges of most pliers became progressively blunted.

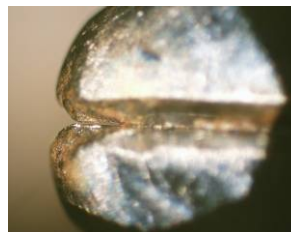


Fig. 2: ETM® n°7 plier after 20 cycles (x50 magnification)

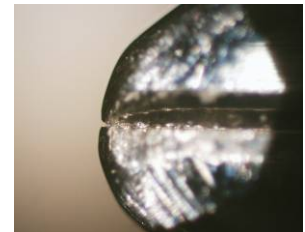


Fig. 3: ETM® control plier after 20 cycles (x50 magnification)

DISCUSSION & CONCLUSIONS:

Standard surgical sterilization affects orthodontic ligature-cutting pliers. Metal corrosion is induced and resistance of the cutting edges to wear is reduced.

This study suggest that each step of the sterilization cycle should be investigated in order to show exactly what part it plays in the observed shortening of the life-time of wire-cutting pliers. Adapted sterilization procedures may have to be developed.

REFERENCES:

- ¹ French circular DGS/5C/DHOS/E2 n°2001-138 of 14 March 2001 relative the precautions to be taken during care with a view to reducing the risks of transmission of non-conventional transmissible agents– 14p. ² SFODF, Lexique de terminologie, 2004 – 30p.