Biofilm Accumulation in New Flexible Gastroscope Channels within 30 Days in Clinical Use

Mariusa Gomes Borges Primo[1], Dayane de Melo Costa [2], Simone Vieira Toledo Guadagnin [1], Adriana Silva Azevedo [1], Michelle Alfa [3], Karen Vickery [4], Lara Stefânia Netto de Oliveira Leão Vasconcelos [5], Anaclara Ferreira Veiga Tipple[2]

[1]Clinics Hospital, Federal University of Goias (FUG), Brazil; [2] Faculty of Nursing, FUG, Brazil; [3]University of Manitoba, Canada; [4]Macquarie University, Australia; [5]Institute of Tropical Pathology and Public Health, FUG, Brazil.

Dayane Costa
daynesaga@yahoo.com.br

Background

Flexible endoscopes are complex-design reusable devices, with long and narrow channels, making reprocessing difficult. Biofilm formation is a key factor for persistent contamination, as it protects microorganism against cleaning and disinfection agents. The aim of this study was to assess the accumulation of biofilm on the inner surfaces of new flexible gastroscope channels after 30 days of patient-use and full reprocessing.

Methods

Three flexible gastroscopes (FG) (GIF–Q150, Olympus™) with new internal channels (Teflon™) were subjected to 30 days of clinical use and reprocessing by trained nursing personnel, using a revised reprocessing protocol, at the endoscopy service of a Brazilian teaching hospital (235 beds). The reprocessing protocol included: pre-cleaning; manual cleaning; automated cleaning and disinfection - 2% Glutaraldehyde; manual drying (forced-air drying) and alcohol rinsing, and storage in vertical position in exclusive cabinets. Then, internal channels were removed from the three patient-ready FG (three biopsy, three air, three water and three air/water junction channels), and the inner surface subjected to bacteriological culture (~30 cm) (n=9) and Scanning Electron Microscopy (SEM) (~1 cm) (n=12). Air/water junctions (~1 cm) were subjected to SEM only.

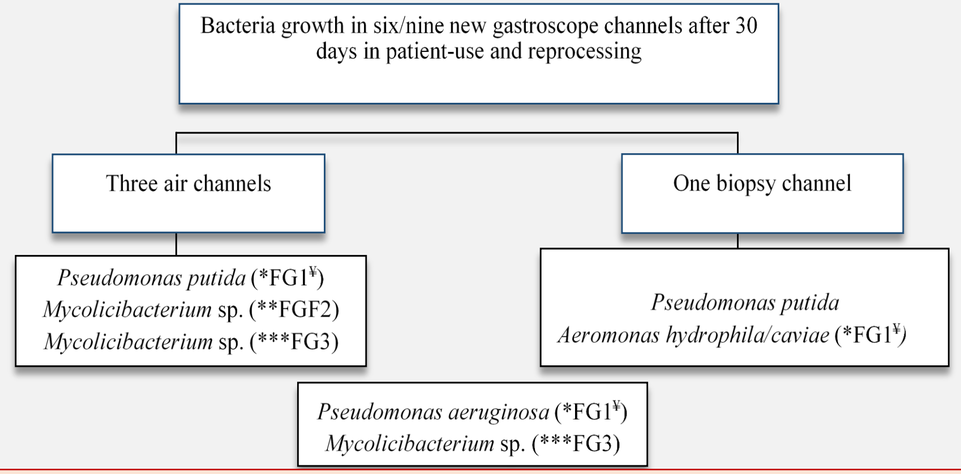

Fig 1. Distribution of bacterial growth and genera/species identified in new flexible gastroscope channels after 30 days of patient-use and reprocessing at the endoscopy service of a large Brazilian teaching hospital. *FG1: flexible gastroscope nº1 **FG2: flexible gastroscope nº2 ***FG3: flexible gastroscope nº3. ¥Moisture was visually detected inside the channels during longitudinal cutting for SEM.

Results

The average of use/reprocessing of the FG was 60 times. Bacterial growth was detected in 6/9 channels (three from FG#1 showed residual moisture) and seven bacterial isolates were recovered, most from air or water channels (Fig 1). Inner surface structural damage was identified in 11/12 channels by SEM. Extensive biofilm was detected in air, water and air/water junction channels (7/12) (Fig 2). Residuals matter were detected in all channels (12/12).

Conclusion

The short timeframe before damage and biofilm accumulation in the channels were evident and suggests that improving endoscope design is necessary, while better reprocessing methods and channel maintenance needs to be investigated in detail. Improving design, maintenance and reprocessing of endoscopes will ensure its safe use.

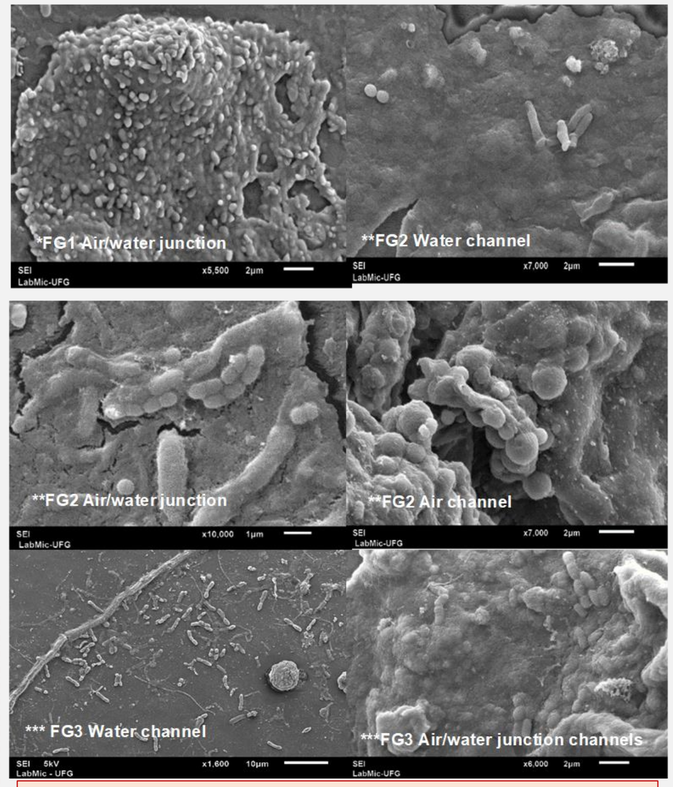

Fig 2. Scanning Electron Micrographs showing extensive biofilm, containing bacilli/rods and/or cocci shape bacteria, on the inner surface of new flexible gastroscope channels after 30 days of patient-use and reprocessing at the endoscopy service of a large Brazilian teaching hospital. *FG1: flexible gastroscope nº1 **FG2: flexible gastroscope nº2 ***FG3: flexible gastroscope nº3.