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APPARATUS

Microbial contamination of gum elastic bougies

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Summary

The gum elastic bougie is a simple device that is used to assist in the management of the difficult intubation. It is not uncommon for a bougie to be re-used many times. This study investigated the incidence of microbial contamination of the bougies in one hospital. Potentially pathogenic organisms were identified both on the bougies and in their storage containers. This has implications for their cleaning and maintenance, and raises the question as to whether we should replace them with single-use, disposable devices.

Keywords *Equipment*: bougie. *Infection*: sterilisation.

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The gum elastic bougie (SIMS Portex Ltd) is a valuable device used by the majority of anaesthetists in the initial management of unsuspected difficult intubation, or when anatomical factors prevent the tracheal tube from being directed into the trachea. Macintosh first described it in 1949 [1]. It has a woven polyester base with a resin coating, that combines stiffness with flexibility at body temperature [2]. The smooth distal end is angled at 40°, 3.5 cm from the tip.

The lubricated bougie is directed posteriorly to the epiglottis, with the tip angled anteriorly and the tracheal tube is passed over it into the trachea. It is possible for the bougie to be advanced as far as the small bronchi and indeed, this 'hold-up' is recognised as a sign of successful tracheal placement [3]. The bougie, therefore, has the potential to introduce pathogens into the respiratory tract.

The manufacturers recommend that bougies are washed thoroughly in an aqueous solution of neutral soap after use to remove all visible soiling [2]. Before re-use they should be immersed in a liquid disinfectant or undergo formal sterilisation. Between uses, the bougie should be stored in its original container and protected from light, and they should be re-used a maximum of five times.

It is common practice simply to 'clean' the bougies with soap and water and store them upright (either angled tip uppermost or vice versa) in an unsterile open container. This study was designed to assess qualitatively the degree of microbial contamination on gum elastic bougies in one hospital.

Methods

A single observer (J.M.C.) obtained microbiological swabs (moistened with sterile water) from both ends of the bougies, and their corresponding containers, at various sites from within the hospital. These areas included all operating theatre suites and recovery areas (including the resuscitation trolleys), day-case unit, critical care unit, accident and emergency, endoscopy suite, cardiac catheter suite and one surgical ward. Appropriate care was taken to avoid handling the parts of the bougie from which swabs were to be taken. The swabs were plated onto agar gel by laboratory technicians. Gum elastic bougies had only recently been introduced onto the resuscitation trolleys on general medical and surgical wards, therefore the majority were unused at the time of the study.

Results

In total, 33 bougies were swabbed, of which 17 were stored vertically in a container. Nine were in their original

Table 1 Microbial contaminants and the number of sites identified with that particular contaminant under the corresponding site

	Angled tip	Straight tip	Container
Coagulase -ve *Staphylococcus*	5	5	1
Staphylococcus species (not identified)	3	5	1
Diphtheroids	1	1	
Bacillus species	2	1	
Micrococcus		1	
Coliform	1		1
Fungus (not specified)	1	1	1

container (two were stored in one container). In the other eight cases the container was from a Seldinger arterial line kit. The other 16 introducers were stored flat, either exposed on a work surface or a tray (11/16), or in the original container (5/16). Of those bougies stored vertically (17), 11 were with the angled tip uppermost. For logistical reasons, only the vertical containers (16) were swabbed.

No formal record was kept of the number of times each introducer had been used. The microbiological results are summarised in Table 1. In total, 18 of the 33 bougies (55%) were contaminated with organisms either at one or at both ends. Four bougies grew organisms from both ends.

There were five bougie tips that grew two organisms; two of these cases from the angled tip, i.e. the patient end. The organisms were coliforms and staphylococcus, and bacillus and coagulase –ve staphylococcus.

Only four of the containers examined (25%) showed microbial growth.

Discussion

The care and cleaning of laryngoscopes is well established. All laryngoscopes have the potential to harbour debris and act as sources of cross-infection. The risk with the gum elastic bougie must be considered as high, particularly in view of the fact that they penetrate further into the patient's respiratory tract.

No formal record is kept of their use, therefore each bougie is probably used many times. Since they function perfectly well after five uses, is the indication for discarding them an infection issue or does it relate to actual physical deterioration? With repeated use, localised areas of weakness can develop in the outer layer of the bougie. In many hospitals they are only replaced when actual damage becomes visible.

There did not appear to be any obvious relationship between the position in which the bougies were stored in a container and the likelihood of them becoming contaminated. It is important to remember that, in an emergency situation, it is not uncommon to insert the straight end of the bougie into the trachea accidentally. This study has shown that both ends are potential sources of infection. In view of the containers possibly harbouring organic debris, should we store the introducers with the angled tip uppermost? However, this position, with the angled tip exposed to the environment, may result in excessive handling by operating theatre personnel.

Although the study was restricted to bacterial (and fungal) contamination, there is an obvious risk of viral transmission, particularly if residues of blood remain in the damaged outer coating. In a recent study, residual blood contamination was found on 40% of apparently clean laryngoscope blades awaiting re-use [4]. More importantly, however, alcohol, Betadine™ and Hibiscrub™ are not considered acceptable for disinfection of blood-borne viruses [5]. With the recent discovery of new variant Creutzfeldt-Jacob disease agent in tonsillar tissue [6], it should also be appreciated that none of the disinfectants (or standard autoclaving) inactivate prions.

We tend to ignore the potential for cross-contamination from re-used gum elastic bougies and most users are unaware of the recommendations for their cleaning and storage. Microbial contamination has been demonstrated on 45% of bougies or their storage containers. Although a significant number of the organisms were environmental commensals, we have also isolated potentially pathogenic organisms.

Our current practice needs to change. We could adhere strictly to the manufacturer's recommendations for cleaning and regular replacement of bougie and container. Alternatively, they could be sterilised between patients. Perhaps a better solution would be to use disposible bougies. We expect airways and tracheal tubes to be sterile, single-use items, therefore bougies should be no different. The single-use products are £5.00 compared with £22.87 for the re-usable bougie (SIMS Portex, personal communication). This could be

a cheaper solution, as well as being good clinical practice.

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