Sterilisation of Laryngoscope Blades

A PRELIMINARY REPORT

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SUMMARY

A simple, effective technique of sterilising laryngoscope blades is presented.

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There must be a serious danger of spreading infection via laryngoscope blades because they may not only produce trauma, but lie near traumatised tissue. An unsterile blade could thus introduce potential pathogens into the pharynx, which could spread to the tracheobronchial tree. Alternatively, a sterile endotracheal tube could pick up pathogens from an unsterile blade which could be introduced directly into the trachea at the time of intubation.

In order to verify that this danger exists, swabs were taken from 8 laryngoscope blades selected at random. These had been well cleaned with soap, water and a brush the previous evening. Cultures were obtained from 7 of these blades. The organisms cultured included *Streptococcus viridans, Strep. faecalis, Staph. pyogenes, Staph. epidermidis* and *Neisseria catarrhalis.*

On reviewing available literature it was found that various methods have been tried to combat this problem. Obviously the most reliable would be the use of disposable anaesthetic equipment—this, however, would be very costly. Autoclaving is undoubtedly the next best method.[1] At our hospital the autoclave is on a 45-minute cycle; this method would therefore require a large number of blades. Soaking of the blades in 70% isopropyl alcohol was tried and abandoned since it affects the cement substance of lensed instruments; wiping with 70% isopropyl alcohol is not 100% effective.[1]

As an alternative, activated aqueous glutaraldehyde (Cidex) was tried. The active ingredient is glutaraldehyde (formula $CHO\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CHO$). After activation the aldehyde group on each end of the molecule reacts avidly with almost all kinds of organic functional groups found in bacteria, spores, fungi and viruses. The substance is activated by adding buffered salt to raise the pH to pH 7,5 - 8,5—once activated it has a shelf-life of 2 weeks. After this time it is recommended that the solution be discarded since the potency decreases. It has no deleterious effect on cement or lens coating of endoscopic instruments.[2] and is non-corrosive. The vapour pressure is almost equivalent to that of water, and it will not evaporate as quickly as the more volatile alcoholic solutions. In a large series no incidence of irritation or sensitivity was reported.[2] A period of 10 minutes is recommended when sterilising instruments for vegetative pathogens (including *Myobacterium tuberculosis, Pseudomonas* and viruses), but 3 hours is required to destroy all resistant pathogenic spores.

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METHOD

Swabs were taken from 30 laryngoscope blades after intubation. They were then soaked in activated glutaraldehyde for 5 minutes, scrubbed with a brush, rinsed under tap water and then dried with sterile gauze. Swabs were then taken from these sterilised blades.

Sterile broth was poured onto the blade. This was soaked up by a sterile cotton wool swab and the blade was then wiped with this swab, especially around the bulb and crevices. At the laboratory this was cultured on a thioglycollate medium (for anaerobic and aerobic organisms) and on a blood plate (for aerobic organisms), and incubated for 24 hours. If no growth was obtained after this period the culture was reincubated for a further 24 hours.

Note: The 5-minute period used for sterilisation is contrary to the manufacturers' recommended time of 10 minutes. The 5-minute period was chosen since it was intended that after extubation the laryngoscope blade should be immersed in the activated glutaraldehyde solution. The patient would then be taken to the recovery room. By the time the anaesthetist returned and prepared the blade for the next case, it was assumed that the time elapsed would be at least 5 minutes. In practice, this time might well be longer but it would not be less.

RESULTS

The results are summarised in Table I.

DISCUSSION

The following facts emerge from Table I:

1. Cultures were obtained from every laryngoscope blade after intubation.

2. The most common organisms cultured were *Strep. viridans* (73%) and *N. catarrhalis* (50%).

3. Of a sample of 30 blades, treated as outlined, a light growth was obtained in only 2 cases. Sample 1 had a light growth of *Staph. epidermidis* which might have been due to inadequate sterilisation or simple contamination (e.g. touching the blade inadvertently); and sample 19

TABLE I. ORGANISMS CULTURED

Sample No.	*Strep. viridans*	*Staph. epidermidis*	*K. pneumoniae*	*Strep. faecalis*	*N. catarrhalis*	*Staph. albus*	*Staph. pyogenes*	*P. mirabilis*	*E. coli*	*Strep. pneumoniae*	After 5 minutes, soaking in glutaraldehyde
1	1+	1+									1+ growth *Staph. epidermidis*
2	1+	1+									No growth
3	3+										No growth
4			2+								No growth
5				2+							No growth
6	3+	3+									No growth
7	3+										No growth
8	3+				3+						No growth
9	+				+						No growth
10	3+				3+						No growth
11	3+										No growth
12	3+				3+						No growth
13	3+				3+						No growth
14					3+						No growth
15	3+										No growth
16	3+				3+	3+					No growth
17	3+				3+						No growth
18	3+				3+		3+	3+			No growth
19	3+				3+						1+ growth *Strep. viridans*
20	3+				3+						No growth
21							1+				No growth
22		1+									No growth
23									3+		No growth
24									3+		No growth
25									3+		No growth
26	+		3+		+						No growth
27	+				+						No growth
28	+				+						No growth
29	1+				1+						No growth
30	3+									3+	No growth
No. of times organisms cultured	22	4	2	1	15 (Total 52 organisms)	1	2	1	3	1	
% of times	73	13	7	3	50	3	7	3	10	3	

Key: 1+ light; 2+ moderate; 3+ heavy; + growth not stated.

had a light growth of *Strep. viridans*, which was also the most common organism cultured (73%), and appeared to be the organism most susceptible to glutaraldehyde. The presence of the organism post-sterilisation might therefore be due to inadequate scrubbing. The aim of scrubbing was to remove most of the particulate matter, and could well have been more meticulous.

4. The total number of organisms cultured was 52. Sample 18 was particularly heavily contaminated.

Since the conclusion of this study, this method of sterilisation is being tried at our hospital. Swabs will be taken to assess the effectiveness of sterilisation in actual operation. With more meticulous scrubbing and a longer period of sterilisation, the technique may well prove to be 100% effective.

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