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Contamination of Anesthetic Machine with Common Method of Disinfection in Operation Room*

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Abstract: The objective of this study was to determine the rate of contamination of anaesthetic machine after using cetrimide -C as a disinfectant solution. In this descriptive and analytical study, 48 samples of the two parts of anaesthetic machine were taken in 6 operation rooms of Babol Shahid Beheshti hospital. Sampling from the parts before and after sodalime was taken at the stages before and after washing with cetrimide-C as a disinfectant solution (10%). Data was analysed by chi-square test. Washing with Cetrimide-C as disinfection solution (10%), are not so effective in the decrease of contamination of medical equipment. According to the results, from where the samples were taken before sodalime at the stage before washing 16.7% of samples and after washing 19.4% contaminated to bacteria. Also, from the parts where the samples were taken after sodalime at the stage before washing 37.5% of cases and after washing 33.3% contaminated by bacteria that there was not statistically significant difference. According to the results, there was a bacterial contamination in the anesthetic machines at the stage before and after washing and it indicates that common method and using Cetrimide-C as a disinfectant solution with substandard concentration are not so effective in the decrease of contamination.

Key words: Anesthetic machine, disinfectant, contamination

Introduction

Numerous factors can role in transmitting infection before, during and after operation in patients under surgical operation. Epidemiologic studies have shown anesthetic equipment role in developing infection during and after operation. Anesthesiologists and patients under general an aesthesia whether affected to infected disease or healthy carriers can easily be infection transmit ion factor to the others. This infection may start from a simple angina and improving to a deadly bronchopneumonia (Dripps *et al.*, 1998; Aitkenhead and Smith, 1990; Miller, 2006). Anesthetic facilities include trachea tube, face mask, Air way, laryngoscope blade and in anesthetic machine, respirator, Tubes, air storage bag, air valves and sodalime can be infection Transmission factor (Stoelting and Miller, 2000; Dorsch and Dorsch, 1998; Jean, 1976). Using contaminated anesthetic equipment can propose as a potential source of contamination in patients under surgical operation. During anesthesia and slow and quiet respiration, some bacteria's go out of patient's air ways and cause contamination of anesthetic machine respiratory system. Therefore should always assume that used anesthetic facilities are contaminated and for this purpose it is necessary sufficient facilities be available for use and other facile should exactly disinfect. The best way for preventing infection is use of once use trachea tube, air way, hose pipes and other rubber parts related to anesthetic machine for every patient and then destroying them (Miller, 2000; Stoelting and Miller, 2000).

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Nowadays, these items abundantly offer in market and only problem in consuming these products is their high price. So we should use various and safe sterile and disinfection methods. Some infectious organisms that can transmit from patients to anesthetic machine include fungus, *Bacillus*, virus, protozoa and spores of bacteria. Anesthesiologists can decrease of distributing, contamination by washing and disinfecting various parts of anesthetic equipment (Stoelting and Miller, 2000; Davidson and Wylie, 1984). Therefore, it is clear that without exact cares to epidemiologic studies anesthesiologists can not play basic role in controlling infection. The aim of this study is to determine the contamination rate of anesthetic machine after washing with Cetrimide-c as a disinfectant substance.

Materials and Methods

This (descriptive and analytical) profile study was accomplished by sampling of anesthetic machines in 6 operation rooms of Babol shahid Beheshti hospital in Mazandaran province. Forty eight samples was taken before washing namely on Wednesdays afternoon, after finishing weekly elective surgical operation (for reaching to maximum contamination rate) and 36 samples after weekly washing namely on Wednesdays afternoon (by assuming minimum contamination in this stage). Because of performing some emergency surgical operations immediately after washing anesthetic machine, sampling in all stages after washing was not possible. Weekly washing of anesthetic machine regularly was done by using Cetrimide-c as a disinfectant solution on Thursday morning. Taking samples by sterile swab was done for preventing contamination of suspended bacterial factors in air with complete regard to points and by using spirit lamp. Sampling from the two parts of anesthetic machine was taken at stages before and after washing namely before and after Sodalime. Then samples was immediately was cultured in blood agar culture that previously the place of sampling on it had been defined by exact label. Cultured samples transmitted to microbiology part and was considered in terms of existing bacteria the type of bacteria was recognized by different environment and warm painting if bacteria grew. The findings was analyzed by chi-square test.

Results

The results show that, from 48 sampling was taken of anesthetic machine in 6 operation rooms from the parts before soda lime at the stage before washing, in 40 cases (83.3%) the results of laboratorial surveys was negative and 8 samples (16.7%) had bacterial contaminatio. The maximum (8.3%) and minimum (2.1%) contamination had related to negative coagulate staphylococcus and bacillus bacteria, respectively.

Likewise, the achieved findings of anesthetic machines from where after Soda lime at the stage before washing showed that of 48 sampling, 30 samples (62.5%) in laboratorial surveys had been negative and 18 cases (37.5%) in surveys had been positive. Also, in this stage the maximum and minimum contamination had related to negative coagulas staphylococcus and bacillus, respectively (Table 1). The achieved findings from 36 sampling were taken before Sodalime at the stage after

Table 1: Percentage distribution of bacterial contamination from where after Sodalime at the stage before washing (n = 48)

Times of contamination	Type of contamination
1	<i>Staphylococcus aureu</i>
1	<i>Bacilli</i>
2	<i>Enterobacteria ceae</i>
5	<i>Diphtheroid</i>
3	<i>Pseudomonas aeruginosa</i>
2	<i>S. aureus, Diphtheroid</i>
4	Negative coagulase <i>Staphylococcus</i>
18	Total

Table 2: Percentage distribution of bacterial contamination from where after sodalime at the stage after washing (n = 36)

Times of contamination	Type of contamination
1	<i>Staphylococcus aureu</i>
1	<i>S. aureus, Pseudomonas</i>
1	<i>Enterobacteriaceae</i>
3	<i>Diphtheroid</i>
4	<i>Pseudomonas aeruginosa</i>
1	<i>S. aureus, Diphtheroid</i>
1	<i>Diphtheroid, Bacilli</i>
12	Total

washing indicate bacterial contamination in the results of negative laboratorial surveys and in 7 sample (19.4%) the maximum (13.8%) and the minimum (5.6%) contamination had related to negative coagulase staphylococcus and staphylococcus Aureus, respectively (Table 2).

Likewise of total 36 sampling were taken from where after sodalime at the stage after washing in 24 sample (66.7%) the results of laboratorial surveys was negative and in 12 cases (33.3%) there was bacterial contamination that maximum (11.1%) contamination had related to pseudomonas aeruginosa and minimum (2.8%) contamination had related to *Diphtheroid*, *Staphylococcus* and *Bacilli*. Analyzed data show that, there is not meaningful relation between bacterial contamination rate at the stage before and after washing.

Discussion

The results of survey indicate bacterial contamination at the stage before and after washing and show that washing with 10% Cetrimide-c solution has not considerable effect on decreasing contamination rate and even on 9 sampling in spite of negative labratorial results has been contamination at the stage before and after washing lack of relation between bacterial contamination rate at stage before and after washing illustrate in decrease of contamination after using 10% cetrimide-c as a disinfectant substance.

Considering that, most separated bacterias are opportunist bacterias and by considering to special terms of patients' body immune system during surgical operation and anesthesia that make them ready for affecting to infectious diseases, these bacterias can be dangerous for patients for example, *Pseudomonas aeruginosa* bacteria is one of main factors in producing hospital infections that can lead to hard diseases like pneumonia. During done surveys in 2000 in two Bandar Abase Hospitals, 85.5% of taken samples from anesthetic machines in surgical rooms were contaminated to bacteria that maximum contamination had related to *Staphylococcus* bacteria. Also, contamination rate of anesthetic machines in next surgical room was 70% that it's maximum contamination had related to *Pseudomonas* and *Bacilli* (Anonymous, 2000).

Bacterial contamination with high percentage in anesthetic machines in two mentioned hospitals indicate insufficient effect of common disinfectant solutions in two mentioned hospitals. Also in present study anesthetic machines was contaminated to pathogeny bacterias like *Staphylococcus aurous* and *Pseudomonas aeruginosa* that the results of this study in terms of contamination prevalence correspond to achieved results of Bandar Abas province hospitals. Also, in various reports of other worlds, have pointed to contamination of anaesthetic machine during general anaesthesia.

On the basis of a study was accomplished by Langevin *et al.* (1999), *Staphylococcus aureus*, *Pseudomonas aeruginosa* and Tuberculosis micro bacterium was obtained from respiratory system of anesthetic machines. With done studies appear that method of disinfection with common solutions like cetrimide-c by no means gurantee being sterile different parts of anesthetic machine but using stronger disinfectant solutions like Cidex or once use facilities is better than disinfect anesthetic facilities.

A research in 1982 defined that use of once use facilities is economically cost effective. Because facilities with more than once use in addition to clearing and sterling cost, have storing and collecting cost (Daggan *et al.*, 1999).

In a survey that was accomplished by Hogarth (1996) and Daggan (1999) about effect of using once use facilities in anaesthetic machine on decreasing contamination rate was concluded use of once use facilities can be effective in decreasing bacterial and viral contamination. Also, these two studies indicated that bacterias can transmit by patients' respiration to anesthetic machine (Hogarth, 1996; Russel and Biebuyck, 1997). So, as patients under general anesthesia are much more sensitive to bacterial contamination and growing bacterias such as *Staphylococcus aureus* and *Pseudomonas aeruginosa* in this study suggest for washing surgical room equipment rather than 10% cetrimide-c as a disinfectant solution should use stronger disinfectant solutions with standard viscosity and for as possible should use once use facilities. Because once use facilities more secure health of patients and would prevent of consequences may occur for unsuitable sterling.

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