A new method of elimination of endotracheal tube biofilms by sodium metasilicate solution

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Background: Biofilm formation on endotracheal tubes is a common phenomenon in ICCU/ITU patients and it leads to very high morbidity and mortality rates. Thus we should search for newer physicochemical methods to alleviate biofilms from endotracheal tubes. The aim of this study was to find out changes of biofilm scores on endotracheal tubes after application of sodium metasilicate(4g/dL). Biofilm scores were calculated by safranin staining method. Culture examination was also done to find out any organism/s present in the biofilms.

Methods: We investigated degree of biofilms on 21 endotracheal tubes in patients admitted in ICCU/ITU in a tertiary care hospital of Kolkata and then we treated those biofilms with a solution of sodium metasilicate(4g/dL). Biofilm scores were calculated by safranin staining method. Culture examination was also done to find out any organism/s present in the biofilms.

Results: Biofilms were present in 95.23% of the endotracheal tubes. The average score of biofilms on the endotracheal tubes were 2.333±0.856±0.187 and after treatment with sodium metasilicate solution it was decreased to 0.666±0.658±0.144 which was found to be highly significant at 0.0001 level. However, when we considered biofilm formation according to two common isolates – Klebsiella pneumoniae and Pseudomonas aeruginosa, then we found that decrease of biofilm score in case of P. aeruginosa was not significant (t-value=±1.467, not significant even at 0.05 level). Culture results showed isolation of K. pneumoniae, P. aeruginosa in 8 and 4 endotracheal tubes respectively, remaining culture reports of 9 tubes showed no growth of any microorganism possibly due to ongoing effective antibiotic treatment.

Conclusion: The presence of biofilm in 95.23% endotracheal tubes clearly suggests that Biofilm formation is a common phenomenon on endotracheal tubes in ICCU/ITU patients and treatment with sodium metasilicate solution may be an effective method of elimination of biofilm from ET tubes.

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