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Letter to the Editor

Clinical Observation on the Disinfection of Turbine Water System to Minimize Postoperative Complications of Minimally Invasive Tooth Extraction

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Dear Editor-in-Chief

With the development of minimally invasive tooth extraction, the incidence rate of iatrogenic cross infection is increasing. Hence, the present study was carried out in order to a) develop a new, feasible disinfection strategy to be used in high-speed turbine and 3-function sprayer water systems and b) assess the clinical significance of newly developed disinfection strategy. A total of 178 patients who had minimally invasive tooth extraction in Stomatological Hospital of Xuzhou, China from June 2013 to 2014 were selected prospectively. The patients were divided into two groups namely control and observation each consisted of 89 patients. The sterile distilled water was used in control whereas mixture of 0.5% chlorhexidine and 95% ethanol was used in observation group to rinse turbine water system during tooth extraction. This study was approved by Ethics Committee of the hospital and informed consent was obtained from patients or their family members.

Lidocaine was used as local anaesthetic and a specialized turbine drill, which was disinfected as described (1) before use. In brief, about 6 ml of disinfectant solution (0.5% chlorhexidine and 95% ethanol) was poured into the water storage tanks of turbines (YK-4A high-speed turbine dental engine, Beijing Surgical Instrument Factory, No.691). Water storage tanks were shaken so that the disinfectant could bestrew the inside. The same procedure described above was adopted for patients of control group, but instead of disinfectant sterile distilled water was used.

In total, 6 ml of liquid from three discharges each with 2 ml were collected in a sterile tube. Then, they were serially diluted in 0.9% NaCl and cultured on nutrient agar. VITEK automatic microbial identification system was used to identify the microorganisms grown on the nutrient agar. The results were analyzed by SPSS 19.0 (SPSS Inc., Chicago, IL, USA). The '*t*' and χ^2 tests were applied. A *P* value of < 0.05 was considered statistically significant.

Of the 89 patients in the observation group, 39 were male. Their age ranged from 24 to 56 with an average of 43.5±10.2. The number of extracted tooth was from 1 to 5 with an average of 2.2±1.1. In the control group, there were 42 male. Their age ranged from 22 to 58 yr with an average of 42.8±12.5. The number of extracted tooth was from 1 to 4 with an average of 2.1±0.8.

The distribution of microorganisms before tooth extraction in observation and control groups was similar ($P > 0.05$). However, after tooth extraction the number of microrganisms was decreased in both groups. The decrease was more prominent in observation group than control group ($P < 0.05$, Table 1). The total washing time (20.27±4.69) and amount of blood loss (6.29±1.38) was significantly lower for patients in observation group in comparison with total washing time (31.18±6.58) and

blood loss (18.33±2.30) in patients of control group ($P < 0.05$). The incidence of post-operative complications such as infection, bleeding and swelling were significantly decreased in observation group than control group ($P < 0.05$, Table 2). Nowadays, 3-function sprayers and high-speed turbines frequently used in clinical setting produce much pressure as soon as they stop operating so that microorganisms in patients' oral cavities will be reabsorbed into water pipes.

Table 1: Distribution of microrganisms in observation and control groups

Groups	Discharge stage	Microrganisms (mean±SD)		
		***Staphylococcus* sp.**	***Actinomycetes* sp.**	***Streptococcus* sp.**
Control	Before extraction	25.87±5.42	19.85±6.75	20.38±8.47
	First 2 ml	24.29±6.78	18.47±4.93	19.37±5.33
	Second 2 ml	13.17±4.39	8.21±3.27	10.24±3.35
	Third 2 ml	6.25±1.58	5.35±1.77	5.86±1.39
Observation	Before extraction	26.42±7.06	20.43±8.24	21.47±9.32
	First 2 ml	10.35±2.27*	6.22±1.36*	5.51±1.46*
	Second 2 ml	4.31±1.33*	2.95±0.31*	2.88±0.21*
	Third 2 ml	1.15±0.28*	0.66±0.44*	0.81±0.22*

Microrganisms in pipes adhere to it at certain place and multiply, subsequently will enter into another patient's oral cavity through the water supply and give rise to new infection (2-4). In this study, *Staphylococcus* sp, *Actinomycetes* sp and *Streptococcus* sp were seen even after three discharges each with 2 ml of sterile water in the control group. This indicates that, the built-in filtration of turbine water systems were inefficient in preventing or reducing the incidence of iatrogenic infections.

Table 2: Incidence of postoperative complications

Groups	Patients *n*	Infection *n* (%)	Bleeding *n* (%)	Swelling *n* (%)	Total incidence *n* (%)
Control	89	7 (7.87)	3 (3.37)	5 (5.62)	15 (16.85)
Observation	89	3 (3.37)	2 (2.45)	4 (4.49)	9 (10.11)
$\chi 2$					3.526
P					0.021

The same turbine water system when disinfected with chlorhexidine and 95% ethanol caused a remarkable decrease in the number microrganisms, ultimately reduced the postoperative complications like infection, bleeding or swelling largely.

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The authors declare that there is no conflict of interest.

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