

Discussion on cleaning method of ophthalmic instruments contaminated by viscoelastic agents

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[Abstract] Objective: To investigate the cleaning method and effect of ophthalmic instruments contaminated by viscoelastic agents. **Methods:** The ophthalmic instruments contaminated by viscoelastic agents were divided into two groups. The control group was cleaned by ultrasonic cleaner and fully automatic cleaning and disinfecting device. On the basis of the control group, 3% hydrogen peroxide solution was added for cleaning. The detection method was used to detect the cleaning quality of the two groups of instruments using the protein residue cleaning test rod. **Results:** The experimental group and the control group were 95% and 75%, respectively. The cleaning rate of the group was significantly better than that of the control group, and the difference was statistically significant ($p < 0.01$). **Conclusion:** The quality of the ophthalmic instruments contaminated with viscoelastic agents after cleaning with 3% hydrogen peroxide solution was significantly improved compared with the users.

[key words] contaminated by viscoelastic agents; ophthalmic instruments; cleaning methods;

The viscoelastic agent (sodium hyaluronate) used in ophthalmic microsurgery is a simple high-molecular substance without antigenicity. It is elastic and highly viscous, has no obvious toxicity and inflammation, and its main component is transparent. Sodium carbonate, chondroitin sulfate, methyl cellulose, etc., can be injected into the tissue cavity to fill, protect, lubricate, etc., thereby improving the quality and safety of surgery. It has been widely used. Microsurgery such as intraocular lens implantation, penetrating keratoplasty, and ocular trauma, but currently there is no good cleaning effect on devices contaminated with viscoelastic agents, and there is a hidden danger of increasing the incidence of tuss. The cleaning quality, this study was cleaned with 3% hydrogen peroxide solution before routine cleaning, so the cleaning quality has been improved, as reported below:

1 Materials and methods

1.1 General Information 200 pieces of ophthalmic instruments contaminated with viscoelastic agents were selected for research and analysis. 200 instruments were divided into 2 groups, 100 in each group, which were control group and experimental group respectively.

1.2 Cleaning method Ultrasonic cleaner, automatic cleaning and sterilizing device are used as cleaning equipment, alkaline cleaning agent is used as cleaning agent, and protein residue cleaning test rod is used for cleaning effect detection.

1.2.1 Control group cleaning process 1 rinse the running water for at least 5 s. 2 brushing, according to the specifications, shape, material, etc. of the device to choose different brushing tools, such as the lumen of the lumen device need to use a pipe brush to scrub, the surface of the instrument can be wiped with a non-floating cloth. After the brushing is completed, the lumen is flushed with a pressure water gun, and the flushing end is flushed from the opposite clean end. The flushing time should be greater than 10 seconds. 3 The instrument after initial washing is placed in an ultrasonic cleaner for ultrasonic cleaning (the ultrasonic frequency should be 100KHZ), and the time should be 5min. The cleaning time can be extended according to the pollution of the equipment, and should not exceed 10 minutes. 4 Put the instrument into a fully automatic washer-disinfector for cleaning.

1.2.2 The cleaning process of the experimental group is the same as that of the control group. After step 1, add 3% hydrogen peroxide solution to scrub in step 2, then ultrasonically clean, and finally put the device into a fully automatic cleaning and disinfecting device for cleaning.

1.3 Cleaning effect monitoring The cleaning effect was sampled after the mechanical cleaning procedure was completed and detected using a protein residue cleaning test rod. After testing the cotton swab moist moisturizing agent, the part of the most vulnerable part of the device (such as the cavity of the injected viscoelastic agent) is sampled by rotating and rubbing, and the sampled cotton swab is inserted into the cleaning test rod to be oscillated and placed at 37 ° C. The culture vessel was incubated for 10 min, 15 min, 30 min, and 45 min, and the control color of the comparative test rod was observed. According to the discoloration result, "-" and "+" indicate negative and positive. Green is clean and qualified with "-"; gray, lavender, purple are all unqualified^[4], showing a gradual increase in protein residues, followed by "+", "++", "+++ "+" said.

1.4 Statistical methods The data were analyzed by spss19.0 statistical software. The chi-square test was used for the count data. The difference was statistically significant at $p < 0.01$.

2 Results

The cleaning rate of the experimental group and the control group of the two groups was 95% and 75%, respectively. The cleaning rate of the experimental group was significantly better than that of the control group, and the difference was statistically significant ($p < 0.01$). See the table below.

Comparison of the cleaning rate of 2 groups

Group	Number of processors	Number of qualified	Number of unqualified
Experimental group	100	95	5
Control group	100	75	25

Note: The difference in the cleaning rate of the two groups was statistically significant ($\chi^2 = 14.16, p < 0.00$).

3 Discussion

3.1 The success of ophthalmic surgery is closely related to the effect of disinfection and sterilization of instruments. The cleaning method and quality of surgical instruments are the key to ensure the success of disinfection and sterilization of instruments, and are an important means to prevent nosocomial infections. Because of any residual surgery The organic matter on the device hinders the penetration of the sterilization medium and causes the bacteria to form a protective film and causes sterilization failure. Therefore, thorough cleaning is the prerequisite for sterilization.

3.2 The cleaning method used in this study is ultrasonic cleaning device + fully automatic cleaning and sterilizing device. Ultrasonic cleaning device uses ultrasonic waves to oscillate in water to produce "cavitation effect", so that the surface of the article can be quickly peeled off, thereby purifying the surface of the object. The automatic cleaning and sterilizing device sprays the cleaning liquid onto the surface of the instrument through the spray arm and washes the surface of the instrument to achieve the purpose of cleaning. The alkaline cleaning agent is a non-foaming cleaning liquid mainly composed of high-quality composite surfactant. It can effectively remove dry stains and denatured protein residues. It contains a variety of enzymes to quickly and effectively decompose protein, fat and other substances in human secretions. It has good emulsification and decomposition power, and quickly removes pollutants from the surface of the device. However, the viscoelastic agent is in close contact with the device, especially the lumen device. Immediately after use, the device should be immersed in sterile water. Otherwise, it will be difficult to be soaked, brushed or ultrasonically affected by the cleaning solution. It is completely removed.

In recent years, the use of hydrogen peroxide solution for the cleaning of regenerative medical supplies has also been reported. The principle of action is mainly: when hydrogen peroxide solution meets with organic matter, it will rapidly generate a large amount of oxygen bubbles, and the generation of bubbles has an effective mechanism. Cleaning effect, its overflow effervescent effect will loosen the surrounding contact, make the viscoelastic loose, the contact surface is fully exposed, so as to achieve the effect of thorough removal; It is not affected by the ambient temperature, the decomposition product is harmless, has no residual toxicity, is easily soluble in water, and is easy to use. It is easy to be accepted in actual work.

4 Summary

Use 3% hydrogen peroxide solution to loosen the viscoelastic agent before ultrasonic cleaning and automatic cleaning and disinfection. The contact surface is fully exposed, which is good for cleaning. Research shows that after cleaning with 3% hydrogen peroxide solution, it is cleaned. The quality has been significantly improved, reducing the incidence of tuss due to the use of instruments with residual viscoelastic agents, and ensuring the safety of surgical patients.