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A study comparing the effects of rubbing gas-permeable contact lenses with the fingers and a cotton swab during cleaning

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A study comparing the effects of rubbing gas-permeable contact lenses with the fingers and a cotton swab during cleaning

Abstract
The authors conducted a study to see if fewer surface scratches on rigid gas-permeable contact lenses would occur during cleaning if a cotton swab was used instead of the finger (tip/palm) method recommended by the manufacturers. It was observed that while both techniques resulted in surface scratches, the cotton swab method demonstrated fewer scratches overall. It was found that in every case but one, the manufacturer’s recommended cleaning process induced scratches that were both higher in number and severity. It was concluded from our study that longer lens life, better optical clarity and an increased resistance to deposit formation could be long term advantages of cotton swab over finger (tip/palm) cleaning.

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A STUDY COMPARING THE EFFECTS OF RUBBING GAS-PERMEABLE CONTACT LENSES WITH THE FINGERS AND A COTTON SWAB DURING CLEANING.

by

CASEY J. FINN
RON V. CUEVAS

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ACCEPTED BY THE FACULTY OF THE COLLEGE OF OPTOMETRY IN PARTIAL FULFILLMENT FOR THE DEGREE OF DOCTOR OF OPTOMETRY.

JAMES PETERSON, O.D.
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ABSTRACT

The authors conducted a study to see if fewer surface scratches on rigid gas-permeable contact lenses would occur during cleaning if a cotton swab was used instead of the finger (tip/palm) method recommended by the manufacturers.

It was observed that while both techniques resulted in surface scratches, the cotton swab method demonstrated fewer scratches overall. It was found that in every case but one, the manufacturer's recommended cleaning process induced scratches that were both higher in number and severity.

It was concluded from our study that longer lens life, better optical clarity and an increased resistance to deposit formation could be long term advantages of cotton swab over finger (tip/palm) cleaning.

Key Words: Cleaning hard contact lenses, cleaning lenses with fingers and cleaning lenses with Q-tip cotton swabs.
INTRODUCTION

Many manufacturers of contact lenses and eye care practitioners recommend a lens care procedure of rubbing the lenses (after the appropriate cleaner is applied) for 10 to 20 seconds between the forefinger and thumb or between the palm and forefinger.\(^1\) This method of friction cleaning can lead to undesirable surface scratches on the contact lenses.\(^2\) While the lenses are being worn, these scratches are exposed to and collect the oily, proteinacious, and sebaceous secretions of the eye and surrounding structures.\(^3\) Both surfactant cleaners and enzymatic cleaners have been shown to be ineffective in removing such embedded deposits. The accumulation of these deposits over a period of time will impair the optical quality and wettability of the lens surface.\(^4\) This can result in decreased vision, reduced wearing time, and shortened lens life.

A means of reducing the ill-effects of this type of friction cleaning is to utilize a substance which has less abrasive qualities than that which is found on the skin of the finger tips and palms of the hand. A practical, but rarely mentioned, alternative is the ordinary cotton-swab.

It is the intention of the authors to comparatively investigate whether the use of cotton-swabs during the cleaning of rigid gas-permeable contact lenses will demonstrate fewer surface scratches when compared with those encountered
during finger (tip/palm) cleaning. It is our intention to determine if such a cleaning procedure should be recommended to the practitioner and patient alike.
MATERIALS

Lenses: Optacryl (4)
Boston II (4)
Polycon (4)
GP II (4)

Cleaner: LC-65 Daily Cleaner
Johnson & Johnson Cotton Q-Tips

Optical Equipment:

Krieger Mount
Nikon AS-1 Slit Lamp
Nikon F3 Camera
2X Nikon Lens
10X, 7X Loupe magnifier
100ASA Kodachrome Film

Lens Scratches Criteria:

Grade 1  Slight 0-25%
Grade 2  Moderate 25-50%
Grade 3  Heavy 50-75%
Grade 4  Severe 75-100% (All scratches cannot be polished out - need new lens)
METHODS

After receiving the lenses from each manufacturer and before beginning the experiment, the authors screened each lens for surface scratches using a 10X magnifier. Each lens passed our lens grading criteria in that no lens was found to have scratches too deep to polish out. As documented proof, 35mm photographs were taken. Before photographing, each lens was labeled by touching a toothpick dipped in black ink to the front surface. The lens was then mounted on at a time atop the Krieger mount which was clamped to the side arm of the slit lamp. A drop of toothpaste helped to hold the lenses in place and the black dot was oriented corresponding to different hands of the clock which allowed for easier lens identification when they were photographed.

We simulated a 90-day cleaning period by cleaning each lens a total of 30 minutes with LC-65. Eight lenses were cleaned with the palm and forefinger and the other eight using the Q-tip method (Q-tip cleaning of the anterior surface only). After the cleaning process, the lenses were photographed again and graded according to our criteria.
DISCUSSION & RESULTS

Mechanical cleaning of the contact lens is an important step in preventing the build-up of materials in the lens surface. The most common implements used during cleaning are the fingertips and palm. Friction from rubbing the lenses can, over a period of time, lead to warpage and/or scratches. In a study by Dr. Kaopua, 100% of the hard lenses cleaned by friction rubbing showed scratches. Stein and Slatt suggest the use of cotton Q-tips as the most effective technique of friction cleaning hard lenses. In the study by Sagan and Rheam, patients noted an increase in comfort and wearability and an improvement in visual acuity after utilizing Barnes-Hinds' "hands off" lens care system. In this type of cleaning program, the gas-permeable lenses are cleaned by placing them in two separate compartments within an enclosed container which is filled with their daily cleaner. Twisting the top of the cap rapidly back and forth cleans the lenses by taking advantage of the "swishing" action of the cleaner on the lens surface. The lenses are not rubbed by the fingertips and palm nor by cotton Q-tips. It may be of further interest to conduct an experiment whereby one group of gas-permeable wearing patients use the Q-tip cleaning method for three months and another group utilize Barnes-Hinds' "hands off" lens care system. One could then compare the scratches induced by each
regimen, evaluate optical and visual clarity and patient satisfaction and wearing time.

The results of our study were consistent with the studies performed by Dr.s' Kaopua, Stein and Slatt. We conclude that the use of Q-tip cotton swab in the cleaning process does indeed result in fewer surface scratches as compared to the fingertip and palm method of cleaning for all lenses. This could be explained by the type materials composing each lens by their manufacturer. For instance, lenses composed of softer materials could be more prone to surface scratches during friction cleaning. Review of the current literature reveals no information on the relative lens hardness for any of our experimental lenses. Therefore, no conclusions were drawn comparing each type of lens and its susceptibility to surface scratches during the cleaning process.

In this study, GP II lenses showed the most scratches induced by fingertip and palm cleaning while Polycon showed the least amount of scratches using this method. Conversely, both the Boston II and GP II lenses were graded 1.5 with Q-tip cleaning while the Polycon and Optacryl lenses were grade 1 (Graph 1).

Figure 1 shows a typical gas-permeable lens after a three month simulated Q-tip cleaning program while Figure 2 shows an average lens after three months of simulated fingertip and palm cleaning.
Graph 1. Lens scratches induced after three months simulated friction cleaning.
Figure 1  Typical lens cleaned with Q-tips

Figure 2  Typical lens cleaned using fingertip and palm
Patients who utilize the Q-tip method may have several advantages. Fewer surface scratches implies less potential for deposits and growth of bacterial colonies. This would lead to longer lens life, superior optical and visual clarity and reduced patient symptomology. Also, wearing time may be lengthened.

The limitations and variables associated with fingertip and Q-tip cleaning include:

1. Amount of pressure applied to the lens when cleaned.
2. Duration of cleaning period.
3. Hand cleanliness prior to cleaning.
   a. Dirt
   b. Abrasive substances
4. LC-65 Daily cleaner abrasive qualities.
5. Softer materials that are more susceptible to surface scratches.
6. Each persons' callous build-up.
7. Q-tip brand.

Which patients would Q-tip cleaning of lenses benefit especially? People who work mainly with their hands generating callous formation would tend to induce more scratches using the fingertip method of cleaning. People living in areas of low humidity and high dust and/or pollen may benefit from Q-tip cleaning as compared to fingertip cleaning. In addition, dry eye prone gas-permeable wearers may benefit from increased wet-tability and comfort directly related to the Q-tip cleaning method.
CONCLUSIONS

The authors feel that all practitioners should recommend the Q-tip method of cleaning to all gas-permeable wearing patients.
1. Allergan LC-65 Lens Care pamphlet, 1985


7. ANSI American National Standards for accessory solutions used with contact lenses made with conventional hard plastic materials such as PMMA. N.Y., N.Y. The Institute, 1974


10. Honan, P.R. Care and feeding of Paraperm 0-2 contact lenses. Contact Lens Journal 11/1/84 V. 12 No. 11, pg. 18
