

CONTACT LENS BLIND STUDY : ARE DISPOSABLE CONTACT LENSES STILL A VIABLE OPTION FOR “STANDARD” EYES?

In 2009, the Swiss Opticians Association conducted a survey to find out the state of development in the Swiss Optical market. After a long period of gaining acceptance, contact lenses are experiencing a boom in the Swiss market. A substantial 14% of Swiss are currently wearing contact lenses. This means that around 21% of ametropic people here are using contact lenses. Especially younger people are favoring contact lenses to wearing glasses. The market for custom-made contact lenses is declining year-on-year, however. This means that standard disposable contact lenses are gaining share and are poised to overtake the market. The optician still has a major influence on this market. However, this dominance is coming under pressure from an internet-influenced market.

Under these circumstances, does the promoting of disposable, over-the-counter contact lenses make sense? This publication will attempt to answer this question.

“BLIND STUDY” OF CONTACT LENSES

A study conducted in 2009 compares spherical silicon hydrogel contact lenses, which were placed in healthy eyes. This study tested a custom-made silicon hydrogel lens against an over-the-counter disposable SIH. The aim of these tests was to find out which of these two products best adapted themselves to the naked eye and, most importantly, left no indentation effect on the conjunctiva, and that the DK-value of the material was high enough (at least $Dk/t \geq 24$ according to Holden&Mertz) for daily usage. For the author, the comfort of the soft lenses for the test subjects was also a priority.

Among the custom-made SIH lenses, the Orbis Definitive (Swisslens) beat the Air Optik Individual (Ciba Vision), as the Modulus MPa proved to be much lower. Regarding the disposable lenses, Biofinity proved to be clearly superior to Air Optix Aqua (Ciba Vision), Air Optix Night & Day (Ciba Vision) as well as Pure Vision (Bausch & Lomb) in the MPa tests.

FEEDBACK OF THE SUBJECT GROUP

As this study was conducted on “spherical eyes”, the subjects were chosen strictly according to this criteria. The average K-reading was 7.63mm in both eyes. The average corneal diameter was 11.4 in the left eye, and 11.5mm in the right. The average age of the test subjects was 29 years old. The BUT-Test found that 14% of the subjects were under 5 seconds, and 79% was 5-10 seconds; 7% of the subjects were under 10 seconds.

TRIALS

Test subjects wore the Orbis Definitive and the Biofinity lenses in their right and left eyes respectively. The test subjects were not aware which lenses they were wearing in which eye. Hence, this was conducted as a “blind study” of contact lenses.

After insertion of the lenses, the first check-up and subjective comfort tests were conducted. After 5 hours, a follow-up was made. Afterwards, the test subjects were given lenses, which they could wear over a period of 3 – 4 weeks. The final follow-up was the most comprehensive conducted. The subjects

were asked to respond to questions regarding comfort, and how many hours of wearing. The specialist then evaluated the alignment and movement of the contact lens, the moistening of the surface, as well as any alterations or indentation to the conjunctiva with the help of fluorescein.

RESULTS

The study found that the comfort of the Biofinity lens decreased over the course of testing. Despite the fact that 86% of test subjects found the Biofinity lens to be “very comfortable” initially, only 64% reported the lenses to still fit comfortably at the end of the test phase.

The Orbis Definitive fared better overall during the test phase, compared to the Biofinity product – 36% of the testers found the contact lens to be “very comfortable at the end of testing, and another 36% reported that the lens sat comfortably in the eye.

The optimal movement of the Biofinity contact lenses was reported to over time to have decreased, from 93% initially to 86%. The optimal movement of the Orbis Definitive increased from the initial 86% to nearly 100%.

In follow-up analyses, the Orbis Definitive shows significantly less contact lens-induced indentation, or staining. None of the custom-made SIH lens left indentation or staining. To be noted: 50% of Biofinity test subjects were not affected by indentation. The other 50% reported slight-to-strong indentation.

DISCUSSION

One of the main questions posed as a result of this blind study is why the Biofinity was consistently superior to the Orbis Definitive in the comfort tests, however the Orbis Definitive was better when it came to indentation. Despite the fact that the Biofinity lens consistently decreased in comfort, it was still better liked in general than the Orbis Definitive. The reason for this could be because the center-thickness of the Biofinity is much thinner (-3dpt: 0.08mm) compared to the custom-made lens (-3dpt: 0.12mm). Also, the approach of fitting the lenses is different. The custom-made contact lenses are fitted to be more “flatter and more moveable” as opposed to the silicon disposable lens. One of the main reasons for this superior comfort is the edge profile of the Biofinity lens. The tighter-fitting Biofinity lenses were initially more comfortable.

The inferior tear exchange is not normally noticed by the contact lens wearer. The modulus was also not a major factor, however the modulus of the Orbis Definitive (Mpa=0.39) was markedly inferior to the modulus of the Biofinity product (Mpa=0.75). The “Comfilcon A” material used to produce the Biofinity lens is also stiffer than the Orbis Definitive.

The results of the indentation speak for themselves. Here, the Orbis Definitive is unbeatable. In the final checkup, there was absolutely no indentation to be found. A finding which is directly linked to the high quality of the materials, to the customized parameters, and also to the edge profile of the lens. The Biofinity lens already showed staining due to indentation among 50% of the subjects during the first day.

As the correlation between the indentation and comfort could not be understood in the test phase, the profile of the edge needed to be further investigated.

EDGE PROFILE

In order to better comprehend the differences in results regarding comfort and indentation, a study was conducted by Mrs. T. Hübner (FH Jena). She studied the fitting criteria of disposable lenses with regard to their edge profile. In her conclusion, she wrote that the fitting and comfort will be influenced by the edge profile, depending on the lens material and design. Lenses with sharper edges should avoid high modulus, stiffness.

As can be seen in the microscopic photographs below, the edge profiles of both lenses are clearly different. It is clear that the edge profile of the Orbis Definitive is much rounder and smoother than that of the Biofinity, which has a much sharper, thinner profile.

As Mrs. Hübner found in her studies, the sharper lens profile is initially more comfortable, whereas the rounder edges are physiologically acceptable for the long term.

CONCLUSION

Contrary to most documentation on Silicon Hydrogel Contact Lenses, this blind study has not only taken into account the pure "Dk-value" of soft contact lenses, but has also analyzed the fitting performance and above all the edge profile of these lenses. Generally, custom-made lenses should be favored. Despite the fact that the Biofinity lenses were clearly superior with regard to comfort, the Orbis Definitive was unbeatable when it came to preventing the staining of the sclera and for long-term wear.

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