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Does blending an RGP lens move or remove plastic?

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Does blending an RGP lens move or remove plastic?

Abstract

Blending of RGP lenses is widely used to Increase patient comfort while wearing the lenses. The blending process smooths the peripheral curves of the lens, but it has not been determined if this process moved or actually removed the lens material. Twenty fluoroperm 30 bicurve, unfinished lenses were weighed on a Sartorius analytical balance to the ten-thousandth of a gram. The lenses were then modified with a tool that would simulate the blending process and reweighed. The data was then compared using a paired one-tailed t-Test and the results were shown to have a statistically significant lower lens weight. Thus, we determined that blending actually removes the lens material.

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DOES BLENDING AN RGP LENS MOVE OR REMOVE PLASTIC?

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ABSTRACT:

Blending of RGP lenses is widely used to increase patient comfort while wearing the lenses. The blending process smooths the peripheral curves of the lens, but it has not been determined if this process moved or actually removed the lens material. Twenty fluoroperm 30 bicurve, unfinished lenses were weighed on a Sartorius analytical balance to the ten-thousandth of a gram. The lenses were then modified with a tool that would simulate the blending process and reweighed. The data was then compared using a paired one-tailed t-Test and the results were shown to have a statistically significant lower lens weight. Thus, we determined that blending actually removes the lens material.

Key Words: RGP contact lenses, blending, analytical balance, t-Test

Does Blending An RGP Lens Move Or Remove Plastic?

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Blending of RGP lenses is a well practiced method of smoothing the transition at the peripheral curves for increased patient comfort and greater wearability of the lens. Most RGP lenses are blended by the laboratory from which they are ordered, but at times it is necessary for contact lens practitioners to reblend the lenses in their own office. Until this time it was not known whether the blending process moved or removed the lens material. However, the results of blending are readily visible with a simple magnifying loupe. Upon examination the lens will show much smoother transitions at the peripheral curves after the blending process, when compared to an unblended lens.

In this study we set out to determine what actually happens to the lens material during the blending process. If the lens material was moved during blending then the weight of the lens should remain unchanged. Conversely, if the lens material is removed during blending then the weight of the blended lens should be less than the unblended lens.

We know of no other previous investigations into this matter.

METHODS

The RGP contact lenses chosen in this study were twenty Flouroperm 30, bicurve lenses with base curves ranging from 7.20 to 8.04mm and an overall diameter of 8.20mm. Each lens, after receipt from the laboratory, was examined for any foreign matter that may have been on the lens. Then each lens was cleaned thoroughly with a standard RGP lens cleaner, rinsed, and then dried. Throughout this procedure the lenses were handled with lint free tissue and tweezers so as not to add weight.

The lenses were then weighed three times on a Sartorius analytical balance to the ten-thousandth of a gram and the mean of the three weights was determined to be the weight of the lens. After the nonblended, cleaned lenses were weighed we stored them in a calcium carbonate desiccator for twenty four hours, removed, and then weighed again three times with the mean of the three weights once more being determined to be the weight of the lens. This was done to determine if the cleaning process left any residual water on the lenses, which would show up as a difference in weight of the lenses after desiccation. We observed no significant change in the weight of the lenses after desiccation (Table 1); therefore, we did not continue to desiccate the lenses after the next cleaning.

The lenses were then modified using a contact lens modification unit, a velveteen covered sponge tool, and some RGP polish. We decided on a sponge tool covered with velveteen instead of many brass tools so that we would have one standardized tool for use on all of the lenses. Since a sponge tool is commonly used to polish lenses we covered it with velveteen to simulate the blending process. The lenses were then modified and were checked periodically during the modifying process with a magnifying loupe to determine the extent of the blend. We determined that when the lenses had reached a sufficiently modified stage there would be no evidence of the scratches that were visible at the peripheral curves of the lenses when we received them from the laboratory. After all the lenses were modified they were again cleaned and dried using the same handling procedures outlined above. The lenses were again weighed three times with the mean of the three weights once more being determined to be the weight of the lenses.

RESULTS

The mean weights of the nonblended lenses, with a mean weight for the total group being .0131 grams, were collated against the mean weight of the blended lenses, which had a mean weight for the total group of .0123 grams, in Table 2. A comparison was made using a paired, one-tailed t-Test on the individual weights of the nonblended and blended groups, Table 3. This determined a probability value of .0001 that the modified lenses were lighter than the nonblended lenses. Notice that on Table 1, each individual weight of the lenses had reduced after blending.

DISCUSSION

After the statistical manipulation of the data it was plainly seen, by the highly significant probability value of .0001 of the paired one tailed t-Test that was used, that the determination to be made was that the lens material is actually removed by our modification process, which would equally be true for blending. Therefore, the weight of the lens decreased. Although this answer it's intent to determine what actually happens to the lens material upon blending. The polish and the velveteen used together in the blending process act as a very fine sandpaper, which modifies the lens in relation to the amount of time spent blending. This blending actually smoothes the transition at the peripheral curve to a level that is more comfortable for wear by the patient. Further studies into this area could include a research project using a population of lenses with the same base curve and one brass, velveteen covered blending tool. These methods outlined would be for standardization of variables involved with using more than one tool and many lenses with different base curves.

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TABLE 1

	NON-BLENDED MEAN OF THREE WEIGHTS IN GRAMS	AFTER DESSICATION FOR FOR 24 HRS. MEAN OF THREE WEIGHTS IN GRAMS
LENS 1	0.0130	0.0129
LENS 2	0.0129	0.0129
LENS 3	0.0132	0.0132
LENS 4	0.0132	0.0133
LENS 5	0.0138	0.0138
LENS 6	0.0132	0.0133
LENS 7	0.0134	0.0133
LENS 8	0.0126	0.0126
LENS 9	0.0127	0.0127
LENS 10	0.0138	0.0137
LENS 11	0.0129	0.0129
LENS 12	0.0131	0.0131
LENS 13	0.0132	0.0132
LENS 14	0.0129	0.0130
LENS 15	0.0129	0.0130
LENS 16	0.0122	0.0122
LENS 17	0.0136	0.0137
LENS 18	0.0132	0.0131
LENS 19	0.0124	0.0124
LENS 20	0.0132	0.0132
NON-BLENDED MEAN WEIGHT OF LENSES IN GRAMS	0.0131	0.0131

	BLENDED MEAN OF THREE WEIGHTS IN GRAMS
LENS 1	0.0126
LENS 2	0.0113
LENS 3	0.0120
LENS 4	0.0128
LENS 5	0.0132
LENS 6	0.0126
LENS 7	0.0128
LENS 8	0.0117
LENS 9	0.0122
LENS 10	0.0134
LENS 11	0.0123
LENS 12	0.0123
LENS 13	0.0125
LENS 14	0.0123
LENS 15	0.0123
LENS 16	0.0114
LENS 17	0.0125
LENS 18	0.0123
LENS 19	0.0114
LENS 20	0.0122
BLENDED MEAN WEIGHT OF LENSES IN GRAMS	0.0123

TABLE 2

X_1: MEAN WEIGHT NONBLENDED

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.0131	.0004	.0001	1.7000E-7	3.151	20
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	**# Missing:**
.0122	.0138	.0016	.2617	.0034	15
t 95%:	**95% Lower:**	**95% Upper:**	**# < 10th %:**	**10th %:**	**25th %:**
.0002	.0129	.0133	2	.0125	.0129
50th %:	**75th %:**	**90th %:**	**# > 90th %:**	**Mode:**	**Geo. Mean:**
.0131	.0132	.0137	2	•	.0131
Har. Mean:	**Kurtosis:**	**Skewness:**			
.0131	-.0462	-.1219			

X_1: MEAN WEIGHT OF BLENDED LENSES

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.0123	.0006	.0001	3.1395E-7	4.5535	20
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	**# Missing:**
.0113	.0134	.0021	.2461	.003	15
t 95%:	**95% Lower:**	**95% Upper:**	**# < 10th %:**	**10th %:**	**25th %:**
.0003	.012	.0126	1	.0114	.0121
50th %:	**75th %:**	**90th %:**	**# > 90th %:**	**Mode:**	**Geo. Mean:**
.0123	.0126	.013	2	•	.0123
Har. Mean:	**Kurtosis:**	**Skewness:**			
.0123	-.184	-.145			

TABLE 3

Paired t-Test X_1: MEAN WEIGHT NONBLENDED Y_1: MEAN WEIGHT OF BL...

DF:	Mean X - Y:	Paired t value:	Prob. (1-tail):
19	.0008	11.0868	.0001

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