HHS Public Access

Author manuscript

Optom Vis Sci. Author manuscript; available in PMC 2015 May 29.

Published in final edited form as:

Optom Vis Sci. 2010 June ; 87(6): 414–420. doi:10.1097/OPX.0b013e3181dc9a04.

Gas Permeable and Soft Contact Lens Wear in Children

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Abstract

Purpose—To compare children's reports of comfort, vision, and contact lens-related issues in gas permeable (GP) and soft (SCL) contact lens wearers.

Methods—Subjects were 116 eight- to eleven-year old children in the Contact Lenses and Myopia Progression (CLAMP) Study. Aspects of contact lens wear were compared for children remaining in their original treatment group (either GPs or SCLs) for three years. Questionnaires were completed at every visit, as was visual acuity. Comparisons were made between the two groups using logistic regression or mixed linear models analyses as appropriate to examine the contact lens wearing experience. Additionally, children crossing over from GP wear to SCLs were compared to children remaining in GP lenses to determine the potential factors related to GP dissatisfaction.

Results—Seventy percent of GP wearers and 93% of SCL wearers wore their assigned lenses every visit. GP wearers wore their lenses significantly fewer hours per week than the SCL wearers (76.2 hours per week vs. 86.8 hrs per week, respectively, $p = 0.003$). GP wearers had statistically significantly better visual acuity though the difference was not clinically meaningful ($p < 0.001$). Comfort was poorer among the GP wearers using the Ocular Pain subscale ($p < 0.001$), but did not differ using a subjective question about comfort. Symptoms were more frequent in GP wearers than SCL wearers ($p = 0.002$), and were related to reports of discomfort. Significant factors relating to crossing over from GPs to SCLs were lower wearing time with GPs and itching.

Conclusions—Children are able to successfully wear gas permeable and soft contact lenses. Long-term adaptation occurred more frequently to SCLs than to GPs. The amount of time GP lens wearers are able to comfortably wear their contact lenses and the amount of itching may help determine whether they will remain in that modality.

Keywords

Pediatric; gas permeable contact lenses; soft contact lenses; myopia; refractive error; children

Children wear contact lenses for many reasons, ranging from refractive error correction[1–10] to vision therapy.[11] Contact lenses may be the primary treatment for some conditions, or

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they may provide an alternative treatment option when others fail. They may also be an elective treatment option for many children. Children as young as a few weeks old may be required to wear contact lenses to treat amblyopia,[11] unilateral aphakia,[12, 13] esotropia,[14] trauma,[10] anisometropia,[15] congenital nystagmus,[16] or albinism.[15] Older children may elect to wear contact lenses for refractive error correction because they do not like their appearance with glasses or because their glasses are uncomfortable.[4, 5, 17, 18] Children are capable of wearing gas permeable (GP) contact lenses,[3, 4, 6–9] soft contact lenses (SCL),[2, 17] and corneal reshaping contact lenses.[1, 19–21] They are also capable of complying with a contact lens care regimen.[5]

Studies in adults have indicated a preference for the vision achieved with GP lenses.[22, 23] Soft contact lenses are rated to be more comfortable than GP lenses more often.[23, 24] In fact, discomfort has been ranked as the number one reason for discontinuation of GP lenses.[24]

Similar data assessing GP lens wear in children are not available though. Studies evaluating GP lenses in children typically have not had a SCL comparison group. Katz et al.[9] randomized children to GPs and glasses to assess the effect of GPs on myopia progression. Khoo et al.[8] used similar comparison groups for their study. Other studies, such as Horner et al.,[17] evaluate SCLs and glasses. None, however, appear to have the ability to make a within study comparison of the comfort, vision, and other factors related to GPs and SCLs.

Children participating in the Contact Lens and Myopia Progression (CLAMP) Study, a randomized clinical trial to examine the effects of GP contact lenses on myopic progression,[4] were enrolled in a run-in period of up to two months to identify the children who could adapt to GP contact lens wear.[3] After successful completion of the run-in period, children were randomly assigned to wear GP contact lenses or soft contact lenses for three years. The children completed surveys regarding contact lens wear throughout the clinical trial. This paper describes the results of the surveys to test the hypotheses that children who wear GPs have better vision, worse comfort, more difficulty handling contact lenses, and lower preference for contact lens wear than children who wear SCLs.

METHODS

This research was approved by the Biomedical Sciences Institutional Review Board of the Ohio State University and conformed to the tenets of the Declaration of Helsinki. Eight- to eleven-year-old children with −0.75 D to −4.00 D of myopia and less than 1.00 D of astigmatism who were otherwise eligible to participate in the CLAMP Study[25] were dispensed GP contact lenses (Menicon Z, Menicon Co. Ltd., Nagoya, Japan). On average (± standard deviation [SD]), the subjects returned 65.7 ± 33.1 days after they received their contact lenses to assess their GP contact lens adaptation. Adaptation to GP contact lens wear was defined as 40 hours per week wearing time and contact lenses that were “usually comfortable” or “always comfortable,” both by subject report.[3]

If the subjects adapted to GP contact lens wear, they were randomly assigned to wear GP contact lenses (n = 59) or soft contact lenses (n = 57) for three years. The GP contact lenses were 9.2 mm diameter Menicon Z, 7.8 mm in optic zone diameter and were fitted to achieve

central alignment. The children were given Claris solutions (Menicon USA, Clovis, CA). The subjects randomly assigned to wear soft contact lenses were fitted with Focus two-week disposable contact lenses, and they were given SOLO Care multi-purpose solutions (CIBA Vision Care, Duluth, GA). The subjects underwent annual comprehensive eye examinations and attended contact lens check-ups at each six-month interval between annual visits.

Children completed a survey about contact lens wear at each of these six visits.[25] The mean wearing time per week was determined by asking the subjects, on average, what time they inserted their contact lenses and what time they removed their contact lenses during weekdays and weekends coupled with questions about how many days per week they wore their lenses.

Symptoms were evaluated from five questions on the contact lens survey. For example the itching question asked “When you wear your contact lenses how often do your eyes itch?” These symptoms were itching, redness, burning, tearing, and light sensitivity. Symptoms were dichotomized to compare “never” and “rarely” to “sometimes,” “often,” and “always.” The subjects rated the comfort of their contact lenses as “always comfortable,” “usually comfortable,” “usually uncomfortable,” or “always uncomfortable.”

Subjects reported how much they preferred glasses or contact lenses by answering whether they liked glasses “a little better” or “a lot better” than contact lenses, whether they liked contact lenses “a little better” or “a lot better” than glasses, or whether glasses and contact lenses were equal. Information on vision, comfort, and handling of contact lenses was collected using a multiple choice format. Comfort was measured in directly using a single question about the comfort of the contact lenses, and using questions from the Ocular Pain subscale on the National Eye Institute Visual Function Questionnaire (NEI VFQ). The Ocular Pain subscale ranges from 0 (extreme, constant pain) to 100 (no discomfort). Contact lens handling was addressed using three questions: one question relating to problems with insertion of contact lenses; one question relating to contact lens removal difficulty; and the final question asked about contact lens cleaning. Binocular, habitual, high-contrast logMAR visual acuity was measured according to a standardized protocol.[26] Data were compared for subjects who wore their original treatment assignment throughout the three-year study. Baseline values were also compared between children who wore their original GP assignment for three years and those who switched to another modality during the three-year study.

Statistical Analysis

Analyses were done focusing on the efficacy of those who remained in their randomized treatment group. For our analyses, any subject crossing over was not included in the analyses comparing lens comfort, vision, etc. This analysis allows for comparison of the true (i.e., as worn) treatment regimen, though the groups are no longer balanced with respect to baseline variables and the length of time in a treatment may be unequal, making the analysis subject to bias. A final analysis evaluating reasons for crossing over focuses on the remainder of the subjects.

Means are presented as basic descriptive statistics for continuous variables. Because there are multiple visits per subject an analysis that accounted for these correlated data was used to allow inclusion of all observations. For analyses evaluating all visits with a continuous outcome (i.e. wearing time), a mixed linear model approach was applied using the MIXED procedure in SAS version 9.2. These models incorporated treatment group and visit to assess the relationship of the lens type with the outcome (i.e. wearing time) and adjust for the presence of multiple observations per person. Means and standard errors (SE) in the tables are from the mixed models, because these models adjust the error term using all of the data. The p-values in the tables were generated from the model using an interaction term of treatment group by visit to compare the two groups at each visit.

For variables with dichotomous outcomes (presence or absence of symptoms, for example) a χ^2 test was used to compare the frequencies in the groups at each visit when the assumptions of the χ^2 test were met (including expected values in each cell greater than 5), and a Fisher's Exact test was used when these assumptions were not met. In order to use data from all visits, a generalized estimating equation model (GEE) was used. These models analyze categorical outcomes when there are multiple observations per person. This analysis was done with the SAS GENMOD procedure.

For assessing factors associated with crossing over from a GP randomization compared to those remaining in the GP group, basic descriptive statistics were t-tests for continuous variables, χ^2 test for categorical variables meeting the assumptions of a χ^2 test (including expected values greater in all cells than 5), and Fisher's Exact test for categorical variables not meeting the assumptions of a χ^2 test. A logistic model was used to assess the characteristics associated with crossing over. A stepwise model using a p-value ≤ 0.20 for entry was used, with the final model retaining variables with a p-value < 0.05.

RESULTS

The mean age, gender, and ethnicity of the two groups at randomization in the CLAMP Study were similar.[4] Table 1 depicts the number of subjects by mode of vision correction and original randomization at each annual visit. Forty (70%) GP wearers completed the clinical trial wearing GP contact lenses. Two-thirds of the GP wearers and 93% of the SCL wearers completed the trial wearing their original treatment assignment every visit. These children are the subjects included for the majority of the analyses.

Overall, the children who wore their originally assigned contact lenses throughout the entire study reported that they wore their contact lenses for 88.2 ± 25.9 hours per week at the end of the study. Seventy-five percent of subjects wore their lenses daily during the week (average 4.5 days); two-thirds wore them for both days during the weekend (average 1.5 days). Mean daily wearing time on weekdays was 13.5 hours per day, while on weekends it was 12.1 hours per day. There was a significant difference in wearing time between the GP (least squares mean = 76.2 hours per week, SE = 2.6) and SCL (least squares mean = 86.8 hours per week, SE = 2.3) wearers (mixed linear model, p = 0.003) (Table 2).

The overall average (± Standard Deviation (SD)) visual acuity was −0.04 (± 0.11) (roughly 20/18) at the last study visit. It was significantly worse for the SCL wearers than the GP wearers at all visits (Table 3), although the difference was less than one line on the visual acuity chart at all time points (on average 3 letters worse). The proportion of subjects who said that their vision was “pretty good” or “perfect” while wearing contact lenses was not significantly different between the two groups (GEE model, p = 0.20) (Table 4).

Comfort on the NEI-VFQ was significantly worse for the GP wearers than the SCL wearers on average across all visits (mixed linear model, p <0.001). At the three-year visit, the mean (± SD) Ocular Pain subscale score was 85.0 (± 14.5) for the GP contact lens wearers and 94.6 (± 8.8) for the SCL wearers (Table 4). These differences in the Ocular Pain subscale did not translate into significant differences when comfort was rated on a coarser, qualitative scale. The soft contact lenses and GP lenses were rated “always comfortable” or “usually comfortable” similarly over the study (Table 4) (GEE model, p-value = 0.09).

Associations between treatment group and patient-reported symptoms assessed on the presence or absence of symptoms are presented in Table 5. Symptoms of light sensitivity were associated with GP wear at more visits than other symptoms. The GP group was associated with significantly increased odds ratios across all study visits for itching (p = 0.02), tearing (p = 0.02), and light sensitivity (p = 0.002), so that each of these were more frequent in the GP wearers. Analyses evaluating the association between the ocular pain subscale and each of the symptoms of burning, itching, tearing, light sensitivity, and redness were done to determine if these symptoms were associated with comfort. The presence of each of these symptoms was related to having scores indicating more ocular pain or decreased comfort.

With respect to contact lens handling data at six months, there was no significant difference between GP wearers and SCL wearers in terms of the proportion of subjects who reported that they never had or usually did not have a problem with contact lenses insertion (90% each group, Fisher’s Exact, p = 1.0) or removal of contact lenses (100% vs. 94% respectively, Fisher’s Exact, p = 0.25). The GP wearers reported that they that they loved or liked cleaning their contact lenses similarly to the SCL wearers (34% vs. 43% respectively, Fisher’s Exact, p = 0.51). At three years, there was no difference between the groups for removal or cleaning of contact lenses (Fisher’s Exact, p > 0.05); however, GP wearers reported significantly more difficulties with insertion than the SCL wearers (13% vs. 0%, Fisher’s Exact, p = 0.01).

Subject preference for glasses or contact lenses is presented in Table 6. There were no significant differences between the groups at each individual visit; however, the soft contact lens wearers reported that they liked their contact lenses better than glasses significantly more often than GP contact lens wearers over all study visits (GEE model, p = 0.03).

A comparison of how subjects responded at baseline, following the GP run-in period, to contact lens wear between those who wore GP contact lenses throughout the study and those who switched to either SCL or glasses during the study is shown in Table 7. Subjects who crossed over from GPs to SCLs or glasses were more likely to report difficulties with

insertion, burning, light sensitivity and wore their lenses 9 hours less per week than those who remained in their GP assignment. Stepwise logistic regression analysis that modeled the likelihood of remaining in GP lenses showed that the average wearing time and itching were significantly related to switching from GPs to SCLs or glasses (average wearing time odds ratio 0.94, 95% confidence interval = 0.89 – 0.99; itching = 5.92, 95% CI = 1.16 – 30.23).

At the conclusion of the study, subjects were given the opportunity to choose whether they wanted to wear GP contact lenses, soft contact lenses, or glasses. Of the 59 original GP contact lens wearers, 28 (48%) chose to continue with GP contact lenses, 26 (44%) chose to wear soft contact lenses, and 5 (8%) chose to wear glasses only. Of the 57 subjects assigned to wear soft contact lenses at the randomization visit, 53 (92%) chose to continue wearing soft contact lenses, 2 (4%) chose to wear GP contact lenses, and 2 (4%) chose to wear glasses only.

DISCUSSION

Adaptation to GP lens wear has proven to be an issue for many young subjects in studies designed to examine the effectiveness of these lenses in curbing myopia progression.[8, 9] The CLAMP Study found about 78% of children were able to complete the two-month run-in period in GP lenses, and just under 70% of the subjects assigned to wear GP contact lenses finished in their original treatment arm.[3, 4] This number is nearly identical to that found for a study conducted in Asia.[9] Katz et al. found approximately 81% of the subjects fitted with GP lenses completed a three-month adaptation phase and about 54% of those originally fitted with GP contact lenses wore them for the entire two-year study. Pediatric soft contact lens wearers are able to adapt to lenses better than GP wearers. Other studies found that 86% to 91% of children continue to wear soft contact lenses for three years.[17, 18] Therefore, both short-term and long-term adaptation rates are better for soft contact lenses than for GP contact lenses, although this study demonstrates that children can successfully adapt to and maintain GP lens wear.

Issues of adaptation to GP lenses are not restricted to children. Reports in adults find discontinuation of both GP and SCL wearers associated with discomfort.[24, 29] Polse and colleagues[30] found that nearly 70% of adults were able to initially adapt to GP contact lens wear, which is similar to children. Fonn et al.[23]fitted one eye of subjects with a soft contact lens and one with a GP lens, and they found that the SCLs were overwhelmingly preferred for comfort, a phenomenon that did not change after the adaptation period.

In contrast, comfort was high over time for both treatment groups in the CLAMP Study. Even among subjects who stopped wearing GP lenses after the run-in period was completed, everyone reported that his or her contact lenses were “always comfortable” or “usually comfortable.” This crossover analysis was based upon a small sample, so it is difficult to make strong conclusions.

There were differences between GP and SCL wearers in this study with respect to comfort, but they were inconsistent. GP contact lens wearers reported that their contact lenses were “always comfortable” or “usually comfortable.” On the other hand, they wore their lenses

about 10 fewer hours per week, and the Ocular Pain subscale from the NEI-VFQ, which measures the ocular comfort, shows significantly worse comfort for the GP contact lens wearers than the SCL wearers. Small sample size makes it difficult to reconcile high levels of comfort with the differences in the Ocular Pain subscale. The Ocular Pain subscale gives specific examples of discomfort (i.e. burning, itching, or aching), that may have given subjects a context to answer about discomfort, as opposed to the more general comfort question. As there was an association between ocular pain and the individual symptoms in the subjects as a whole, the ocular pain scale may have elicited more information about comfort.

Among those subjects crossing over, two SCL wearers switched to GP wear based upon parental belief that GP lenses would slow myopic progression. Comfort was the primary motivation for those crossing over from GP lenses to glasses or SCLs.

GP wearers had better logMAR visual acuity. Three other studies of adult contact lens wearers found no difference in high contrast visual acuity between GP and SCL wearers.[31–33] The difference between the GP and SCL groups in this study was less than one line (on average about 3 letters) so, although it was statistically significant, it was not clinically meaningful. The difference may have been greater if subjects with more than 1.00 D of astigmatism were allowed to enroll in the study, but the entry criteria were aimed to reduce the amount of uncorrected cylinder experienced by the SCL wearers.

At six months, the subject's reports of contact lens handling (insertion, removal and cleaning) did not differ between the SCL and GP groups. The GP wearers indicated that they had more problems with lens insertion at the three-year visit than the SCL wearers; other handling issues were similar between the groups. Other studies have also shown that children are able to handle contact lenses with little problem.[2, 5] One hypothesis regarding more difficulty with insertion after three years for GP wearers may be their desire to wear contact lenses. The GP subjects wore their lenses about 10 fewer hours per week than SCL wearers, which may indicate a lack of willingness to insert contact lenses or greater difficulty with contact lens insertion. Although subjects reported relative difficulty for GP contact lens insertion at the three year visit compared to SCL insertion, 90% of them still reported no problems or usually no problems, which is consistent with the expectation that GP wearers would have few issues with insertion. Insertion issues were not found to be chronic; the proportion of subjects in both groups reporting at least some difficulty with insertion was variable by visit, but represented a small number of subjects.

SCL wearers also liked their contact lenses "a little better" or "a lot better" than their glasses approximately 10% more frequently than the GP wearers across all visits. This difference is illustrated by the significantly greater wearing time for SCL wearers.

Symptoms (itching, burning, redness, tearing, and light sensitivity) occurred at low levels among both groups, though slightly more frequently in the GP wearers for light sensitivity, itching, and tearing. This is similar to reports elsewhere of symptoms in contact-lens wearing children and teens.[34] Itching at the baseline visit after the run-in period was significantly associated with GP wearers crossing over to either SCL wear or glasses.

For crossovers from GPs to SCLs or glasses, the two associated factors were itching and wearing time. Wearing time may represent a combination of other factors that make it a surrogate for things which we may or may not have measured. Given the average difference in wearing time was 10 hours per week, or roughly 1.5 hours per day, this may not be a clinically relevant issue.

It is worth reiterating that the subjects in the CLAMP Study were required to successfully complete a run-in period prior to randomization. Therefore, all subjects in this study were able to adapt to the GP lenses before they were assigned to remain in GP lenses or continue on into SCLs. This means that the results here may differ from a subject just beginning in GP lens wear.

It is also possible that the simple act of being a study subject differentiates the subjects from the regular pediatric population, for example, when offered the choice of correction at the end of the study about half of those subjects in GPs would choose to remain in GPs, while 44% of them would choose SCLs. Among SCL wearers, 92% of them wanted to remain in SCLs. This might indicate that in a normal population, the discontinuation rate may be higher, though three years may be considered a long time to continue an undesirable refractive correction for study participation. Given that these CLAMP subjects had experienced both types of lenses because of the run-in period, this indicates a preference for the soft contact lenses. A small number of subjects (8% of GP wearers and 4% of SCL wearers) preferred returning to glasses showing that among these children, contact lenses were a viable and desired correction option.

CONCLUSIONS

Eight- to eleven year-old children are capable of comfortably wearing both GP and soft contact lenses. These results confirm clinical impressions that long-term adaptation to soft contact lens wear is more likely than long-term adaptation to GP contact lenses. Overall wearing time may help determine initial and long-term adaptation to GP lenses. Depending on a particular patient’s needs, either soft or GP contact lenses are legitimate treatment options for young myopic children.

ACKNOWLEDGMENTS

This study was supported by grants K23-EY00383, T35-EY07151, R21-EY12273, and R24-014792 from the National Eye Institute, National Institutes of Health, Bethesda, Md; Menicon Co, Ltd, Nagoya, Japan; CIBAVision Corporation, Duluth, GA; SOLA Optical, USA, Petaluma, CA; and an American Optometric Foundation William C. Ezell Fellowship (JJW), sponsored by Essilor, Dallas, TX.

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Table 1

The treatment group that subjects in the Contact Lens and Myopia Progression (CLAMP) Study were assigned to and the treatments they were actually wearing at each annual visit.

Initial random assignment	**GP**			**SCL**		
Lenses worn to visit	**GP**	**SCL**	**Glasses**	**GP**	**SCL**	**Glasses**
Baseline	59	0	0	0	57	0
1 year	50	4	5	2	53	1
2 year	42	6	9	2	52	2
3 year	40	11	8	2	53	2

Optom Vis Sci. Author manuscript; available in PMC 2015 May 29.

Table 2

Mean ± SE from a mixed linear model of wearing time in hours per week for subjects who wore their originally assigned treatment throughout the entire study.

Visit	GP	SCL
6 month	69.4 ± 3.7	75.5 ± 3.3
1 year	76.9 ± 3.8	83.6 ± 3.2
18 month	79.6 ± 3.9	87.7 ± 3.2
2 year	79.6 ± 3.9	89.1 ± 3.3
30 month	72.4 ± 4.3	92.7 ± 3.7*
3 year	76.7 ± 4.0	93.5 ± 3.3*

*Significant difference between GP and SCL group by mixed linear model $p < 0.05$

Table 3

The mean ± SE habitual, high-contrast visual acuity at each visit for subjects wearing the originally assigned treatment for the entire study.

Visit	log MAR visual acuity	
	GP	SCL
6 month	−0.08 ± 0.01	−0.01 ± 0.01*
1 year	−0.04 ± 0.01	+0.002 ± 0.01*
18 month	−0.06 ± 0.11	−0.01 ± 0.01*
2 year	−0.08 ± 0.01	−0.01 ± 0.01*
30 month	−0.10 ± 0.02	−0.04 ± 0.01*
3 year	−0.08 ± 0.01	−0.03 ± 0.01*

*Significant difference between GP and SCL group by mixed linear model $p < 0.05$

Optom Vis Sci. Author manuscript; available in PMC 2015 May 29.

Table 4

The percentage of gas permeable (GP) contact lens and soft contact lens (SCL) wearers who reported the contact lenses were “always comfortable” or “usually comfortable,” subjective vision rating (%) and Ocular Pain subscale score from the National Eye Institute Visual Function Questionnaire at each visit for subjects wearing the originally assigned treatment for the entire study.

Visit	Always or usually comfortable (%)		Rating vision “pretty good” or “perfect” (%)		Ocular Pain subscale score	
	GP	SCL	GP	SCL	GP	SCL
6 month	100.0	88.2*	100.0	90.2	83.8 ± 1.8	93.5 ± 1.6+
1 year	100.0	96.0	94.9	89.8	86.6 ± 1.8	92.9 ± 1.6+
18 month	91.9	87.8	100.0	90.0	87.1 ± 1.8	93.1 ± 1.6+
2 year	92.1	88.0	89.5	90.0	86.4 ± 1.8	92.9 ± 1.6+
30 month	89.3	100.0	92.9	94.9	88.0 ± 2.1	95.8 ± 1.8+
3 year	97.3	94.1	92.1	87.8	85.0 ± 1.8	94.6 ± 1.6+

*Significant difference between GP and SCL group by Fisher’s Exact $p < 0.05$

+Significant difference between GP and SCL group by mixed linear model $p < 0.05$

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Table 5

Percentage of gas permeable (GP) contact lens wearers and soft contact lens (SCL) wearers that experienced symptoms “often” or “always”.

Visit	Itching		Redness		Burning		Tearing		Light sensitivity	
	GP	SCL	GP	SCL	GP	SCL	GP	SCL	GP	SCL
6 month	20.0	9.8	10.0	5.9	2.5	0	12.5	11.8	25.0	13.7
1 year	12.5	4.0	10.0	12.2	5.3	8.0	35.0	18.0	33.3	12.0*
18 month	23.1	6.1*	12.8	6.1	2.6	4.1	28.2	14.3	30.8	12.2#
2 year	18.4	6.0	12.8	12.0	7.7	4.0	30.8	10.0*	31.6	12.0#
24 month	17.9	10.3	14.3	7.7	7.1	5.1	25.0	12.8	40.7	7.9#
3 year	13.2	3.9	15.8	2.0*	7.9	3.9	29.7	9.8	36.8	4.0#

*Significant difference between GP and SCL group by Fisher’s Exact $p < 0.05$

#Significant difference between GP and SCL group by χ^2 test $p < 0.05$

Table 6

Percentage of gas permeable (GP) contact lens wearers and soft contact lens (SCL) wearers who liked contact lenses “a little better” or “a lot better” than glasses at each visit.

Visit	GP	SCL
6 month	78.4	89.8
1 year	81.6	93.8
18 month	79.4	94.0
2 year	87.9	91.8
30 month	88.5	94.9
3 year	87.9	95.9

Table 7

Comparison of baseline characteristics for subjects who continued to wear GPs for the entire three-year study compared to the subjects who switched to glasses or contact lenses during the study.

Characteristics at Baseline	Continued in GP	Switched to SCL or glasses	p-value
Age (years)	10.4 ± 1.2	10.5 ± 1.2	0.97*
Spherical equivalent (D)	−2.4 ± 0.8	−2.1 ± 1.0	0.29*
Gender (% female)	60.6	55.0	0.78+
Wearing time (hours per week)	84.9 ± 12.3	75.9 ± 14.0	0.02*
Visual acuity (logMAR)	−0.06 ± 0.09	−0.06 ± 0.08	0.91*
Vision (% pretty good or perfect)	100	94.7	0.38#
NEI-VFQ Ocular Pain subscale	84.8 ± 15.1	78.9 ± 20.9	0.26*
Comfort (% always or usually comfortable)	100	100	
Insertion (% always or usually no problem)	78.1	47.1	0.05+
Removal (% always or usually no problem)	90.6	94.1	1.0#
Cleaning (% always or usually no problem)	53.1	52.6	1.0#
Itching (% sometimes, often, always)	18.2	40.0	0.08+
Redness (% sometimes, often, always)	21.1	26.3	0.74#
Burning (% sometimes, often, always)	0	15.0	0.05#
Tearing (% sometimes, often, always)	15.2	20.0	0.72#
Light sensitivity (% sometimes, often, always)	24.2	52.6	0.04+

*p-value from t-test

+p-value from χ^2 test

#p-value from Fisher's Exact test