Contact Lens & Anterior Eye 37 (2014) 285–291

Contents lists available at ScienceDirect

Contact Lens & Anterior Eye

journal homepage: www.elsevier.com/locate/clae

The use of daily disposable lenses in problematic reusable contact lens wearers

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ARTICLE INFO

Article history:
Received 17 September 2013
Received in revised form 13 February 2014
Accepted 1 March 2014

Keywords:
Hydrogel contact lenses
Daily disposable
Dryness
Symptoms
Hyperaemia
Corneal staining

ABSTRACT

Purpose: Replacing soft contact lenses (CLs) on a daily basis brings a number of advantages, most notably, reduced exposure to deposits, disinfectants, allergens, and other contaminants. This retrospective study estimated the prevalence of problems in current wearers of reusable soft CLs and tested the effect of refitting "problem" patients with daily disposable (DD) hydrogel lenses.
Methods: Prevalence was estimated from 398 current reusable CL wearers for: frequent/constant discomfort or dryness, ≥2 h of uncomfortable wear, ≥grade 2 conjunctival hyperaemia (0–4), or ≥grade 3 corneal staining (0–15). In the second part of the study, 217 reusable CL wearers classified as problem patients were randomly refitted with DD lenses manufactured from one of two materials: etafilcon A ($n = 96$) or nelfilcon A ($n = 121$) and reassessed 1 week later.
Results: Thirty-nine percent (154/398) had some qualifying criterion: reduced comfortable wearing time (CWT), 20%; dryness, 20%; irritation, 5%; corneal staining, 8%; and hyperaemia, 7%. After refitting with DDs, the prevalence of reduced CWT was decreased from 65% to 51% ($P = 0.0039$), dryness from 60% to 41% ($P < 0.0001$) and corneal staining from 28% to 21% ($P = 0.04$). There was no significant change in the prevalence of irritation, or hyperaemia. Some differences were noted between the two lens materials.
Conclusions: A high proportion of reusable soft lens wearers encounter clinically relevant signs or symptoms with their current CLs. This study provides evidence that refitting with DD lenses is a useful strategy for alleviating some of the common problems of CL wear.

1. Introduction

Since the introduction of daily disposable (DD) soft contact lenses in 1994, there has been a gradual, if variable, increase in their usage around the world [1]. In some countries, most notably, Norway, Japan and the United Kingdom, DD contact lenses represent a third or more of prescribed contact lenses (CLs). The expansion in DD prescribing options for astigmats and presbyopes, as well as the introduction of silicone hydrogel DD lenses, is likely to continue this trend.

The advantages and the resulting potential clinical benefits of DD CLs are summarized in Table 1. The convenience of daily disposability is one of the most attractive features for patients [2]. Since few CL wearers, if any, are fully compliant with the rigors of CL cleaning and disinfection systems [3,4], the simplification of the care regimen encourages better hygiene. CL storage cases, for instance, are recognized as important sources of microbial contamination [5,6]. Reusing disinfection solution can result in infection [7]. A further advantage from the absence of disinfectant chemicals is the avoidance of adverse solution effects such as solution-induced corneal staining [8].

A wide range of potential benefits accrues from minimizing the lens adsorption and surface deposition of tear film components. Increasing levels of deposition have been shown to reduce pre-lens tear film stability [9,10] and, in turn, reduce lens comfort [10,11] and wearing time. CL associated papillary conjunctivitis (GPC) is assumed to be triggered by a combination of mechanical irritation from and immunological reaction to surface deposition. Increasing lens replacement frequency significantly reduces the risk of developing GPC [12,13]. DD lenses have also been found to reduce the symptoms associated with ocular allergies, such as hay fever compared with reusable CLS [14,15]. This is assumed to be due to a reduction in any exposure to allergens through discarding lenses on a more frequent basis. Similarly, it is possible that there may be some advantage in discarding any inflammatory cell products, such as cytokines, picked up from the tear film [16,17].

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http://dx.doi.org/10.1016/j.clae.2014.03.002
1367-0484/

Table 1
Actual and theoretical benefits of daily disposable soft contact lenses, with supporting references.

Advantages	Possible benefits	References
Reduced exposure to lens deposits	Reduced risk of papillary conjunctivitis	Parozinski and Donshik [13]
Reduced exposure to biochemicals	Reduced risk of inflammation	Temel et al. [16], Thakur and Willcox [17]
Protection from allergens	Reduced slit lamp changes improved comfort	Hayes et al. [14]
Incorporation of wetting agents	Improved comfort	Coles et al. (2004), Peterson et al. [37], Wolffsohn et al. [38]
No exposure to disinfectants	Reduced risk of adverse reaction to disinfectants Improved comfort	Andrasko, Ryen [8], de la Jara et al. [18]
No storage case	Reduced risk of microbial exposure	Hall, Jones [40], Szczotka-Flynn et al. [5]
Convenience	Improved compliance with care regimen	Dumbleton et al. [41]
Cost	Reduced cost for part-time wearers	Efron et al. [42]

Of the many clinical studies involving DD CLs, surprisingly few have compared the clinical performance of daily replacement versus other CL replacement modalities. Although using a wide range of study designs, only one has compared replacement modalities using a single lens type [18]. The first in this series was one of the largest studies and involved a chart review of >23,000 CL patients, of whom >400 were fitted with DD lenses at a practice in Japan [19]. The rate of corneal complications was lower with the DD lens wearers than with low or high water conventional hydrogel lenses. Solomon et al. compared DD use with other replacement modalities [20]. Compared with 2-weekly replacement of the lenses of similar material, the DD wearers showed fewer deposits, reported better overall satisfaction and had fewer tarsal abnormalities. In a chart review of 138 daily wear CL patients, Suchecki et al. found significantly fewer adverse events and less conjunctival injection with DDs compared with 2-weekly replacement [21]. A recent study evaluated the use of senofilcon A lenses used on a DD basis compared with 2-weekly replacement in conjunction with various care systems [18]. During 3 months of wear, there was a lower incidence of corneal infiltrative events with the DD group who also reported higher end-of-day comfort than with some of the 2-weekly replacement groups.

Epidemiological studies have found conflicting results regarding the effect of daily disposability on microbial keratitis (MK). Dart et al. found increased risk of MK with DD lenses compared with other planned replacement soft lenses, however, the rate varied between DD lens brands [22]. Another confounding factor is whether the use of DD lenses is combined with occasional overnight wear, which, in itself, raises the risk of MK. Other studies have found similar or lower rates of MK with DDs than with other modes of lens wear [6,23,24]. A recent case–control study has provided the strongest evidence of reduced complications with DD lenses [25]. Chalmers et al. found a seven-fold increased risk of corneal infiltrative events with reusable soft lenses compared with DDs. Several authors have suggested factors that may explain these apparently conflicting findings and why some studies might find relatively high MK rates with DDs [26,27]. It is likely that DD lenses were initially supplied to patients who were a higher risk and more likely to be non-compliant. Even now, DD are often supplied through internet suppliers and to categories of patient who are less likely to comply with even the simplified levels of hygiene required for DDs [28]. Also, as noted earlier, the performance of DD lens type varies widely between brands.

Two recent studies have highlighted the fact that many habitual soft CL wearers experience less than satisfactory CL wear. In reviewing >1000 CL wearing subjects entering clinical trials, Riley et al. found that more than half (52%) could be categorized as only "marginally successful" or even as "problem" patients [29]. The most common shortcomings were reduced end-of-day comfort followed by frequent symptoms of dryness or discomfort. In addition, a smaller proportion showed clinically significant slit lamp findings of hyperaemia or corneal staining. Richdale et al. surveyed 344 CL wearers of whom 35% described themselves as "dissatisfied" CL wearers [30]. The primary self-reported reason for dissatisfaction was ocular symptoms (dryness and discomfort), followed by preference for another corrective modality. Discontinuation of CL wear is an inevitable consequence for many of these problem patients and, not surprisingly, symptoms of dryness and discomfort are cited as the most common reasons for CL discontinuation [30–33].

Given the various actual and theoretical benefits of DD lenses, they are an obvious prescribing option for those patients who fall into the problem category and, in fact, this strategy has already been adopted by many practitioners. The purpose of this retrospective study was to evaluate the effect of using DD CLs for patients experiencing 'problems' with reusable soft lenses.

2. Method

The current study was a modification of the methodology of Riley et al., this time evaluating the effect of refitting problem patients with DD rather than with reusable silicone hydrogel lenses.

In the first part of this two-part study, the prevalence of problems was estimated in a sample of 398 existing reusable soft CL wearers using the criteria of Riley et al., with one exception: this study monitored conjunctival hyperaemia whereas the previous study differentiated limbal and bulbar conjunctival hyperaemia. The subjects were drawn from three clinical trials undertaken at 36 sites across North America and the United Kingdom in the period January 2006 to February 2009. Each study followed a similar protocol and included similar eligibility criteria. Subjects were required to be existing soft contact lens wearers over 18 years of age with a refractive error that could be corrected by a spherical lens between −1.00 and −6.00 diopters (D). They were also required to have no evidence of ocular abnormality or disease that would contraindicate contact lens wear.

At a baseline visit, subjects were questioned about symptoms experienced with their habitual reusable CLs and were asked about their typical average and comfortable wearing times. This was done by questioning patients about their normal insertion and removal times and, if there was a reduction in comfort, the time of day that this was first noticed. Subjective and objective refraction, visual acuity and biomicroscopy (including grading of conjunctival hyperemia, corneal staining and other slit lamp findings) were also assessed at this visit. Subjects were classified as "problem" patients if, at the baseline visit, they qualified for at least one of the five criteria described in Table 2.

The second part of the study evaluated the effect of refitting 217 problem patients with DD lenses of various types (Fig. 2). Of these, 126 subjects were identified from Part 1 of this analysis while the remaining 91 were recruited from a separate study at eight sites of patients with symptoms of dryness. To be recruited for these 'dry eye' studies, subjects were required to report reduced wearing time or experience frequently or constant dryness or irritation plus an accompanying sign of dryness, such as corneal staining. Therefore, these subjects qualified for the criteria listed in Table 2, but were not included in Part 1 of the current analysis, as they were already known to be problem patients.