Contact Lens and Anterior Eye xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Contact Lens and Anterior Eye

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

Topical anaesthetic use prior to rigid gas permeable contact lens fitting

Felicity R. Gill[a], Paul J. Murphy[a,b,*], Christine Purslow[a]

[a] Cardiff University, School of Optometry and Vision Sciences, Cardiff, UK
[b] University of Waterloo, School of Optometry and Vision Science, Waterloo, Canada

ARTICLE INFO

Keywords:
GP contact lenses
Anxiety
Anaesthesia
Comfort
Success

ABSTRACT

Purpose: To investigate effect of topical anaesthetic (TA) during gas permeable (GP) contact lens (CL) fitting on subjective and objective measures of patient anxiety.
Methods: 47 subjects (mean ± sd age = 26.9 ± 4.9 years; soft CL wearers, 18, neophytes, 29). Each subject randomly assigned to Group A or B, and attended on two occasions, one week apart. First visit: subject received bilaterally either a single drop of TA (0.5% proxymetacaine) (Group A) or placebo (0.9% saline) (Group B) prior to GP CL application. No drops were instilled at second visit. Each visit mimicked a GP CL fitting. At each visit, patient anxiety was assessed either subjectively (visual analogue scale (VAS)) or objectively (skin conductance (SC)), as well as anterior ocular health.
Results: Visit 1: GP CL trial produced small increases in hyperaemia and corneal staining, but no difference associated with TA use. Visit 2: increases in staining and hyperaemia were observed, but hyperaemic responses significantly less than at Visit 1, for both groups. Corneal staining also less, but not statistically significant. VAS scores indicated subjects who received TA during Visit 1 were significantly less anxious at Visit 2. Visit 2: comfort slightly reduced for subjects who received TA at Visit 1, and significantly increased for subjects who received placebo. Use of TA reduced anxiety during lens adaptation period compared with subjects receiving placebo.
Conclusions: TA use during GP CL fitting has potential patient benefits: improved first-time GP CL wear comfort, reduced anxiety during adaptation, reduced anxiety prior to subsequent GP CL wear.

The decline in rigid gas permeable (GP) contact lens (CL) prescribing is well documented [1]. In a previous study, we showed that the initial wearing discomfort with GP CLs discourages practitioners from recommending this lens type to patients [2]. Topical anaesthetic (TA) use in rigid gas permeable fitting results in enhanced initial patient comfort [3], and may also reduce patient anxiety about initial lens comfort [3]. If initial comfort is improved with TA, particularly in patients perceived to have high ocular touch sensitivity or are anxious, practitioners may feel encouraged to consider GP CLs as a potential option [4]. However, the use of topical anaesthetic to aid GP CL fitting, is not common practice in the United Kingdom and practitioner opinion is divided on the acceptability of TA during GP CL fitting without evidence on the safety and benefit of TA use.

Anxiety is the adaptive response to a threat, for example, in response to a clinical procedure [5]. Anxiety is known to influence patient success with CL [6,7]. It has been suggested that patients may not try CL because they are anxious about having them placed on their eyes [7]. Anxiety levels appear to vary between individuals and both internal and external forces may influence anxiety levels. Spielberger [8] suggested that 'trait' anxiety refers to a person prone to anxiety, i.e. it is a fixed personality trait, while 'state' anxiety is a transient anxiety experience [8].

Use of TA makes the first GP CL experience more comfortable, but this raises questions over whether this makes the next visit, without TA, a worse experience, and therefore misleads a patient. Literature shows that use of TA results in less patient dropouts following the fitting phase [3], however an insight into patient experience over the fitting phase would be advantageous.

This study investigated the effects of TA use, during GP CL fitting, on the ocular surface to assess its safety of use; on subjective and objective measures of patient anxiety; and of previous TA use on the second patient experience with GP CL.

1. Methods

A prospective, randomised, double-masked cohort study was conducted involving two visits, scheduled with one week between visits.

* Corresponding author at: University of Waterloo, School of Optometry and Vision Science, 200 Columbia Avenue West, Waterloo, N2L 3G1, Ontario, Canada.
E-mail address: pjmurphy@uwaterloo.ca (P.J. Murphy).

http://dx.doi.org/10.1016/j.clae.2017.07.005
Received 20 March 2017; Received in revised form 5 July 2017; Accepted 11 July 2017

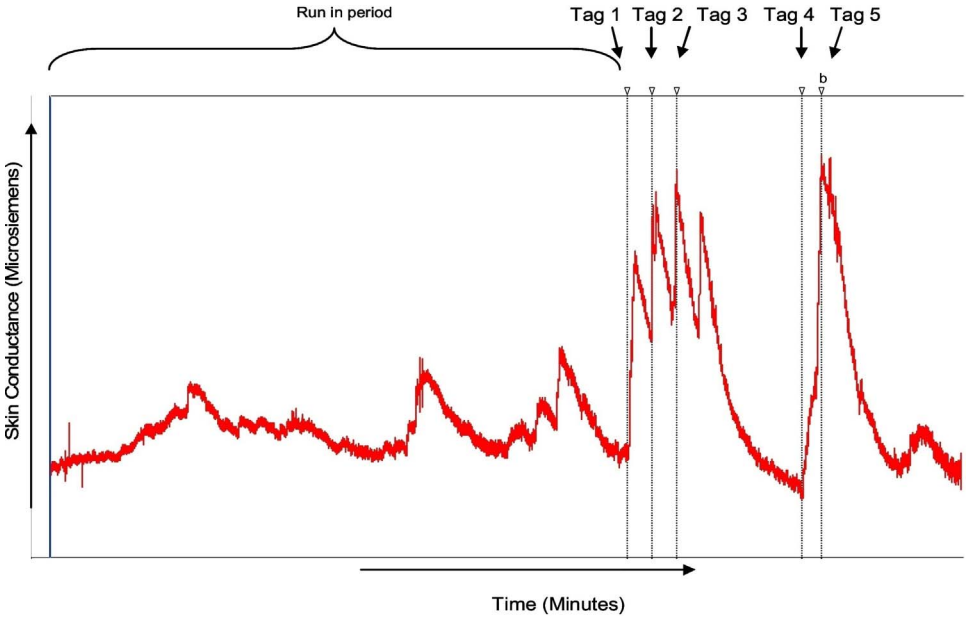

Fig. 1. Example of raw skin conductance trace, showing marker tags. Tag 1: Examiner says: "I'm going to put a drop into yours eyes now"; Tag 2: Examiner says: "I'm now going to insert the lenses to your eyes"; Tag 3: Completion of lens insertion; Tag 4: Examiner says: "I'm now going to remove the lenses from your eyes"; Tag 5: Completion of lens removal.

1.1. Subjects

Forty-seven healthy, volunteer, subjects from staff and students within Cardiff University completed the study, m 20, f 27, mean ± sd age = 26.9 ± 4.9 years (range 18–45). Twenty-nine subjects were neophyte and 18 had experience of or were current soft CL wearers. Subjects were excluded if they had worn GP CL before, suffered from any ocular condition including dry eye or any systemic condition known to affect the tear film or cornea, were taking any medication known to affect the tear film or cornea, or were pregnant or breast-feeding. Ethical permission for the study was obtained from the School of Optometry and Vision Sciences Ethical Committee and signed informed consent was obtained from all subjects. All procedures conformed to the tenets of the Declaration of the Helsinki.

1.2. Study groups

Subjects were randomly assigned to two groups (A or B) and either received a single drop of TA (A) or saline placebo (B) prior to GP CL application at the first visit, in both eyes, respectively. Group A (n = 25) had a mean ± sd age of 27.1 ± 4.6 years, m 11, f 14. Group B (n = 22) had a mean ± sd age of 26.6 ± 5.2 years, m 9, f 13.

1.3. State and trait anxiety questionnaire

The Spielberger State-Trait Inventory (STAI) [9] incorporates two 20-item question sets measuring state and trait anxiety. The items are generic and the STAI has been used to measure anxiety in many healthcare studies [10–12]. The full STAI is lengthy and has been shortened to two 6-item scales [9,13,14]. Each item has four possible responses, with each response giving a score, and the anxiety result is found by summing the response scores. The shortened State-Trait scales were completed by all subjects prior to drop instillation and GP insertion.

1.4. Visual analogue scale

An anxiety visual analogue scale (VAS) was completed prior to GP CL application to indicate subject anxiety [15–17,35]. Subjects were asked to mark their answer on the VAS to the question "How anxious do you feel about having contact lenses on your eyes today?", between the two extremes of "Not at all anxious" and 'Very anxious'. A comfort VAS was completed after GP fitting to indicate how comfortable the lenses had been on the eyes in response to the question "How did the contact lenses feel on your eyes today?", between the two extremes of 'Not at all comfortable' and 'Very comfortable'.

1.5. Skin conductance recording procedure

Skin conductance (SC) shows the emotional state reflected by changes in the sympathetic nervous system as a result of stress or arousal. Sympathetic activation causes release of acetylcholine, which acts on the muscarinic receptors leading to sweat production and a skin conductance increase [18]. SC has been used as a tool for monitoring post-operative pain in medicine [19]. It has been found to be better than alternative objective methods, e.g. heart rate, blood pressure and electroencephalograph (EEG), at detecting pain [18].

Skin conductance was measured by attaching 2 silver-silver chloride electrodes (coated with electrode gel) to the pads of the index and middle finger of the subject's left hand. Signals from the electrodes were amplified (×2000) and low pass filtered (0–35 Hz) using a physiological amplifier (Biopac MP30) connected to a laptop PC (Toshiba Satellite Pro 4200) running Biopac Student Lab Pro software (version 3.65, BIOPAC Systems Inc, Goleta, CA). All subjects washed their hands with a liquid soap prior to having the electrodes attached to improve the quality of contact. A period of 10 min was allowed to elapse before data collection to ensure the skin had fully absorbed the gel. The subject was asked to keep their hand still, resting on their left leg throughout the consultation. Conversation during the consultation was controlled and the same explanations and reassurance were given to all participants.

SC response occurs with a latency of 1–3 s following a stimulus, making it difficult to directly link a response to a particular event [23]. For this reason, tags were helpful in marking periods of interest. Specific phrases were used by the examiner at key points during the consultation, and simultaneously the examiner added a tag to the trace (Fig. 1). Tags were also added to the SC trace to identify completion of a particular task during the consultation. When subjects returned for the second visit, Tag 1 was omitted and only Tags 2–5 were inserted onto the SC trace.

Tag 1 Examiner says, "I'm going to put a drop into your eyes now"

Tag 2 Examiner says, "I'm now going to insert the lenses to your eyes"

Tag 3 Completion of lens insertion