The use of fluorescein in contact lens aftercare

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1. Introduction

Sodium fluorescein has been used in the assessment of corneal lesions since the 1880s and over the past hundred years it has been used in almost all spheres of contact lens practice [1]. In contact lens aftercare, its primary use is to examine the integrity of the corneal and conjunctival surface, and there is no doubt that it is an essential diagnostic tool in the identification and differential diagnosis of many corneal lesions, and in highlighting conjunctival changes such as Contact Lens Papillary Conjunctivitis (CLPC). The use of fluorescein is considered by many to be an essential step in contact lens aftercare. In the United Kingdom, The College of Optometrists code of ethics and guidelines to the optometric profession on the care of and refitting contact lens wearers advises the use of “appropriate topical drugs and diagnostic agents” [2]. Since the 1990s there has been a large increase in the number of peer-reviewed publications related to corneal staining and significant interest in the contact lens community on its relevance [3]. Much of the debate has been driven by the observations of punctate staining associated with different combinations of silicone hydrogel lenses and care products with resulting claim and counterclaim of the significance of the findings. Factors such as the period of time that staining is assessed after lens wear and the use or otherwise of Wratten #12 filters are also contributory factors in the levels of staining seen [4–7].

While much has been published on the incidence and potential consequences of staining, little or no data can be found on the extent to which practitioners routinely use fluorescein during soft contact lens aftercare. This short communication will report on the results of surveys carried out amongst contact lens fitting eye care practitioners on their habits when prescribing, fitting and monitoring soft contact lens wearers.

2. Methods

Between July 2006 and March 2008 2116 contact lens fitting eye care practitioners from 5 countries/regions of Europe (Table 1), attending courses at THE VISION CARE INSTITUTE™ of Johnson & Johnson sro in Prague and Johnson and Johnson Medical Holdings spa in Milan, were surveyed on a number of aspects of contact lens practice. The sample was made up of practitioners representing the professions that carry out the majority of contact lens fitting in each market. At the start of a presentation on the use of the slit lamp delegates were asked: “How often do you stain a soft contact lens wearer with fluorescein?” Each practitioner was presented with 4 choices: (1) Always, (2) Most of the time, (3) Only if I think that there is a problem, and (4) Never. The participants used a Bosch interactive voting unit to register their responses, which were then displayed to the whole group when everybody had voted. The results were downloaded onto a Microsoft Excel spreadsheet (Microsoft Corp., USA) and the data mined using basic table functions within the software. Linear regression analysis was carried out on the responses of each country over time to ascertain if this varied over the time scale of the survey. At a later stage in the same course, practitioners were asked to estimate the amount of corneal staining that they see in soft daily wear contact lens wearers. They were presented with 4 options: less than 10%, 10–19%, 20–30% and greater than 30%. Once again the information was collected using the Bosch interactive voting unit and not presented to the class until all had voted.
3. Results

Significant differences were found in the responses of practitioners from different countries (Fig. 1), with the UK being the only group in which over 50% of respondents claimed to use fluorescein at each appointment. Combining the top two box responses of “Always” and “Most of the time” showed 3 distinct clusters. The UK group had the highest number of respondents with 75% in this category, Poland and Italy were next with 45% then the 3rd cluster were Germany and the Scandinavian countries with around a quarter of practitioners. The German practitioners were the group in which most claimed never to use fluorescein with 28% falling into this category.

We investigated the extent to which, if any, the number of practitioners who claimed to use fluorescein on a regular basis changed over time. For all countries there was no evidence of any change in the response rates over the study period with correlation coefficients being 0.2 or less in all cases.

In general, practitioners from the countries that reported using fluorescein the most, also reported seeing the highest incidence of corneal staining (Fig. 2). Similarly the practitioners who stained the least, trended towards reporting seeing the lowest incidence of staining.

4. Discussion

The results of this study suggest that although the topic of corneal staining may be growing in interest amongst the academic community, most practitioners (with the exception of UK sample) do not routinely use fluorescein at soft lens aftercare visits. In addition there is some evidence, albeit on a relatively small base that the increased interest in the subject has not significantly changed usage patterns over the study period. A potential limitation to this data is the extent to which the samples used reflect the contact lens fitting population at large. The practitioners attending the classes at THE VISION CARE INSTITUTE™ had applied and were invited without any level of pre-selection. It is a reasonable assumption that the groups had a higher interest in contact lens practice than an unselected random group of practitioners. Additional work would be interesting to see if the use of fluorescein was related in any way to the level of experience of the practitioner, which was not captured in this sample. Notwithstanding these challenges, the question remains why is it that between 25% and 75% of practitioner only use fluorescein when they think there is a problem, or not at all. In some countries within Europe, fluorescein is either not readily available or there are legislative limitations on its use by non-ophthalmologists which we have see significantly lowers the frequency of its use [8]. In all of the countries sampled in this report there are no such reasons why fluorescein may not be used by contact lens practitioners. During the classes discussions occurred with the participants on the reasons for their responses, and follow up discussions with the trainers and the authors broke the reasons for not using fluorescein down into 2 main categories:

1. Concerns about discoulouration of the lens following fluorescein installation.
2. Concerns about the risk of Pseudomonas aeruginosa infection from fluorescein left in the eye following the installation.

It is interesting to question these “excuses” in the context of contact lens practice in the 21st century. Certainly in the days of expensive conventional lenses that were expected to last for 2–3 years the fear of anything that might detract from the lens condition was a real one. Fluorescein is a water-soluble dye that is absorbed into a hydrogel lens as a function of the amount in the tear film. While high molecular weight fluorescein is often cited as a means of reducing this absorption its primary use is to examine the fit of a soft lens and its reduced fluorescence vs. regular sodium fluorescein reduces its effectiveness in looking at corneal staining. The biggest factor in reducing the possibility of discoulouration is the volume of solution applied to the eye. The use of lower concentrations of fluorescein either with a moistened fluoret or 1% minim was shown to be the most effective clinically [9]. In all cases the goal should be to reduce the volume of fluorescein delivered to the eye, which can be achieved by reducing the surface area of the fluorescent strip that is wetted [10]. The use of a minimally wetted fluorescein impregnated strip will reduce the volume of solution available to discoulour the lens as well as improve its diagnostic value. The increased use of disposable lenses further invalidates fears about discoulouration given the ability to affordably change the lens if it becomes discouloured. A single drop of saline in the eye in which a minimum amount of fluorescein has been placed is usually sufficient to remove any excess—in practice a ‘wash out’ is rarely required, a short time delay before lens insertion sufficing.

The concerns about Pseudomonas aeruginosa infection are interesting to explore, it is a Gram-negative, aerobic rod belonging to the bacterial family Pseudomonadaceae. It is also one of the most common pathogens associated with microbial keratitis, and as such a concern to all contact lens practitioners [11].
association with fluorescein seems to stem from a case report published in 1955 in which a number of cases of pseudomonas infection were attributed to colonisation of un-preserved fluorescein sodium solutions in a hospital eye clinic [12]. A subsequent study failed to colonise sterile strips of fluorescein that were inoculated with the bacteria [13]. It would seem therefore that the introduction of fluorescein from sterile strips wetted with a sterile saline solution would seen to be unlikely to exacerbate any infection.

So should we encourage contact lens practitioners to use fluorescein more often? While the debate continues about the significance of superficial punctate staining of the cornea and its relevance there is no doubt that fluorescein staining indicates an insult to corneal integrity whether it be in the contact lens wearer or non-wearer, in which staining is also frequently found [3]. The peer-reviewed standard for good clinical practice in the UK, The College of Optometrist’s guidelines are clear on the need for the use of “diagnostic agents” although they fall short of specifying which are to be used. Personal correspondence with eye care practitioners from around the rest of Europe indicates that such guidelines do not always exist to define the scope of good clinical practice.

Practitioners who report using fluorescein the least are also those that report seeing the lowest incidence of corneal staining. While it could be argued that their belief that corneal staining is a rare event drives their behaviour in not using the agent more, discussions with those practitioners tends not to support this contention. The practitioners who use fluorescein, see staining incidences that are more in line with the literature. While not all corneal staining is clinically significant or requires intervention, if the practitioner knows that it is there then an informed clinical judgement can be made.

The arguments for not using the agent seem to be somewhat flawed in modern contact lens practice and it is hoped by education and wider communications of the value of staining that more practitioners use it more often.

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**References**