**LETTERS TO THE EDITOR**

**Superglue accidents and the eye — causes and prevention**

Editor — Ocular superglue accidents have been described and suggestions for prevention made but they continue to occur. A review of two cases and the literature has led us to suggest that a simple change in superglue packaging design would greatly reduce the incidence of these accidents.

A 27-year-old man accidentally had superglue (nail fastening glue, cyanoacrylate) dropped into his right eye instead of chloramphenicol (Fig 1). His general practitioner had prescribed oral erythromycin 250 mg four times daily and the chloramphenicol eye drops for recurring folliculitis 2 days earlier.

On examination the right eyelids were glued shut. A decision to await spontaneous separation of the lids was made, his erythromycin continued, and chloromycetin eye ointment commenced instead of drops.

On review 4 days later the lids were still fused and a decision was made to separate them under general anaesthesia. Postoperatively he had a small corneal abrasion which healed uneventfully.

The second case was a 17-year-old man who developed severe right eye pain after mistaking (in darkness) a superglue preparation for an over the counter eye medication which he used for a mild itching of his eyes.

On examination the lids were completely stuck down together and his eye was fixed beneath them. He was given chloromycetin to put over the juncture of the lids and spontaneous separation awaited.

Four days later there was a small yellow discharge from the eye, the lids were partially open, and the eye was mobile underneath. The glue was predominantly stuck to the lashes and the bulk of it was trimmed away with some of the lashes permitting the opening of the eye which was otherwise normal. He remained well at review 4 days later.

Mistaking cyanoacrylate for ophthalmic preparations is well recognised and has been attributed to carelessness, poor vision, and childhood naivety. Complicit in this is the use of plastics of similar texture for bottles of similar shape, size, and mechanism of use.

Suggestions for prevention have included (1) keeping medicines and superglue separate, (2) to keep red bottle tops for superglue (though this was the situation in our first case), (3) to have superglue preparations with similar packaging to medications banned, and (4) to have distinctive bottle shaping. We recommend the use of the snap safe lid (Fig 2). This childhood lid lock requires the alignment of two arrowheads for opening, demanding of the user an understanding of the opening mechanism (a childhood factor), careful inspection (reducing carelessness), and the ability to see the arrowheads align (reducing accidents as a result of poor sight or in darkness). A warning label on or adjacent to the lid would be a useful addition. Convenience in packaging and use of the superglue product would be preserved.

It is likely that these two accidents would have been prevented had this opening mechanism been used for the superglue product.

The effects of superglue accidents include severe eye pain, corneal abrasion, punctate epithelial keratopathy, conjunctival epithelial abrasion, loss of lashes, and eyelid skin excoriation, as well as the associated initial fear and tarsorrhaphy. Dermatitis, burns, and accidental oral administration have also been described. Change is clearly needed and the snap safe lid on superglue bottles would offer a simple and convenient way to prevent these accidents.

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**Excimer laser PRK and corticosteroid induced IOP elevation: the tip of an emerging iceberg?**

Editor — We have been performing excimer laser photorefractive keratometry (PRK) with a VisX 20/20 laser for the correction of myopia and myopic astigmatism over the past year. Detailed preoperative assessment and frequent postoperative review include assessment of intraocular pressure (IOP) using a Goldmann-type applimation tonometer. IOP is recorded preoperatively, at 1 week and again at 1, 2, 3, 4, and 6 months after PRK. Following PRK all patients are given topical fluorometholone 0-1% four times daily (FML, Liquifilm, Allergan, UK) to the treated eye for a minimum of 3 months as part of the standardised treatment regimen. Analysing the range of postoperative IOP measurements, we were surprised that, having treated more than 100 myopic eyes, no patient with a rise in IOP (of >4 mm Hg) secondary to this topical steroid use had been seen. One week after PRK 92% of these eyes had an IOP less than or equal to their preoperative level. However, of greater interest, at 3 months 60% of eyes (n=58) exhibited an IOP less than their preoperative level, and a total of 78% were equal to or less than preoperative IOP level despite continuous use of topical fluorometholone. No patient had a rise of IOP of greater than 4 mm Hg compared with preoperative IOP, and no IOP measurements greater than 22 mm Hg were encountered. It is noteworthy that Atkins et al recently reported a statistically significant drop in measured IOP in 118 eyes following PRK, but the authors of this study did not expand upon this rather unusual observation. The US Food and Drug Administration (FDA) controlled excimer laser PRK studies have utilised varied post-
operative topical corticosteroid regimens for up to 6 months after PRK, however, in studies that have predominantly utilised fluorometholone 0.1%. Sher et al detected no elevations in IOP greater than 22 mm Hg (n=16); however, a few demonstrated only one case of significantly elevated IOP (n=23); and Salz et al observed only five eyes with elevated IOP in a study of 160 eyes. In two large studies utilising dexamethasone 0.1% in the postoperative regimen, Machet et al demonstrated mild elevation in IOP (21–29 mm Hg) in 13%–6% and marked elevation of IOP measurement (>30 mm Hg) in 8%–2% of eyes respectively (n = 147). They concluded that corticosteroids had a significant rise in IOP in only 12% of eyes.

Several studies have demonstrated a rise in IOP following prolonged administration of topical steroids in 30% or more of the ‘normal’ subjects, with an elevation of greater than 5 mm Hg in 1%–2% of eyes. None of the less, the prospective studies have demonstrated a mean elevation in IOP of >4 mm Hg after 6 weeks of fluorometholone administration and an elevation of greater than 5 mm Hg in 8% of eyes. On these latter observations, we would have anticipated identification of five or more cases of significant IOP elevation (greater than 5 mm Hg) in the reported group.

A rise in IOP in this small study may lie in the inherent inaccuracies of the Goldmann applanation tonometry technique, which may be compounded by the modifications to the central corneal thickness and curvature caused by the PRK ablation zone. Applanation tonometry is based on the Imbert–Fick principle which states that when a sphere is filled with a liquid at pressure P, the pressure P can be determined by finding the surface tension pressure P, which is needed to flatten the surface of the sphere. In ideal circumstances the pressure P = P. Interestingly, Maklakoff reported in 1885 that when an applanation tonometer was used on a hollowed out glass, if its accuracy in differing characteristics would not be sufficient to compare relative values, whereas, in the same year Imbert looked at the forces involved in tonometry, given that the central corneal thickness and curvature, area of contact, etc and was of the opinion that, contrary to Maklakoff’s theory, the force exerted was equal to the IOP. The subsequent assumptions of the Imbert–Fick ‘principle’ include that the cornea is thin, perfectly elastic, and exerts no other forces itself and no adjustment is made for the surface tension of the precorneal tear film, nor is the corneal curvature taken into account in the calibration of the tonometer. It has been shown that in eyes with low-tension glaucoma, the cornea is significantly flatter than in ‘normal’ eyes matched for sex and age, suggesting that a flatter cornea may give rise to erroneously low IOP measurements as assessed by Goldmann tonometry. It has also been confirmed that there is a positive correlation of measured IOP with increasing central corneal curvature. Significantly, manometric studies of human eyes undergoing cataract surgery have demonstrated that central corneal thickness can significantly affect applanation IOP measurements, with a mean IOP underestimation of 5–2 mm Hg when the central corneal thickness is 0.45 mm."

Therefore, in conclusion, we postulate that the combination of relative flattening and thinning of the central cornea following excimer laser PRK may contribute to a falsely low IOP reading by Goldmann applanation tonometry with the manometric hypothesis being an error of as little as 4–6 mm Hg, although such an error in measurement is likely to be greater in eyes with higher attempted myopic corrections and greater depth of central ablation. However, in these circumstances, the relatively small magnitude of fluorometholone induced IOP elevation may be inaccurately measured as ‘normal’, providing an apparently absent or reduced postoperative incidence of this complication. Since dexamethasone produces both a greater incidence and greater magnitude of IOP elevation in comparison with fluorometholone, it is not surprising that steroid induced hypertension has been noted using a dexamethasen regimen. However, possibly because of falsely low IOP measurements after PRK the incidence of elevated IOP in these series is less than might be anticipated. This hypothesis has obvious implications for the future as it is estimated that in Britain alone more than 100 000 people will have eximer PRK in the next 5 years. It is imperative for ophthalmologists and optometrists to appreciate that, in patients with a history of PRK, the applanation tonometer may not always provide accurate measurements of IOP. Under these circumstances, and until definitive studies can be completed regarding glaucoma as an absolute contraindication to PRK, with ocular hypertension and a strong family history of glaucoma being relative contraindications to PRK treatment. We are presently undertaking a larger prospective study to measure variables such as diurnal variation, and other factors which may influence IOP measurement, in addition to laboratory based experimental manometric studies to determine the relative importance of post-excision laser changes in corneal curvature and thickness upon Goldmann applanation tonometric measurements.

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BOOK REVIEW


This excellent little book is one of a series of ophthalmology monographs from the American Academy of Ophthalmology which covers more than the title suggests. It is really an easy to read objective review of modern cataract surgery.

There are 10 well referenced short chapters, each concluding with a summary. At the end of the book is a self study examination of 20 multiple choice questions with answers and discussion. The first four chapters, after a historical review of cataract surgery, describe the manufacture of intraocular lenses, the materials used, and the styles available. The pros and cons of each are discussed as objectively as possible with backup from trials where available. The remaining chapters discuss the practical aspects of cataract surgery with lens implantation.

A discussion of modern techniques is again very balanced, urging caution before rushing into the latest fad before it has stood the test of time. There are chapters on patient evaluation and selection, the complications, and results of lens implantation.

I enjoyed this book very much. At every stage of choice the evidence is presented where available. When none has been gathered and opinion taken over this is made clear, in contrast with much of the current ophthalmic press which presents so much of the individual surgeons’ whims.

There is enough in this book for the young ophthalmologist to approach practical cataract surgery and the examiners with confidence, but it also clarifies the mind of the more mature in facing representatives from lens companies.

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