Narrow Strip Conjunctival Auto Graft for Treatment of Pterygium

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Recurrence of pterygium is the most common complication of pterygium surgery. Although recurrence rate are more favorable with a conjunctival auto graft than with bare sclera techniques no single approach has demonstrated absolute effectiveness against recurrence.

The aim of this study, which was conducted at Cole eye institute, Cleaveland, Ohio was to determine the efficacy of narrow strip conjunctival auto graft surgery in the treatment of pterygium. It was designed as a retrospective non-comparative interventional case series study. 21 consecutive interventions were studied in 20 eyes of 18 patients for primary (n =17 cases) or recurrent (n =4). Pterygia exhibited at least 3 mm of corneal extension with progression towards visual axis in 19 out of 21 cases. The rate of limbal/ corneal recurrence at 12 months after conjunctival auto graft was defined as primary outcome measure and was assessed by the primary surgeon.

All surgeries were performed under retrobulbar anesthesia. Pterygium excision was performed as usual and anterior margin of conjunctival wound was sutured directly to sclera anterior to the rectus muscle insertion with 10-0 Vicryl to form the posterior margin of bare sclera zone. A narrow 2 mm wide free superior conjunctival epithelial auto graft was fashioned with Wesscott scissors. A 1 to 2 mm zone of undisturbed conjunctiva was preserved posterior to limbus to ensure that limbal stem cells were not violated. The graft then was transplanted to pterygium excision site and was sutured to limbus and sclera anteriorly and posteriorly with 10 –0 vicryl. Suturing of graft and conjunctiva in this manner allowed a 2 to 3 mm zone of bare sclera between the two.

At one year and all the points there after 18 out of 19 (94.7%) cases were free of recurrence. The lone recurrence occurred inferiorly in an eye that had undergone an adjacent narrow strip conjunctival transplantation 6 months for a recurrent temporal pterygium previously and that remained recurrence free after a second surgery.

According to authors, the narrow strip technique appears to offer many advantages over other conjunctival auto graft techniques. Harvesting a narrow conjunctival graft may be less traumatic to the superior bulbar conjunctival procurement site than harvesting a larger graft. This approach also preserves limbal stem cells from the donor site. The concept of an intervening water shed zone may provide additional protection against limbal /corneal recurrence. The direct scleral fixation of graft and conjunctival wound may promote active migration of epithelium over bare sclera which in turn provides a barrier to fibro vascular proliferation by augmenting epithelial scleral adhesion and eliminating the potential subepithelial/ Tenon’s space that might provide the avenue for pterygium recurrence. One could argue that this effect is no different from bare sclera excision technique. However it is possible that the epithelium emanating from graft is different and likely healthier than that originating from conjunctival wound at the cut edge of pterygium.
Diurnal Variation of Central Corneal Thickness and Goldmann Appplanation Tonometry Estimates of Intraocular Pressure

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Elevated intraocular pressure (IOP) is a major risk factor for the development and progression of glaucoma, a disease responsible for 12.3 % of blindness worldwide. IOP undergoes a natural diurnal variation of approximately 2-6 mm Hg in normal eyes that may be higher in glaucomatous eyes. Due to this variability, and evidence that suggests the risk of glaucomatous damage is related to the maximum IOP or magnitude of fluctuation during the diurnal cycle, clinicians are advised to conduct multiple measurements over the course of a day to determine the IOP profile of at – risk patients.

Goldmann appplanation tonometry is the “gold standard” instrument for the assessment of IOP, but the accuracy of this device is believed to be influenced by corneal properties such as central corneal thickness (CCT) and hydration. CCT has shown to increase overnight as a function of hydration by approximately 2.9% to 5.5%, and return to baseline within 1 to 2 hrs of awakening. It may be hypothesized that the diurnal variation of CCT and corneal hydration may influence the accuracy of measurement of diurnal variation of IOP made using the Goldmann tonometer, but previous studies have indicated that the diurnal variation of CCT is too small to have a significant effect.

The aim of the study was to determine whether there was a temporal correlation between the diurnal variation of CCT and IOP, as measured by Goldmann appplanation tonometry in young healthy adults, with an emphasis on the time period after the eye opening. The presence of a relationship may indicate that the accuracy of tonometric estimates of IOP is influenced by the diurnal variation in CCT.

This study is from school of optometry and basic science, University of New South Wales Sydney. Twenty five eyes of 25 young healthy normal participants were examined in this prospective observational cross-sectional study. IOP, CCT and corneal curvature were measured using standard clinical techniques over a 24 – hour period, and the temporal interrelationships between these parameters were examined.

The results showed that overnight change in IOP measured by Goldmann tonometry was 3.1 +/- 2.4 mm Hg (p<0.001), CCT was 20.1 +/- 10.9 micrometer (p=0.016), with no statistical change in central corneal curvature (0.05mm, p=0.477,). Both IOP and CCT were highest on awakening at 7.00 then dropped rapidly to baseline levels by 9:00 and these two parameters were highly correlated (r=0.978,p<0.001). After 9:00, there was no correlation between these parameters (r=-0.453, p=0.260). The peak value of IOP was recorded at or near eye opening in the majority (17 of 25, 68%) of participants whereas the minimum value tended to occur mid-afternoon.

The results of this study indicates that IOP and CCT fluctuate in distinctive patterns over a 24-hour period; all were significantly higher on eye opening than immediately before sleep, decreased rapidly for up to 2 hours, then became relatively stable for the remainder of the day. According to authors this is the first study to show that CCT and IOP were highly correlated during the 2-hour period after eye opening.

The overnight increase in IOP is thought to be due to the supine position adopted during sleep, reduction of ambient illumination, the change from light to dark conditions, the stage of sleep, and various circulating chemicals such as cortisol. These factors are removed on awakening and thus may at first seem to explain the subsequent rapid decline in IOP between 7:00 and 9:00. However the participants in this study were required to awake and up right for 15 minutes before
IOP measurement with the intentions of avoiding the IOP changes associated with waking process.

The cornea increases in thickness overnight due to the relative hypoxia, decreased osmolarity and increased temperature that occur under the closed eyelid during sleep, and as anticipated, there was a significant diurnal fluctuation in CCT in this study. A limitation of this study may be the selection of young, healthy participants with no ocular pathology, because the results may not necessarily be applicable to the glaucomatous population, as there may be specific corneal changes in older participants and in glaucomatous participants.

The results of this study may have a substantial influence on the clinical assessment of IOP. Although it is inappropriate to make absolute conclusions in the absence of being able to measure the true IOP, it seems likely that the diurnal variation of CCT interferes considerably with the accuracy of IOP measurements for the first 2 hours after waking. As a result, clinicians should interpret IOP results obtained during this period with caution, as there may be errors resulting from variations in CCT if patients are seen outside normal working hours, or in patients with unusual sleep patterns such as shift workers.

Atropine for the Treatment of Childhood Myopia

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Myopia is the most common eye disorder in humans. Studies indicate that the incidence rates of myopia in Asia are rising. The widespread prevalence and the rising rates, the associated visual morbidity and consequent diminution of quality of life and social disability, and the substantial costs incurred for its correction make myopia a significant public health concern. Recent clinical trials of a variety of interventions, such as progressive addition lenses and rigid gas-permeable contact lenses, have yielded disappointing results or positive results of marginal clinical significance.

To date, only topical atropine, a non-selective muscarinic antagonist, has been demonstrated through relatively small randomized trials to have some clinical effect on the progression for myopia. However, these atropine studies suffered from various methodological shortcomings such as lack of regular and detailed follow-up examinations, absence of appropriate clinical controls, and absence of masking of participants and investigators.

Aim of the study, which was conducted at Singapore National Eye Center, Singapore, was to evaluate the efficacy and safety of topical atropine, a non-selective muscarinic antagonist, in slowing the progression of myopia and ocular axial elongation in Asian children.

It was designed as parallel group placebo controlled randomized double mask study were 400 children aged 6 to 12 years with refractive error of spherical equivalent of −1.00 to −6.00 diopters (D) and astigmatism of −1.50 D or less participated. Participants were assigned with equal probability to receive either 1 % atropine or vehicle eye drops once nightly for 2 years. Only one eye of each subject was chosen through randomization for treatment. All children regardless of their treatment allocations were prescribed photocromatic glasses for correction of their refractive error. To minimize the observational bias neither the study participants nor the investigators were aware of the interventions given. The atropine and the placebo were packed in identical packets and both pupils were dilated when the children were presented before investigators.

The main efficacy outcome measures were change in spherical equivalent refraction as measured by cycloplegic autorefraction and change in ocular axial length as measured by ultrasonography. The primary
safety outcome measure was the occurrence of adverse events.

Three hundred forty-six (86.5%) children completed the 2-year study. After 2 years, the mean progression of myopia and of axial elongation in the placebo–treated control eyes was $-1.20 +/-.069$ D and $0.38 +/- 0.38$ mm, respectively. In the atropine–treated eyes, myopia progression was only $-0.28 +/- 0.92$ D, whereas the axial length remained essentially unchanged compared with baseline ($-0.02 +/- 0.35$ mm). The differences in myopia progression and axial elongation between the 2 groups were $-0.92$ D (95% confidence interval, -1.10 to -0.77 D; $p<0.001$) and $0.40$ mm (95% confidence interval, 0.35-0.45 mm; $p<0.001$), respectively. No serious adverse events related to atropine were reported.

The results in the study show that once nightly dose of atropine 1% drops achieved a reduction in progression of low and moderate childhood myopia compared with the placebo treatment that is both statically and clinically significant. Over a period of 2 years treatment achieved approximately 77% reduction in mean progression of myopia compared to placebo treatment and this finding is strongly corroborated by the concomitant findings in ocular biometry. Authors claim that compared to other similar studies this study stands apart because of its design and presence of several controls.

Much like the cause of myopia the mechanism of action of atropine in retarding the progression of myopia and axial elongation is not understood clearly. Further research is required to elucidate the mechanism of action, to evaluate the safety and efficacy of bilateral atropine treatment beyond 2 years, and to identify the characteristics of children who will derive maximum benefit from this treatment.