New myopia treatment with daily Atropine 0.01% drop

BY SHUAN DAI* 

Myopia is a major public health issue and millions of children are impaired due to uncorrected refractive errors. According to the World Health Organization (WHO) the majority of these are from myopia alone. In the Western world, including New Zealand, 39% of adults have myopia and the number increases to 80% or more in China, Singapore and Hong Kong.

On an individual level, the physical and financial burden of myopia correction, whether being spectacle or contact lens wear is a lifelong cost these myopes must endure. At the community and public health level this has proved to be a costly and significant health issue facing developing and developed nations alike.

In the United States alone the estimated cost of refractive correction by glasses for distance visual impairment amounts to US$3.9 to US$7.2 billion dollars annually, without considering the cost of refractive eye examinations. The cost increases considerably if one factors in the cost of managing complications of myopia such as retinal detachment.

Over more than three decades eye care professionals worldwide have been exploring methods to slow down myopic progression. These efforts include eye exercises, Chinese acupuncture, rigid gas permeable contact lens and the more recent introduction of dual focal contact lens and use of progressive glasses, all with limited success.

Atropine is a non-selective muscarinic antagonist. As we have known for many years, 1% atropine used on a daily basis in childhood can slow the progression of myopia. However, there has been no controlled trial to verify its efficacy and there are many problems associated with this treatment, including inconvenience, the cycloplegic effect, and the rebound progression of myopia that occurs after stopping the medication.

It is uncertain how atropine acts to inhibit myopia progression. Initial inhibition of accommodation was thought to be important, but subsequent studies have shown that atropine also inhibits myopia in animals, such as in chickens, that have no accommodative facility.

One theory is that atropine and other muscarinic antagonists may have biochemical effects on the retina or sclera, which in turn affects remodeling of the sclera. Another theory suggests that increased lid exposure or, secondary to pupil dilation, may increase collagen cross-linking within the sclera, thereby leading to scleral growth and axial elongation which can be seen in higher myopes.

In the ATOM1 study, published by the Singapore researchers in 2006, 460 children aged 6-12 years with spherical equivalents of -3.00 and -6.00 D were randomly assigned to atropine 1% and placebo medication in one eye.

At the end of two years, the mean myopia and axial length progression in the ATOM1 study were -0.2±0.29 D and -0.02±0.25mm, respectively, in the atropine 1% eye, compared with -1.80±0.06D and +0.38±0.31mm, respectively, in the placebo eye. However, there were issues with the side effects of the 1% atropine drops such as prolonged pupil dilation, glare, loss of accommodation and the need for transition progressive spectacles to help with reading.

The ATOM2 study, published in Ophthalmology in 2013 from the same research group in Singapore, aimed to study the efficacy of weaker atropine drops on myopia progression. In this latest study a nightly dose of atropine 0.5% was compared with 1% and 0.1% every two-year period. The ATOM2 study involved 400 children aged 6-12 with at least -2D of myopia and with progression of at least -0.25D per year. At the conclusion of the two-year trial the rates of myopia progression were -0.30 ± 0.63D, -0.38 ± 0.60D and -0.49 ± 0.60D in the 0.5%, 1% and 0.1% groups respectively. There was no significant difference between 0.5%, 1% and 0.1% myopia progression.

Progression of less than -0.7 D occurred in 60%, 59% and 58% respectively in the atropine groups in all these studies, which are significantly less than the ATOM control group with a mean rate of progression of -1.25D over the same time. However, contrary to expectations, atropine 0.01% also had significant clinical effects on myopia progression. The myopia progression rate in this group (0.49±0.60 D/2 year) was less than -1 when compared with the 2.09±0.60 D/2 years in the ATOM1 control groups. In addition, the ocular side effect profile was significantly better with accommodation and visual acuity.

A follow up study, Atropine for the treatment of childhood myopia changes after stopping atropine 0.01%, 0.1% and 0.5%, which was published earlier this year. Three years after stopping atropine treatment the overall myopia progression in the 0.5%, 1% and 0.1% groups was 1.15±0.61D, -1.04±0.83D and -0.72±0.72D respectively. The rebound is much less in the 0.1% atropine group and this result is very significant when compared to the ATOM control group where -1.2 D progression was observed during the two-year period. These findings are very promising for myopia progression control and 0.01% atropine is now considered as a poor treatment in many parts of the world for myopia progression.

The findings from these studies are mainly observed in large Chinese ethnic children and as of today these are randomised study of the European population, though we expect the results will be similar.

Over the last two years at Eye Doctors we have treated over 20 myopic children with 0.01% atropine. They all have myopia of more than 2D with documented progression of more than -0.30D in the year prior to treatment. In date we have found that none of those on treatment have myopia progression of more than -0.25D on average. There were no significant side effects such as light sensitivity, blurring near vision or allergic reactions. This treatment is currently not funded by the government. Both parents and child with myopia and interested in the treatment the parents can contact Eye Doctors for assessment and treatment options.

In conclusion atropine 0.01% is a safe and the effective treatment for myopia progression with no known significant side effects.

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REFERENCES:


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