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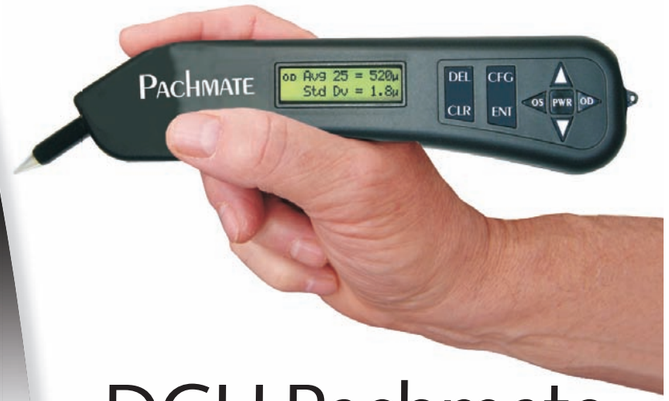

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Parental Predictors of Poor Visual Outcome with Occlusion Treatment for Unilateral Amblyopia

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ABSTRACT

Aim: Visual acuity outcome of amblyopia treatment depends on the compliance. This study aimed to determine parental predictors of poor visual outcome with occlusion treatment in unilateral amblyopia and identify the relationship between occlusion recommendations and the patient's actual dose of occlusion reported by the parents.

Methods: This study comprised three phases: refractive adaptation for a period of 18 weeks after spectacle correction; occlusion of 3 to 6 hours per day during a period of 6 months; questionnaire administration and completion by parents. Visual acuity as assessed using the Sheridan-Gardiner singles or Snellen acuity chart was used as a measure of visual outcome. Correlation analysis was used to describe the strength and direction of two variables: prescribed occlusion reported by the doctor and actual dose reported by parents. A logistic binary model was adjusted using the following variables: severity, vulnerability, self-efficacy, behaviour intentions, perceived efficacy and treatment barriers, parents' and childrens' age, and parents' level of education.

Results: The study included 100 parents (mean age 38.9 years, SD ±9.2) of 100 children (mean age 6.3 years, SD ±2.4) with amblyopia. Twenty-eight percent of children had no improvement in visual acuity. The results showed a positive mild correlation (kappa = 0.54) between the prescribed occlusion and actual dose reported by parents. Three predictors for poor visual outcome with occlusion were identified: parents' level of education (OR = 9.28; 95%CI 1.32-65.41); treatment barriers (OR = 2.75; 95%CI 1.22-6.20); interaction between severity and vulnerability (OR = 3.64; 95%CI 1.21-10.93). Severity (OR = 0.07; 95%CI 0.00-0.72) and vulnerability (OR = 0.06; 95%CI 0.05-0.74) when considered in isolation were identified as protective factors.

Conclusions: Parents frequently do not use the correct dosage of occlusion as recommended. Parents' educational level and awareness of treatment barriers were predictors of poor visual outcome. Lower levels of education represented a 9-times higher risk of having a poor visual outcome with occlusion treatment.

Keywords: amblyopia, visual outcome, parental predictors, educational level, treatment barriers

INTRODUCTION

Amblyopia has a prevalence of approximately 2% to 4% in the population and is a form of cerebral visual impairment caused by a deprivation of vision or abnormal binocular interaction.[1] This condition is characterised by abnormal neuronal numbers and connections in the visual pathway and cortex caused by a disturbance of vision during a sensitive period of development.[2] Amblyopia is not always effectively treated by wearing spectacles and is unrelated to any structural abnormality.

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The management of amblyopia is a challenge for clinicians and continues to be the subject of clinical research. Early treatment of amblyopia, during the critical period, leads to a better outcome than later treatment.[3,4] Mainstream treatment for unilateral amblyopia involves refractive correction with spectacles and/or occlusion by patching or penalisation of the fellow eye.[5]

Whilst effectiveness of occlusion therapy for amblyopia is a research priority,[5,6] there is a lack of research into the risk factors associated with poor visual outcomes. Several studies have suggested that one of the factors influencing outcome with amblyopia treatment is the level of compliance with occlusion therapy.[7-11] However, risk factors associated with poor compliance and parental predictors of compliance with amblyopia treatment continue to remain unknown, particularly given that the

approach to treatment is not standardised and is different for each patient.[12]

It is well known that occlusion of the dominant eye can be problematic due to the forced use of the degraded vision of the non-dominant eye. Also skin irritations can be caused by adhesive patches. Children who wear glasses and use a patch are also more likely to be victims of physical or verbal bullying[13] which potentially affects their willingness to participate in treatment. Parents' difficulties in patching their children are also common and can cause great distress within the family.[14,15] Parents report having difficulties with occlusion therapy regardless of the child's age, with fewer parents reporting difficulties when the child is treated with glasses alone.[15] Recent investigations associate poor compliance with parental fluency, country of origin, educational level and initial visual acuity of the child.[16]

This study aimed to investigate parental predictors of poor visual outcome with occlusion treatment in unilateral amblyopia and to identify the relationship between occlusion recommendations and the patient's actual dose of occlusion as reported by the parents. This investigation contributes to the understanding of the relationship between health advice and parents' behaviour and quantifies the effect of various parental predictors (risk factors) of poor visual outcome with occlusion treatment for unilateral amblyopia.

METHOD AND STUDY DESIGN

Ethics approval for this study was obtained from the local ethics committee. Informed consent was obtained from the parents of the children after the nature of the study was explained.

This prospective study comprised three phases: (i) spectacles and refractive adaptation for a period of 18 weeks, (ii) occlusion of 3 to 6 hours per day for a period of 6 months and (iii) questionnaire administration to parents of amblyopic children with strabismic and/or anisometropic amblyopia. A convenience sample was used to recruit participants.

Each child underwent an ophthalmic evaluation consisting of an assessment of visual acuity, cycloplegic retinoscopy, fundoscopy, fixation behavior and binocular function. After this evaluation, spectacles were prescribed where appropriate. Given that there is evidence to suggest that amblyopia improvement with optical correction alone occurs in one-quarter of patients[6] and by 18 weeks of spectacle wear,[17] spectacles were prescribed full-time and participants were reviewed at 6-week intervals for 18 weeks prior to any occlusion treatment being prescribed.

Children were eligible for inclusion in the study if they (i) were under 8 years of age, (ii) were diagnosed with moderate unilateral strabismic and/or anisometropic amblyopia, defined as 6/12 to 6/30, or had three lines difference between the visual acuity of both eyes and with vision in the sound eye better than 6/12[6] and (iii) had been prescribed 2 to 6 hours of occlusion therapy per day for a minimum of 6 months. Children with ocular pathology or developmental delay were excluded.

Occlusion was prescribed according to a standardised treatment protocol of 2 to 6 hours of occlusion therapy per day for a minimum of 6 months. Occlusion was not objectively monitored. The orthoptists carrying out the vision tests had no knowledge of the factors determining participation in the study.

Visual acuity was used as the measure of visual outcome, classified as a categorical variable, improvement or no improvement, based on visual acuity results after 6 months of treatment. Improvement was considered to have occurred in cases where the visual acuity improved at least one line after 6 months of occlusion. Visual acuity was recorded using age-appropriate methods of assessment. Children were tested with their optical correction at 6 metres with either the Sheridan-Gardiner singles test or Snellen acuity chart. The same test was used for each child during the study period, even if they were able to progress to another test.

Parents were asked to participate by filling out a self-administered questionnaire. For this study, "parent" was defined as the full-time guardian or the person who administered the occlusion treatment. The questionnaire consisting of 51 items was based on the main components of Roger's Protection Motivation Theory (PMT). This theory brings together three cognitive appraisal processes, which are commonly considered in fear-arousing situations.[18] These involve: a perception of the severity of a potentially harmful situation; a perceived vulnerability or susceptibility to harm; and a perception of how likely a particular course of action was to reduce or prevent the threat, labelled response efficacy. A fourth cognitive mediator was added to the model; the expectancy that one can perform particular actions, labelled self-efficacy.[19] This fourth model was adopted in this study because it takes into account the decision to make specific protective health behaviours or, alternatively, produce a maladaptive response; the threat appraisal process and the coping appraisal process. Protective health behaviours are those which reduce risk or threat. In this study protective health behaviour relates to the parents' full involvement in their child's occlusion rehabilitation program.

The questionnaire was translated from Searle et al[20] into Portuguese. It contained six sections divided into two parts. The first part included questions relating to demographics and socioeconomic status, including information about occlusion. Parents were also requested to provide details on the health care provider's recommendations for patching their child and how many hours, on average, they were presently achieving. The second part included questions

relating to the study variables regarding parents' experiences with occlusion therapy in the last 6 months. Responses to individual items were measured on a 5-point Likert scale: 1 - totally agree; 2 - agree; 3 - meaningless; 4 - disagree; 5 - totally disagree (Table 1).

Table 1. Questionnaire administered to parents

Psychosocial variables		**Examples**
Severity		I am worried about visual problems of my child.
Self-efficacy		The visual acuity of my child is going to get better if she patches every day.
Treatment barriers	Stress perception	Patching my child is stressful.
	Limitations	When my child is patching she can't play.
	Stigma	The appearance of my child with the patch bothers me.
Percieved efficacy		I patch my child easily.
Behaviour intentions		I am going to patch my child like my health care provider recommends.
Vulnerability		If left untreated my child is going to have problems at school.

To determine the questionnaire's internal consistency, a pre-test was undertaken using a sample of 30 respondents. Cronbach's alpha was used to evaluate internal consistency for each variable. The internal consistency estimate of reliability for each variable was as follows: severity (α = 0.63); self-efficacy (α = 0.77); treatment barriers (α = 0.82); perceived efficacy (α = 0.88); behaviour intentions (α = 0.87) and vulnerability (α = 0.88)

After collecting the data, the association between visual outcome (no-improvement and improvement) and a number of factors was assessed. These included childrens' age, parents' age, and parents' educational level, either 'basic' (secondary education or less) or 'higher' education. Associations between visual outcome and the various components of the psychosocial variables of Roger's Protection Motivation Theory (Table 1); and interactions between perceived efficacy and self-efficacy, severity and vulnerability, and limitations and stigma were also assessed.

After initial descriptive analysis, correlational analysis was used to describe the strength and direction of two occlusion variables: prescribed occlusion reported by the health care provider and actual dose reported by parents. A logistic binary regression technique was used to estimate the odds ratio (OR) for each factor. The parameters' significance was tested with the Wald test at a 5% significance level.[21,22]

This analysis allowed the investigation of questions of interest including: (i) What is the relationship/ correspondence between occlusion recommendations from the health care provider and the patient's actual dose reported by the parents? (ii) What is the relationship between non-improvement after 6 months of treatment and parents' psychosocial variables? and (iii) What are the parents' predictors for non-improvement of visual acuity after 6 months of occlusion?

RESULTS

All 100 study participants who were approached agreed to participate in this study. The mean age of the 100 parents included in the study was 38.9 years (SD ±9.2). The mother was the most frequent participant (71%). In relation to educational level, 63% of parents had a basic education compared with 37% who had a higher education. The 100 children had a mean age of 6.3 years (SD ±2.4, range 2-8), 51% were male. Prescribed occlusion as reported by the health care providers was 3 hours in 57% of the children, between 4 and 6 hours in 31%, and 6 hours in 12%. Seventy-two percent of children demonstrated improved visual acuity after 6 months of therapy, compared with 28% who showed no improvement.

To determine if the parents were applying the recommended regime of occlusion we assessed the correspondence between recommendations from the health care provider and the patient's actual dose reported by the parents. The results show that there is a positive mild correlation between the prescribed occlusion and the actual dose (kappa = 0.54). The results illustrate discrepancies between the number of hours recommended and parental dosage. From 50 parents who had to patch their child 3 hours, only 43 (86%) complied and 7 parents (14%) were using other dosages. It is curious that some parents reported patching above the recommended dosage with six parents patching between 4 and 6 hours, and one parent patching more than 6 hours. On the other hand, from 38 parents who had to patch between 4 and 6 hours, only 22 (58%) complied. Thirteen parents (34%) reported that their child was patching 3 hours and three parents (8%) reported that their child was patching more than 6 hours.

Binary logistic regression was performed to assess the impact of 14 factors on the likelihood that respondents would have a problem with improvement of visual acuity. The full model containing all predictors was statistically significant, indicating that the model was able to distinguish between respondents whose children's visual acuity improved and those who did not. At a 5% significance level, three risk factors or predictors for no improvement after occlusion, were identified: parents' education (OR = 9.28; 95%CI 1.32-65.41, p = 0.025), treatment barriers (OR = 2.75; 95%CI 1.22-6.20, p = 0.015) and the interaction between severity and vulnerability (OR = 3.64; 95%CI 1.21-10.94, p = 0.022) (Table 2).

Severity (OR = 0.07; 95%CI 0.00-0.72, p = 0.036) and vulnerability (OR = 0.06; 95%CI 0.05-0.74, p = 0.028), when considered in isolation were identified as protective factors that promote compliance with treatment.

Table 2. Reasons for referral

Variable	Odds Ratio (95.0% Confidence interval)
Severity	0.07 (0 - 0.72)
Vulnerability	0.06 (0.05 - 0.74)
Perceived efficacy	0.15 (0.04 - 6.17)
Treatment barriers	**2.75 (1.22 - 6.20)**
Limitations	5.08 (0.29 - 89.71)
Stigma	1.62 (0.44 - 5.96)
Self-efficacy	0.45 (0.04 - 4.60)
Behaviour intentions	1.80 (0.20 - 15.98)
Parents' age	0.97 (0.91 - 1.05)
Childens' age	1.03 (0.83 - 1.29)
Parents' education	
Parents' basic education (1)	**9.28 (1.32 - 65.41)**
Parents' higher education (2)	1.45 (0.41 - 4.98)
Interactions between variables	
Perceived efficacy and Self efficacy	2.30 (0.44 - 12.07)
Severity and Vulnerability	**3.64 (1.21 - 10.93)**
Limitations and Stigma	0.60 (0.25 - 1.43)

Parents with a basic education were found to be a predictor for poor visual outcome with occlusion treatment. To better analyse this finding, Table 3 provides data for educational level and visual acuity improvement. This table shows that most of the children who did not show an improvement in visual acuity after occlusion treatment had parents with a basic education.

Table 3. Parents educational level and visual acuity improvement

Level of education	Improvement (N=72) N (% of improvement)	No Improvement (N=28) N (% of no improvement)
Basic education	44 (61.1%)	20 (71.4%)
Higher education	28 (38.9%)	8 (28.6)

Treatment barriers, such as parents who believed that patching reduced their child's activities like playing and reading, were also found to be negatively associated with visual improvement. Furthermore, the outcome in visual acuity was poorer when parents believed that their child's visual impairment was severe (severity) and associated with future implications (vulnerability). However, when severity and vulnerability were considered in isolation, they were statistically significant as variables that promote compliance.

DISCUSSION

In this study, we examined factors that may influence visual outcome after treatment with occlusion. The optimum outcome of amblyopia treatment is binocular vision, which is best promoted by an equal visual input from each eye.[5] Methodological studies to investigate the effectiveness of occlusion treatment have shown that spectacles alone are a powerful treatment for amblyopia, but that patching is superior to spectacles alone.[23]

The results of this study suggest that parents' level of education could play an essential role in the visual outcome of occlusion treatment. After 6 months of occlusion it was found that 28% of children did not demonstrate an improvement in visual acuity. It was also found that parents very often do not apply the correct dosage of occlusion recommended by the health care providers. The present study suggested that parents with lower levels of education have more difficulties in treatment implementation, resulting in a higher proportion of children with no improvement in visual acuity after 6 months of therapy. Other studies have also found this association.[9,16] In this study we found that these parents represented a risk factor 9 times higher compared with parents with a higher level of education.

The influence of parents' educational level may be related to the interaction or communication between the health care provider and the parent. Parental understanding of technical terms and psychological processes is likely to be limited and may initially be hindered by the emotional arousal engendered in the communication of the diagnosis and treatment plan. The health professional must encourage parents to verbalise doubts and contribute to their child's management to decrease anxiety, increase communication and decrease the time of treatment. Increasing a parent's understanding and thereby compliance to treatment will help lead to positive results in the child's visual rehabilitation. Instructions about treatment objectives can be useful for increasing compliance.[24] Health professionals must also involve parents in finding resolutions to problems related to patching. Parents should be encouraged to repeat instructions about their child's treatment as given by their health care provider, in order to ensure all information is correctly understood. It is essential to allow some time for any clarification of doubts the parents my have about their child's treatment.

This study also found that parents with an awareness of treatment barriers (beliefs regarding prohibition of children's activities or limitations, perceived emotional

distress and stigma) have a risk factor 2 times higher than other parents, consistent with previous published scientific work.[20] Perceived prohibition, or limitations, of the childrens' activities has been found to be negatively associated with compliance because parents have the perception that patching is preventing their children from playing, socialising and reading.

Interaction between severity and vulnerability was also identified as a risk factor for no-improvement in parents with high distress levels associated with treatment implementation, with a risk 3 times higher than other parents. Hence low compliance was influenced by vulnerability, treatment barriers and self-efficacy components associated with parents having high levels of distress.[12] On the other hand, parents with high levels of severity (parents who believe that amblyopia is a serious disease when left untreated) and vulnerability (parents who believe that their children could have amblyopia in the future) are less likely to have compliance problems.

One of the main limitations of logistic regression is that the explanatory variables must not be highly correlated with one another as this could cause problems of estimation. To understand if this could explain the difference in findings between the two psychosocial variables, severity and vulnerability, when analysed in isolation versus in interaction we assessed the correlation between variables. The correlation analysis showed a null correlation with a Pearson correlation of -0.053. These results are important because it demonstrates to health care providers the need to analyse parents' behaviour and their coping strategies in treatment implementation. The current results will help to contribute to the understanding and promotion of compliance interventions.

A further limitation of this study is related to the mechanisms by which the visual acuity improvement was assessed. We cannot exclude the learning effect from repeated testing and the use of Snellen and Sheridan-Gardiner visual acuity tests may have affected outcomes. The advantages of logMAR acuity data over the Snellen fraction are well known, and yet existing logMAR charts have not been adopted into routine ophthalmic clinical use in Portugal.

In conclusion, parents frequently do not use the correct dosage of occlusion as recommended, and parents' educational level and awareness of treatment barriers may be predictors of poor visual outcome. Future studies should be conducted to further investigate these findings and explore additional relationships between visual acuity improvement and other variables. It is also important to analyse compliance variables in children, for example their experiences of distress and anxiety during occlusion treatment and to determine whether cost-effective compliance-promoting strategies can be designed and implemented.

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Minimising Sun-Related Damage to Australian Children's Eyes

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ABSTRACT

Australian children and their families live and enjoy an outdoor lifestyle in an environment with variable and at times, high ultraviolet radiation levels. Generally they have been successfully educated to care for their skin against sun damage. However a similar message regarding the need for eye care has not been as forthcoming. Recent research has shown evidence of sun damage in young Australian children's eyes and indicates the need for eye sun protection. Developing strategies such as wearing hats and sunglasses which aim to minimise eye damage are indicated. In doing this the link between sun avoidance and vitamin D deficiency-related disease needs to be considered.

This paper presents a review of the scientific literature which reports on the prevalence of sun-related eye changes and damage in children's eyes. Possible prevention strategies which offer protection to Australian children's eyes such as sunscreen, sunglasses and hats will be discussed. The need for research in this area will also be highlighted.

Keywords: sun damage, ultraviolet radiation, children

INTRODUCTION

It is well documented that there is a link between sunlight exposure and disease.[1] Australian public health campaigns have existed for many years aimed at encouraging people to protect themselves from the sun. The main focus has been on skin protection, due to the prevalence of skin cancer in Australia. Little public information on the importance of protecting the eyes exists. Challenges occur when formulating recommendations for sun exposure and the eyes when the scientific literature is reviewed. Recently the need to minimise sunlight exposure in children's eyes has been highlighted, as technology has begun to foster an understanding of the presence of sun damage in the eyes of Australian children.[1] Conversely, sun avoidance can pose potential health risks, with a known link to vitamin D deficiency disorders such as rickets.[2] Furthermore, other research suggests that outdoor activity with sun exposure may offer some protection from development of myopia in children.[3] Thus a balance needs to be reached to prevent eye disease linked to lifelong sun exposure without compromising outdoor activities and placing children at risk of disease related to sun avoidance.

Ophthalmohelioses refer to sun-related eye disorders resulting from combined cumulative ultraviolet radiation (UVR) exposure, oxygen and heat causing progressive ocular deterioration and vision impairment.[4] Conditions in this group include photokeratitis, pingueculae, pterygium, cataract, age-related macular degeneration and skin cancers such as basal cell carcinoma.[4,5] The incidence rate of basal cell carcinoma in parts of Australia are amongst the highest rates of cancer in a defined population ever reported.[5] It is also known that prolonged, cumulative UVR exposure, especially related to outdoor occupations, increases the risk of ocular melanomas such as choroidal and ciliary body melanoma.[6]

Thus there is merit in considering UVR prevention strategies in the context of good health which begin in childhood, to minimise the impact of ophthalmohelioses in older age. This paper will present the findings of a literature review funded by the Statewide Ophthalmology Service Agency for Clinical Innovation which examines the available research and discusses the challenges faced in developing these strategies.

THE IMPACT OF ULTRAVIOLET RADIATION

Much has been written on the prediction of safe levels of UVR exposure for skin, which takes into account ambient UVR and seasonal variations, dietary intake of vitamin D and the level of individual skin pigmentation.[2] For example, it is estimated that a person with deeply pigmented skin has the equivalent sun protection as a fair skinned person constantly

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wearing SPF 15 sunscreen.[7] Conversely, synthesis of vitamin D occurs inversely according to skin pigmentation, taking much longer in deeply pigmented than fair skin.[7] However a daily safe level of UVR exposure for the eyes has not yet been established, other than avoiding needless and continuous UVR exposure in extreme environments such as snow, sand and water and in industrial working environments where UVR exposure easily occurs, for example welding.[2]

Ophthalmohelioses can be readily detected in adults by ophthalmic examination. However, measuring the effects of UVR exposure in children is more difficult as early clinical manifestations are not as readily apparent. Recently, ultraviolet fluorescence techniques similar to those which detect signs of UVR exposure-related dermatologic diseases have been used to demonstrate preclinical ocular changes, indicating UVR-related eye damage in children.

Seventy-one Australian children aged 3-15 years underwent ocular examination using ultraviolet fluorescence photography (UVFP), with 23% showing increased fluorescence indicating UVR-related changes; all these children were over the age of 9 years.[1] The UVR changes were detected by UVFP only, and not evident using other ophthalmic techniques. This study also noted that the prevalence of UVR changes increased with age. Ten percent of studied children had established pingueculae on standard photography; these children were all 13 years or older.[1]

The authors acknowledged that the changes detected may have been attributable to other causes and that the eyes with UVR changes may not develop pingueculae or pterygium later in life. However, it was suggested that the ocular changes observed using UVFP may be the earliest indicator of UVR changes in the body. The authors concluded that perhaps UVFP could be used as a universal screening tool for children to detect the preclinical signs of UVR eye damage, leading to parental awareness to prevent further UVR changes and possible eye and systemic disease.

Another study from northern Europe examined 68 children aged 8-15 years, living in an environment of high UVR. The authors found 15% of children had visual field and foveal changes and commented that these children had suffered high unprotected UVR exposure.[8] No other known research reports a link between UVR and eye damage in children.

Individuals may be exposed to up to 80% of their lifetime cumulative ultraviolet radiation before the age of 20 years.[9] Thus the issue of preventative strategies in childhood to reduce ophthalmohelioses later in life needs to be explored. Minimising or avoiding sunlight may be perceived as a possible solution. Sunlight avoidance may occur in individuals who are institutionalised or veiled for cultural reasons. Sun avoidance has been linked to vitamin D deficiency such as rickets in children and osteomalacia and osteoporosis in adults.[2] There is also a suggestion that sunlight avoidance may be linked to other diseases such as bowel cancer.[2]

Findings from the Sydney Myopia Study demonstrated the relationship between sunlight avoidance and the possible negative effect on the eyes. The study examined the refractive status of 2,000 children aged 12-13 years, finding that the time children spent outdoors was negatively associated, with a 23% decrease in the likelihood of having myopia.[3] It was concluded that outdoor activity may provide some protection from children becoming myopic.[3]

STRATEGIES TO MINIMISE ULTRAVIOLET RADIATION

The most common form of sun protection practised by parents and carers for their children is use of sunscreen, with less frequent wear of protective clothing and hats.[10] Studies have found that sole reliance on sunscreen may prevent sunburn but may lead to an increase in the amount of sun exposure a child is allowed thus increasing the UVR exposure to the eyes.[10] Australian schools have generally been proactive in minimising children's sun exposure by increasing the amount of shade available in play grounds and by teachers actively encouraging children to use available shade whilst outside.[11] However, other strategies such as sunglasses and hats should be further investigated for the eye protection they could offer.

SUNGLASSES

The American Academy of Pediatrics described UVR as a hazard to children, including their eyes, and that those children under 10 years of age may be at increased risk for retinal injury because the transmissibility of the lens to damaging visible blue and ultraviolet light is greatest during this period.[12] One of the most obvious strategies available to prevent eye disease from UVR exposure is by wearing sunglasses. Australia was the first country to introduce a national standard for sunglasses known as AS 1067.1-1990 titled "Sunglasses and Fashion Spectacles" in 1971. In 2003 this standard was revised to classify sunglasses and fashion spectacles according to the amount of transmitted UVR. Five categories of lenses were developed and it became mandatory for manufacturers to indicate to consumers through labeling, into which category the sunglasses belonged.

Sunglasses worn by children need to incorporate frames which fit well to the face, close to the surface of the eye to provide maximum protection[12] and which will tolerate bending.[13] The lenses must be secure and impact resistant, manufactured from polycarbonate materials.[13] It is important consumers are warned that a high cost may be a better reflection of the brand or optical quality rather than their ability to reduce or prevent UVR exposure to the eyes.[9]

In 2008, Cancer Council Australia released a position statement titled Eye Protection from Ultraviolet Radiation.[14] The following recommendations were included in the key messages: (i) reduce UVR exposure as much as possible; (ii) wear a broad-rimmed, bucket or legionnaire style hat and (iii) wear close-fitting, wrap-around style sunglasses that meet the Australian Standard AS/NZS 1067:2003 for sunglasses (categories 2, 3 and 4).

The issue of children wearing sunglasses was also addressed with the suggestion that during periods of moderate UVR, that is a UV Index of 3 or greater, children wear sun-protective clothing including a hat which will provide some shade to the eyes; the SunSmart UV Alert which provides the daily UVR being available from the Bureau of Meteorology.[15]

Children spend a substantial period of time in school environments and school programs have been shown to influence children's behaviour towards sun protection through curriculum and policies such as "No hat, no play".[16] Should then, wearing sunglasses be mandatory for children in environments such as school playgrounds and sporting venues? The logistics of enforcing sunglass usage is daunting. An immediate issue would be ensuring that children are wearing sunglasses that reduce the eyes' UVR exposure rather than a pair of fashion spectacles. Parents and carers purchasing sunglasses would need clear instructions regarding how to identify appropriate sunglasses.

The risk of eye trauma from wearing sunglasses in the event of a fall or misuse also needs to be considered. This has recently been studied in the US, with the paediatric population, 0-17 years, having the least number of eye injuries related to wearing glasses when age groups were compared.[17] However this group suffered significantly more injuries related to use of glasses for sport, but it was not reported whether the glasses were prescription or sunglasses.

Introduction of mandatory sunglass usage would also require changes to educational policy and involve support and commitment from governments, schools, parents and carers. The "Kidskin" program conducted in Western Australia aims to reduce sun exposure and improve sun protection behaviours in children. The need to identify a "champion" at an individual school level who could drive participation and acceptance of such a program was highlighted.[16] If sunglass usage is mandated in Australian schools the question of whether this should apply to both primary and secondary school needs to be considered.

Recently, an initiative has begun in a limited number of Victorian and NSW primary schools to introduce sunglass wear for primary school children. The sunglasses are purchased by the school and each child has their own pair which is stored in a labelled, plastic container. The sunglasses are worn each day during recess and lunch. Although not yet considered as part of the school uniform, and it is not compulsory for them to be worn, the sunglass initiative has proven popular with teachers, parents and children.

An additional challenge exists in encouraging teenage children to protect their eyes. Australian teenage populations have been studied previously for their knowledge of the effects of sunlight exposure and their sun protection behaviours. An early study examined trends in sun exposure and protective behaviours in adolescents in all states and territories of Australia, from 1993 to 1999.[18] Students from years 7 to 12 were surveyed, with 78,032 students participating. The outcome of the study showed a significant decrease in use of sunglasses from 1993 to 1999. Further, only 11% of the 1999 cohort reported practising the three protective behaviours of use of a hat, sunscreen and protective clothing.

An Australian study in 2006 surveyed 40 South Australian school students aged 13-18 years to determine their knowledge of the effects of sunlight on the eyes and the need for protection.[19] The results of the survey were then compared to a similar survey conducted in 1995.[20] The 2006 study found a trend of increasing knowledge of the need for sun-protective behaviours with increasing age. The 17-18 years group showed a significantly higher knowledge score than the 13-15 years group. However this knowledge did not ensure a change in behaviour in the group. Seventy-four percent of participants owned a pair of sunglasses, but only 44.5% reported wearing them regularly and 32% wore them occasionally. Also, more than half the participants wrongly believed that sunscreen offered good or fair protection to the eyes, an increase from the 1995 survey.[19] The study found only two-thirds of the 2006 participants acknowledged the risk UVR posed to the eyes. This was significantly lower than the finding in 1995, and the authors commented that the increased efforts by various bodies over the past decade, aimed at increasing awareness of sun-related eye damage in the youth, has not resulted in a significant increase in knowledge.[19]

HATS

It is known that hats effectively reduce sun exposure to the face and head and Australian schools have been proactive in recently implementing policies such as "no hat, play in the shade" policy.[20] In studying outdoor workers in Queensland, it was estimated that consistent outdoor hat-wearing reduced the risk of non-melanoma skin cancers by up to 100 times for basal cell carcinoma and 13 times for squamous cell carcinoma.[21] It is also known that different styles of hats provide varying levels of protection to the face. For example, a hat with a 7.5 cm brim will provide reasonable protection to the cheeks and nose.[22] The shape of the hat has also been found to influence UVR exposure with broad-rimmed and bucket hats providing more protection to the face and head, followed by legionnaire style hats. Baseball

caps provide the least amount of protection to the face and unfortunately these are probably the most popular style to be worn especially by adolescents.[23]

Rather than further complicating the sun protection issue for children by mandating sunglass usage, the role of hats in reducing UVR exposure to the eyes needs to be critically examined. So far, literature is unavailable on how much UVR protection a hat offers to the eyes.

PUBLIC EDUCATION

Whichever strategy is found most suitable, sunglasses, hats or a combination, to reduce UVR exposure to children's eyes, there will need to be a public health awareness raising campaign to support the implementation. Numerous campaigns have been run in the past by the NSW Cancer Council in partnership with NSW Health Department. In evaluating these campaigns for their impact on awareness, knowledge, attitudes and sun-protective behaviours amongst parents and children, it was found that over half of the targeted population was reached. Awareness was highest following a campaign and dropped between campaigns suggesting the need for continued strategies to keep sun protection on the population's agenda, and possibly, development of alternative approaches that have a lasting impact.[24] Programs which educate regarding the deleterious effects of sun exposure and the link to melanoma have been effective in reducing melanoma incidence as mortality rates have stabilised over the past five years.[25] Closer examination of these programs with a focus on reducing the influence of UVR exposure on eyes is highly recommended.

CONCLUSION

The Australian population is increasing and ageing and with this comes a greater incidence of eye disease. Therefore there is merit in ensuring children enter adulthood enjoying good vision and eye health. There is a proven link between lifetime UVR exposure and the likelihood of ophthalmoheliosis. Recent research has shown preclinical signs of UVR damage in relatively young Australian children, although the implication for developing eye disease later is not known.[1]

An urgent need exists to minimise children's exposure to harmful UVR to protect their skin and eyes, within the accepted Australian outdoor lifestyle. Public health campaigns must educate that the eyes as well as the skin require protection, that eye damage will occur from cumulative UVR exposure and that sunscreen will not stop damage to the eyes. Further research is needed to determine the effectiveness of hats in reducing UVR exposure to the eyes. This will contribute to the decision of whether the wearing of hats is sufficient or whether sunglasses should be worn outside to minimise the harmful impact of UVR on Australian children's eyes.

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Spontaneous Resolution of Early Onset Esotropia: Two Case Studies

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ABSTRACT

The case studies of two infants who both presented with a large angle early onset esotropia that resolved completely within the first 12 months of life are presented. Spontaneous resolution of early onset esotropia is uncommon and these two cases highlight the importance of examining infants carefully and repeatedly prior to early surgical intervention.

Keywords: Infantile esotropia, spontaneous resolution, binocular development

INTRODUCTION

Early onset esotropia, also referred to as congenital esotropia or infantile esotropia, is characterised by the presentation of an esotropia within the first 6 months of life. Children with early onset esotropia typically exhibit minimal refractive error, and can later develop any of the following associated features, including inferior oblique (IO) overaction, dissociated vertical deviation (DVD) or latent nystagmus.[1]

Spontaneous resolution of early onset esotropia is uncommon. Reporting possible cases of spontaneous resolution reiterates the importance of the delicate maturation of the visual system that occurs during infancy and highlights the importance of examining infants carefully and repeatedly prior to surgical intervention. This paper presents two cases of patients diagnosed with early onset esotropia who demonstrated spontaneous resolution.

CASE REPORTS

CASE REPORT 1

Miss P presented aged 4 weeks with a history of an esotropia since birth. There was no significant family history, a normal pregnancy and birth. Miss P, other than her right esotropia, was a healthy thriving infant meeting all her developmental milestones

On examination, she was alert and cooperative. All testing was performed for near fixation only. She demonstrated a large right esotropia on corneal reflections which measured approximately 30 degrees using Hirschberg's method. Her visual behaviour showed central, steady and maintained fixation and following ability with each eye, and left fixation preference on cover test.

Miss P's right eye was unable to abduct beyond the midline on ductions whilst presenting a visually attentive stimulus (toy and examiner's face) and by performing post-rotational opticokinetic nystagmus testing. There was no significant refractive error, no nystagmus, and no other significant clinical findings. Due to the limitation of abduction, a magnetic resonance imaging (MRI) was performed to exclude any pathology, particularly along the VI cranial nerve, but no pathology was detected.

At aged 8 weeks, Miss P's esotropia measured up to 50 prism dioptres using the Krimsky method. Her right abduction, tested as previously, had improved to beyond midline, and was graded as a -2 limitation. She maintained left fixation preference and treatment of 30 minutes left occlusion daily was recommended.

At aged 3 months, Miss P had been compliant with occlusion as instructed. Her parents had noted a significant improvement in her esotropia. Alternate prism cover test measured a 10 prism dioptre esophoria. Her right abduction was full, with no evidence of amblyopia or suppression. She was able to fuse a 20 prism dioptre base-out prism presented over either eye. It was recommended that occlusion be ceased.

At Miss P's most recent visit, at aged 6 months, she was orthophoric with no evidence of abduction deficit or amblyopia. A normal fusional response was noted on 20 prism dioptre base-out prism testing.

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CASE REPORT 2

Master J presented at aged 5.5 months with a history of an esotropia since birth. There was no significant family history, a normal pregnancy and birth. Master J, other than his esotropia, was also a healthy thriving infant meeting all of his developmental milestones.

On examination, Master J was alert and cooperative. All testing was performed for near fixation only. On cover test, a large alternating esotropia was measured to be approximately 40 prism dioptres using the Krimsky method. His visual behaviour showed central, steady and maintained fixation and following ability with each eye and no fixation preference on cover test.

Ocular motility showed a mild left abduction deficit which was graded as a -1 limitation. Testing of abduction was performed similarly to Miss P. He had no significant refractive error, no nystagmus and no other clinical defect. Due to the limitation of abduction, MRI was also performed however, no pathology was found. Due to the alternating nature of the esotropia, no occlusion was recommended.

Master J was reviewed at 9 months of age. Alternate cover testing for near showed orthophoria. Ocular motility showed full abduction of both eyes. There was no fixation preference and therefore no evidence of amblyopia. A normal fusional response was noted on 20 prism dioptre base-out prism testing.

DISCUSSION

Spontaneous resolution of an early onset esotropia is uncommon. The most recent Pediatric Eye Disease Investigator Group (PEDIG) study that aimed to identify the probability of spontaneous resolution concluded that 27% of patients are likely to spontaneously resolve by 6 months of age.[2] The study included infants aged less than 20 weeks, examined by an ophthalmologist and diagnosed with an esotropia. Of the 27% of patients who spontaneously resolved, most presented with a variable or intermittent esotropia and measured less than 40 prism dioptres. The authors acknowledged that only one patient with a constant deviation greater than 40 prism dioptres spontaneously resolved, therefore concluding it is less likely that patients with a constant esotropia measuring greater than 40 prism dioptres will spontaneously resolve.

Few cases of spontaneous resolution of early onset esotropia have been reported by other authors. Shon et al[3] reported three cases with spontaneous recovery of early onset esotropia. Their patients presented at less than 6 months of age with an esotropia less than 40 prism dioptres. They resolved at less than 12 months of age. Of particular interest was that with long-term follow-up all three patients later demonstrated poor stereoacuity and the associated phenomenon of DVD and IO overaction, which developed between the ages of 39 and 59 months.

In our cases, Miss P and Master J presented at ages 4 weeks and 5.5 months respectively. Both infants had a clinically identified large angle esotropia that was constant at their initial examination, and by reports from the parents was present since birth. Both infants were healthy and thriving. Miss P resolved at less than 6 months of age and Master J at less than 9 months of age. Master J's parents reported resolution when he was aged approximately 7 months. The clinical findings suggest there is a high probablility that these patients had an early onset esotropia and demonstrated a phenomenon of spontaneous resolution that is rarely observed.

Why did these infants' esotropia resolve? Some key issues for discussion include identifying the characteristics and causes of an early onset esotropia; the pathway that allows for resolution including visual, macular and binocular maturation, which may actually be what hinders ocular alignment. Further issues include the timing of surgical intervention, the importance of carefully measuring the angle of deviation at more than one visit to observe any reduction in angle size, counselling of parents and follow-up of patients with spontaneous resolution in light of the potential for development of poor stereoacuity, DVD and IO overaction.

The aetiology of early onset esotropia is undefined. Ocampo and Foster[4] summarised some schools of thought. Early researchers hypothesised that excessive tonic convergence was a major contributing factor in the development of early onset esotropia. Others suggested that fusion was defective at birth and irreparable which resulted in no drive for orthophoria or binocularity.

Thorn et al[5] and Chino et al[6] later discovered that the necessary neurons for binocularity are present at birth, however they are immature. The maturity of the neurons and associated pathways occurs in stages during infancy, and can be impeded, incomplete, delayed or cease development.[7] Thorn[5] identified the neurons in the primary visual cortex that are involved in binocular functions. These neurons were found to mature at approximately 3 months of age, irrespective of ocular alignment. Fawcett, Wang and Birch[7] also summarised the significant research that has defined discrete stages of binocular development and stages of vulnerability for incompletion or cessation. They reported that at aged 3 months the average infant's binocular maturity begins and continues at a fast rate until 8 to 18 months. The progress then slows and persists until approximately 3 years of age.

Studies in binocular development suggest that despite a manifest deviation, infants have the potential for developing binocular functions. This is a possible reason for the spontaneous resolution seen in our cases, whereby their binocular development matured such that the drive

for orthophoria was eventually achieved. It is however not possible in a clinical setting to determine the maturity of the binocular cells without a cortical analysis.

Patients with a persistent manifest deviation, require surgical intervention within the "window of opportunity" or crucial stages of binocular development to allow for any potential for developing binocular functions. By classifying the stages of binocular development, this isolates the primary reason why many ophthalmologists and orthoptists advocate early surgical intervention for infants with early onset esotropia; to optimise the potential for developing binocular functions. However, there is some debate that delayed surgical intervention is better for achieving more accurate postoperative alignment due to the improved accuracy in the measurement of strabismus.[8] For our patients, early surgical intervention was discussed with the proviso that the patient fulfilled several criteria prior to intervention. These criteria included that all pathology be excluded, a constant manifest esotropia and stable measurements over at least two consecutive visits. For both Miss P and Master J, any associated pathology was excluded, however, the angle of deviation reduced and resolved and surgery was unwarranted.

Another contributing factor that may influence spontaneous resolution of ocular alignment in infancy is macular maturity. The macular development commences in utero with initial rapid growth in the first 3 months, then slows as the rest of the retina develops. At 8 months the foetus' macula resumes development at the same rate as the rest of the retina. At birth, the macular development is incomplete. It is suggested that macular development is completed by 4 months postnatal age.[9]

If macular maturation is delayed, unstable alignment or strabismus may be evident. It is possible that delayed macular maturation may have occurred with the cases reported. On clinical examination fixation from either eye was central, steady and maintained, suggesting good macula function. Also the macula appeared normal on dilated indirect ophthalmoscopic examination. However, without electrodiagnostic analysis, delayed macular maturation is difficult to determine.

Miss P gave an indication of possibly having delayed macular and visual maturation with the evidence of fixation preference. By occluding the left eye, the right eye was allowed more visual stimulation. This may also have contributed to the drive for orthophoria and spontaneous resolution of her early onset esotropia.

CONCLUSION

The most likely diagnoses based on the available data and clinical evidence is that both infants exhibited spontaneous recovery of early onset esotropia. Both presented with a constant esotropia at birth and resolution occurred within the critical stages of binocular development. It can be suggested that spontaneous resolution occurred due to the intricate maturing of binocular functions and/or of the macula and thus was sufficient that orthophoria was established. Both children will continue to be monitored with close interest, particularly in regards to the possible demonstration of poor stereoacuity, DVD and IO overaction.

Irrespective of whether these children had delayed binocular and macular maturation, they highlight the importance of keeping in mind that patients initially identified with an early onset esotropia may spontaneously resolve. The occurrence of spontaneous resolution of early onset esotropia also reiterates the advantages of carefully measuring the angle of deviation on more than one occasion prior to surgical intervention.

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Monocular Nystagmus in a Case of Septo-Optic Dysplasia

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ABSTRACT

A case of septo-optic dysplasia in a 2-year old boy is presented. The variable symptoms and characteristics of the disorder are described in relation to its aetiology, with particular emphasis on the unusual occurrence of monocular nystagmus.

Keywords: septo-optic dysplasia, monocular nystagmus, de Morsier syndrome

INTRODUCTION

Septo-optic dysplasia (SOD), also known as de Morsier syndrome, is a rare congenital disorder loosely characterised by a triad of optic nerve hypoplasia (ONH), midline abnormalities of the brain (including agenesis of the septum pellucidum, hypoplasia of the chiasm, infundibulum or corpus callosum) and hypothalamic-pituitary dysfunction.[1-6] A diagnosis of SOD features two or more of these characteristics. The incidence of SOD appears to be in the order of less then 10 per 100,000 of the population of which around one-third present with a complete manifestation of the triad.[7,8]

Symptomatically SOD is highly variable and may encompass a large array of manifestations.[6] There can be varying degrees of endocrinological defects such as pituitary dwarfism or growth hormone deficiency, hypothyroidism, panhypothyroidism, diabetes insipidus or hyperprolactinaemia. This may be in isolation or in addition to neurological defects that can result in developmental delays and intellectual disabilities.[1,3,5] Visual disturbances are more commonly found in SOD cases and are often the primary reason for clinical presentation.[9] Some of these disturbances may include depression in visual acuity, bilateral or unilateral nystagmus, strabismus or afferent pupillary defects.[10]

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CASE REPORT

Master J was referred to the ophthalmologist after his doctor discovered an abnormal light reflex at two months of age. On his initial appointment a right exotropia was suspected but when reviewed five months later, examination under cycloplegia revealed an intermittent right pendular horizontal nystagmus. The amplitude and frequency of the nystagmus were not noted. The unusual presentation of congenital monocular nystagmus led to spasmus nutans suspected as a possible diagnosis, however to rule out any underlying intracranial pathology, magnetic resonance imaging (MRI) and an examination under anaesthesia (EUA) were performed. The EUA showed healthy and normal discs and retinae and no venous pulsation, however, the MRI revealed an absent septum pellucidum, hypoplasia of the optic nerves and optic chiasm, thinning of cerebral white matter and box-like formation of the lateral ventricles. It is proposed that the optic nerve hypoplasia (ONH) was likely to have been missed during the EUA due to the symmetrical and bilateral nature of the condition. Given both the presenting monocular nystagmus and MRI findings, the patient was diagnosed with septo-optic dysplasia.

Despite a delay in Master J's visual development, whereby fixing and following was not achieved until 4 months of age, regular appointments with a paediatrician showed that he was reaching developmental milestones and had a normal linear growth. By 14 months of age, Master J was demonstrating a persistent left-sided head tilt that appeared to a greater extent since he had started walking independently. The head tilt was noted to place his eyes in a null position that reduced or settled his nystagmus. At 19 months he also began to show an intermittent right esotropia as well as

the right intermittent pendular nystagmus. On examination by retinoscopy no significant refractive error was found. At two years of age his nystagmus was only occasional and an accurate visual acuity was unattainable. Because of the potential for amblyopia to develop, particularly in the right eye, management involved regular appointments for vision assessments and occlusion of the left eye with close monitoring. Although the use of dilation as a means of occlusion can reduce the impact of nystagmus,[11] patching 4 hours a day was the preferred management in this case. Subsequent visits have shown vision of 3/60 in the right eye and 3/9 in the left. Unfortunately many appointments were missed and a more accurate vision has been unattainable. In addition adherence to the occlusion program has been difficult and the level of amblyopia, particularly in the right eye, and the effect of treatment remains relatively unknown.

Despite the initial possible diagnosis of spasmus nutans, a comprehensive investigation has shown that Master J appears to have septo-optic dysplasia associated with right intermittent monocular nystagmus, a left compensatory head tilt, right intermittent esotropia and amblyopia.

DISCUSSION

The malformation of the optic disc, nerve and chiasm, absence of the septum pellucidum and regular hypothalamic and pituitary disturbances cause an array of symptoms.[12] Where some patients may have impaired visual acuity or legal blindness, often causing developmental delays, additional to intellectual disabilities and linear growth disturbances, milder cases, like Master J, may only have mild to moderate vision impairment and lack any functional defects of the central nervous system or endocrine system.[5,10]

As a result of defects to the midline structures, clinical manifestations of SOD are quite variable among individuals.[6,13] Damage to the endocrine system can have an extensive impact on linear growth and pubertal development due to the reduction in secretion of growth hormone (GH), thyroid-stimulating hormone or adrenocorticotropic hormone. It is suggested that the extent of the abnormalities to the septum pellucidum and hypothalamo-pituitary axis on an MRI may help predict the severity of endocrinal damage.[6] Effects on GH secretion are somewhat manageable via hormone replacement therapy if the condition is diagnosed early.[14] However, some cases with GH deficiencies do not show signs of delayed growth until after the age of 1 to 3 years.[4,15] In Master J's case, while an early diagnosis was important and showed good long-term prospects with his vision being his only ongoing concern, regular monitoring will be equally important in observing visual capacity and any growth changes.

Neurological deficits can range from global disabilities to focal defects, such as epilepsy or hemiparesis.[6] Interestingly, the septum pellucidum, a key structure in the diagnosis of SOD, is quite mysterious in relation to its function. It is a thin sheet of membrane that separates the lateral ventricles in the centre of the brain and runs from the corpus callosum down to the fornix.[16] In SOD the septum pellucidum is absent and thus there is no connection between the fornix and corpus callosum.[15] Because of its numerous connections with subcortical areas it is unclear what function the septum pellucidum serves in the brain and researchers are unsure whether the neurodevelopmental defects in SOD are a consequence of its absence or merely damaged tissue.[3]

Optic nerve hypoplasia is exhibited in 75 - 80% of SOD cases and can cause a range of ophthalmic presentations.[6] Clinically ONH shows a characteristic 'double ring sign' caused by the retina and pigment epithelium abnormally extending over the outer portion of the lamina cribrosa.[5] Decreased visual acuity seems to be the greatest risk, however manifestations such as bilateral or monocular nystagmus and esotropia can be attributed to midline damage or may be secondary to sensory disturbances.[6]

Master J's case was unusual in that his only presenting symptom was infantile monocular nystagmus. His nystagmus though not assessed in detail or with eye movement recordings, was noted as horizontal, intermittent and pendular. Literature and case studies showing nystagmus associated with SOD describe quite varied presentations.[5,17-20] Monocular nystagmus associated with SOD is thought to be quite rare, however, one other case has been reported.[1] This case, presented by Anderson,[1] discusses a 4-year old girl with monocular nystagmus and sectoral ONH associated with SOD. The child's nystagmus was characteristic of monocular nystagmus, which typically presents with a pendular waveform and has a high frequency and low amplitude.[1] It is possible that, if assessed further, Master J's nystagmus may be similar. Other cases of nystagmus, also associated with SOD, have presented pendular,[5,17] jerk[18,19] and see-saw[20] waveforms. These cases seem to follow the more varied characteristics of infantile nystagmus, which often present with pendular or jerk waveforms or a mixture of both.[21-23]

Monocular nystagmus presenting on its own, is very rare.[24] It can be associated with spasmus nutans, a benign condition that presents with asymmetric or occasionally unilateral nystagmus.[24] Occurring in the first year of life, it classically presents with a triad of nystagmus which is usually intermittent and pendular with a small amplitude and high frequency, head nodding and torticollis and typically resolves by 3 to 6 years of age.[25,26] Monocular nystagmus may also be associated with more serious intracranial pathologies such as gliomas or craniopharyngiomas of

the chiasm. For this reason, neuroimaging of patients with monocular nystagmus is very important in ruling out more sinister intracranial pathologies.[1,25,26] For Master J, neuroimaging was essential in exposing the presence of SOD.

The aetiology of SOD is largely unknown and what is understood is rudimentary in nature.[14] Several suggestions have been developed to account for its sporadic occurrence including viral infections, environmental teratogens or vascular or degenerative damage.[10] It is reported to be common in children of mothers with gestational diabetes or younger mothers and has been shown to cluster in areas of large population where teenage pregnancy rates are higher.[8]

Singh et al[2] discussed two main theories, namely, the developmental and destructive theories. The developmental theory describes a disruption in the gestational development causing a differentiation of the septum pellucidum, hypothalamus and the retinal ganglion cells. The second and more widely accepted theory suggests that there is an insult during pregnancy before the visual system is fully developed.[2] The mechanism of injury can differ between cases,[5] but the insult is thought to damage the already established hypothalamus, septum pellucidum and retinal ganglion cells.[2] On the other hand Lubinsky[27] argues that the combination of affected organs and variable times of development is not conducive to SOD being described as a developmental anomaly or dysplasia. He proposes that a vascular disruption sequence of the anterior cerebral artery makes more sense because of its proximity to the optic tract and chiasm and its particular supply to both the optic nerves and chiasm and the anterior hypothalamus and septum pellucidum.[27]

More recent research has indicated genetic involvement. Identification of mutations in key developmental genes has helped implicate a possible genetic defect underlying developmental mechanisms and may explain the cause of some cases of SOD.[6] The HESX1 gene was identified as playing a role in the pathogenesis of rare familial forms and the more common mild sporadic forms of SOD.[28] However, studies showed that mutations of the HESX1 gene turned out to be quite rare. Familial cases of SOD found in a study by McNay et al,[8] did not even involve HESX1, further suggesting that there must be other factors causing this condition. It is suggested by Campbell[10] that the aetiology of SOD is likely to be multi-factorial in nature where there is a combination of both genetic and environmental factors playing a role.

For Master J, the cause of his SOD is not known. His mother is thought to have been quite young during her pregnancy. This could potentially be related to the aetiology, however her exact age at the time of pregnancy remains unknown to the authors.

CONCLUSION

SOD is a rare condition that can cause numerous problems in endocrinological, neurological and visual development. Its aetiology is largely unknown and barely understood. Early diagnosis is very important in SOD for best treatment results and prognosis. The presentation of monocular nystagmus in isolation, as in the case of Master J, is unusual in SOD and a detailed assessment of all the possible causes was essential for his final diagnosis and ongoing treatment.

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Selected Abstracts from the Orthoptics Australia 67th Annual Scientific Conference held in Adelaide 21-24 November 2010

OPENING ADDRESS

David Ben-Tovim

A clinical professor of psychiatry at Flinders University School of Medicine, Professor Ben-Tovim is the director of redesigning care at Flinders Medical Centre. His role involves delivering safe hospital care and has mapped the way patients progress through the hospital system, from entering emergency, being admitted to wards and leaving the hospital. Prof Ben-Tovim has been able to improve the cost, delivery and quality of service delivery by applying the LEAN process.

PATRICIA LANCE LECTURE THE PUPIL: MORE THAN THE APERTURE OF THE IRIS DIAPHRAGM

John Crompton

The pupil is more than the aperture of the iris diaphragm; it is a kinetic indicator of the functional state of the retina and surrounding tissue. Its three major optical functions are: (i) to regulate the amount of light reaching the retina, (ii) to diminish the aberrations (chromatic and spherical) produced by imperfections in the cornea and lens, and (iii) to increase depth of focus (Glasser 1978). Simple clinical procedures enable evaluation of the complex neural mechanism controlling pupillary size and reactivity, between the retina tectum and III nerve. Added to these are the state of retinal light adaptation, supranuclear input from frontal and occipital cortex and the brain stem reticular formation. No wonder the "awake pupil" is in constant hippus. This lecture will illustrate the clinical importance of looking at the pupil (Casson & Crompton 1978; Casson & Crompton 1999).

ANZSOPICAM ONE-YEAR RESULTS

Tanya Pejnovic, William Campbell, John McKenzie

Purpose: ANZSOPICAM is an investigator-initiated prospective multicentre clinical trial of photodynamic therapy in choroidal amelanotic melanoma. This paper summarises the one-year results.

Method: Patients presenting with posteriorly located amelanotic melanoma were recruited into the study. After full ocular and systemic assessment, photodynamic therapy was applied with the Zeiss Visulas laser, using verteporfin as the photosensitiser. PDT was repeated at three-monthly intervals until the melanoma had completely regressed.

Results: Sixteen patients were recruited in the first year. All the melanomas have demonstrated a response. Complete regression of the tumour has been achieved in 10 patients to date, six after just one treatment and four after two. None have developed recurrent tumour or systemic metastatic disease so far, but one patient, an 85 year old male, died of an unrelated condition three months after PDT.

Conclusion: The one-year results indicate PDT is effective in causing regression of amelanotic melanoma without compromising vision. The study is ongoing.

ADVOCACY IN STROKE

Neryla Jolly, Ann Macfarlane, Kathryn Thompson

Advocacy is a term that is linked to legal, political and social issues. Dictionary definitions refer to advocacy being used to provide information to a patient to enable a decision to be made or a series of actions to change "what is" to "what should be" (Wikipedia). It can question the way current events are occurring; participate in agenda-setting by raising significant issues, target issues, propose solutions, open the solutions for acceptance, defend or promote a cause, plead in favour of a situation, recommend (Cassells) and urge by argument (Macquarie Dictionary).

This presentation will highlight the orthoptist's role as an advocate, citing the outcomes from a study of 150 patients admitted for care in a stroke unit. Some of the outcomes include: (i) use of spectacles to improve poor visual acuity to normal levels to assist daily activities, (ii) modification of spectacles to match changed ocular movement patterns and assist ocular comfort, (iii) use of abnormal head postures to avoid diplopia, (iv) refer a previously undiagnosed ocular condition for the correct form of ophthalmic treatment to restore ocular comfort and full visual function, (v) referral to agencies such as Vision Australia to achieve best outcome with the current decreased vision and (vi) charting in the hospital records the eye medications required for the ongoing treatment of chronic eye conditions.

Advocacy goes further than testing and reporting vision standards, it supports the patient to achieve better quality of life. Consideration of the orthoptist's role as an advocate reinforces that their unique skills and knowledge are of immense help to the patient and that this role needs to be emphasised.

A CASE OF CHRONIC PAPILLOEDEMA IN A 9-YEAR OLD GIRL

Fiona Gorski

A 9-year old girl from New Caledonia presented to the Eye Clinic at The Children's Hospital at Westmead following an urgent referral from the neurology department. Despite having reasonable vision, subsequent testing with Humphrey Field Analyser revealed remarkable field loss. Ophthalmoscopy revealed significant optic disc swelling. This patient's treatment and follow-up will be discussed.

THE GLAUCOMA REGISTRY

Jamie Craig

The Australian and New Zealand Glaucoma Registry has been established by A/Prof Jamie Craig and his team. The Registry is funded by the Eye Foundation which is affiliated with the Ophthalmic Research Institute of Australia and the Royal Australian and New Zealand College of Ophthalmologists. The purpose of the Registry is to facilitate the identification of factors which contribute to a poor outcome for patients with glaucoma. Glaucoma blindness can in most cases be prevented if those at high risk of developing it are identified and treated appropriately at an early stage. Currently many people at high risk are asymptomatic in the early stages, and are not diagnosed until irreversible vision loss has occurred. Better identification of those people that are at high risk of glaucoma will result in an overall reduction of preventable blindness by treating the condition before any sight loss has occurred. Current research

at Flinders is unravelling the genetic contribution to a bad outcome, and the identification of patients who have progressive disease.

OVERVIEW OF JUVENILE IDIOPATHIC ARTHRITIS AND ITS OCULAR ASSOCIATIONS

Katie Scanlon, Stephanie Crofts

Juvenile Idiopathic Arthritis (JIA) is the most common form of persistent arthritis in children. Uveitis has a known association with JIA. JIA is a condition that requires a multidisciplinary approach to management, including regular ophthalmology reviews. A retrospective analysis of patients with JIA who presented to the eye clinic at The Children's Hospital at Westmead will be discussed.

IS AXIAL LENGTH THE MOST IMPORTANT FACTOR TO CONSIDER IN THE SILICONE FILLED EYE?

Aaron Woollard

Despite meticulous efforts to measure axial length in a silicone filled eye, a refractive surprise was the outcome. A number of lessons were learned from a young man with bilateral cataract secondary to multiple complicated retinal detachments bilaterally.

THE POTENTIAL IMPACT OF EYE DOMINANCE ON VISUAL REHABILITATION

Kerry Fitzmaurice, Natalie Costa

Eye dominance is a concept well recognised in the literature, however it is a factor rarely taken into account when performing procedures or providing strategies creating a potentially monocular visual situation. The literature contains a small number of reports on the confounding impact of eye dominance on eccentric viewing strategy and some reports of patients requesting treatment where pathology impacts the dominant eye. A small series of studies have suggested amblyopia may have a protective effect in relation to AMD, if this is the case a consequence would be the best potential eccentric viewing locus in the non-dominant amblyopic eye. A study was undertaken to explore the coexistence of amblyopia and AMD and further explore the potential impact of eye dominance on eccentric viewing training. Data from this study was combined with data from an earlier study on eye dominance giving a larger cohort sample.

One-hundred-and-thirty-one members of the Macular Vision Loss Support Society of Australia completed a screening questionnaire. Of these respondents, 20 met the criteria to participate in a follow-up assessment. Data from these 20 participants were combined with data of 19 participants from the earlier study.

Self-report from the 131 initial respondents indicated 4.6% had amblyopia. The best potential eccentric viewing locus was found in the non-dominant eye of 38.5% of participants from the combined studies. Some participants in both studies (20.5%) required occlusion to use vision in the non-dominant better acuity eye.

CHILDREN WHO LIVE WITH VISION IMPAIRMENT IN AUSTRALIA: FINDINGS OF THE AUSTRALIAN CHILDHOOD VISION IMPAIRMENT REGISTER

Sue Silveira

The Australian Childhood Vision Impairment Register is sponsored by the Royal Institute for Deaf and Blind Children, in partnership with children who live with vision impairment, their families, teachers, low vision service providers and health professionals. The Register is supported by a database which captures details on Australian children with vision impairment. This represents the first time uniquely Australian data has been gathered and available.

The findings of the Register will be presented which includes prevalence of eye disease and vision impairment and details of support these children and their family's access. A new online forum for parents and children will also be discussed with useful resources for orthoptists to consider accessing as they support Australian children living with vision impairment.

A SPORTING VISION

Genevieve McMahon, Cem Oztan

Paralympic sport offers opportunities for elite athletes who are blind or vision impaired to compete in elite level competition. It exists to provide opportunities for athletes who have a competitive disadvantage in non-Paralympic sport.

The Australian Paralympic Committee (APC) is responsible for developing and strengthening pathways and opportunities for athletes in the nine Paralympic sports for athletes with a vision impairment that have programs in Australia. Through the work of APC vision-impaired classifiers, Talent Search Program, Paralympic Education Program (PEP) and key relationships with key disability and health sector organisations these pathways continue to develop.

To determine an athlete's eligibility for Paralympic sport, a group of officials, known as classifiers, assess athletes to determine how their impairment influences their sport ability, regardless of their level of training or development. Classification is used to group athletes with similar levels of impairment into classes for equivalent competition. In this way, classification ensures that winning is determined by athletic skill, fitness, power, endurance, tactical ability and mental focus, the same factors that account for success in sport for athletes who are able-bodied. The outcomes of Paralympic competition become based on athletic performance rather than on differences that exist in athletes' vision.

Orthoptists can play a pivotal role not only in the area of classification, but are also best positioned to promote opportunities that exist for people with vision impairment in Paralympic sport. The role of the orthoptist as a classifier will be presented.

EYEPLAYSAFE: AN INTERACTIVE WEB-BASED RESOURCE TO EDUCATE CHILREN AND FAMILIES ABOUT EYE SAFETY

Louise Brennan, Sue Silveira

Eye injuries in children are common, despite the fact they are a group that should have high levels of supervision with little access to environments and implements which cause harm. Serious childhood eye injuries can have lifelong visual and psychological consequences.

Eyeplaysafe will educate children and families regarding potential eye risks and hazards in environments where it is known children have injured their eyes – home, school and sport. It further aims to develop the personal skills and behaviours of children to reduce the incidence of preventable eye injury.

Eyeplaysafe is a web-based interactive learning package. It utilises current technologies such as interactive whiteboards and has content and design based on current research into paediatric eye injury and the school curriculum. Delivery of the package is primarily through NSW primary schools; access is also available to children, families and the community via the internet. Components of the *Eyeplaysafe* interactive resource will be showcased along with the web address. The governance and development of *Eyeplaysafe* along with the evaluation process will be presented.

CHILD ABUSE AND THE ORTHOPTIST

Alex Levin

Child abuse is pervasive in human society around the world. Four to six percent of abused children will first present to the ophthalmologist. It is inevitable, that orthoptists who work with children, will encounter patients who are at risk or have already suffered from child abuse or neglect. Virtually every form of child abuse can potentially have ocular manifestations. Physical abuse may manifest with overt injuries such as bruising or eye trauma. Visual sequelae of brain injury from abuse may also include visual loss and strabismus. Child neglect may involve failure to comply with prescribed treatment such as patching. Covert sexual abuse may present as functional vision loss. Orthoptists may also encounter situations in which they feel that the parent-child interaction is worrisome. All medical professionals, including orthoptists, who work with children, are mandated reporters of child abuse in most countries and therefore must educate themselves about warning signs and strategies for action when abuse is suspected.

NEUROFIBROMATOSIS AND ASSOCIATED OCULAR MANIFESTATIONS

Fiona Gorski

Neurofibromatosis is a dominant genetic phacomatosis with variable expression. There are two types of neurofibromatosis, both of which have ocular associations. A case study and a retrospective cohort study of children with neurofibromatosis, seen within the eye clinic at The Children's Hospital at Westmead, will be explored.

THE STUDENT EVALUATION OF METHODOLOGIES FOR TEACHING CLINICAL SKILLS

Irina Sim, Neryla Jolly, Phillipa Loxton, Kathryn Thompson

"Clinical" is a term used to describe the end result of the health educational experience. It takes its root from "klinkos" a Greek work which means 'around the bed'. In reality there is a knowledge component, a manual or doing component and when effectively used with the patient a combination of both the knowledge and the manual component referred to as a psychomotor skill.

The purpose of this presentation is to raise the teaching methods that are used by academics and practitioners when assisting students to learn clinical skills. Once the methods have been established then a framework will be set up for the students to evaluate the methods that assist them to learn most effectively.

Different models of teaching clinical skills will be described. A range of teaching methods used at the university and in the clinical environment will be raised and analysed against the teaching models. Participants will be invited to raise other methods currently being used. Following the conference, a tool that evaluates the different methods will be developed. The tool will be based on a Likert scale and provide an opportunity for comment. The results will be fed back to the next conference.

NEW ORTHOPTIC EDUCATION AT LA TROBE UNIVERSITY

Zoran Georgievski

Orthoptic education at La Trobe University has changed. We are responding to the growing need for eye care provision by enhancing orthoptic education and so enabling orthoptists to play a greater role than previous in the management of eye disease and people who are at risk of developing eye disease and vision loss.

The La Trobe program is of 4 years duration leading to a Bachelor of Health Sciences/Master of Orthoptics combined degree, with the possibility of graduate entry into the Master program of 2 years. The aim of this presentation is to outline the main streams of study through the course, including ophthalmic disease and therapeutics, 'traditional orthoptics', and the clinical education structure and provisions.

ENDOTHELIAL KERATOPLASTY

Richard Mills

Endothelial keratoplasty is a surgical technique for the replacement of the corneal endothelium entirely through a limbal scleral tunnel incision. This technique eliminates the need for any corneal incisions or sutures, and preserves the corneal surface from limbus to limbus. It therefore allows preservation of the normal corneal topography, faster and stronger wound healing, and the avoidance of suture-related problems such as induced astigmatism, unpredictable corneal power, infection, ulceration, and suture-induced vascularisation leading to graft rejection.

CENTRAL AUSTRALIAN OCULAR HEALTH STUDY

John Landers, Tim Henderson, Sotoodeh Abhary, Jamie Craig

The Central Australian Ocular Health Study was designed to enumerate the levels of ocular morbidity among indigenous Australians living in remote communities within the central Australian statistical subdivision, one of the most isolated and disadvantaged regions of the country. This project was undertaken by the departments of Ophthalmology at Alice Springs Hospital and the Flinders Medical Centre during weekly outreach clinics conducted within remote central Australia.

1,884 individuals aged 20 years or older, living in one of 30 remote communities within the statistical local area of 'Central Australia' were recruited for this study. This equated to 36% of those aged ≥20 years and 67% of those aged ≥40 years within this district, allowing for the determination of ocular disease prevalence. Six-hundred-and-eight (32%) were subsequently reviewed between 6 months and 3 years of their initial assessment (median 2 years), thereby allowing estimations of ocular disease incidence. Participants were recruited as they presented to the eye clinic at each remote community. They underwent visual acuity testing and subjective refraction. Following this they had a comprehensive ocular assessment of their anterior and posterior segments including visual field testing on a selected group.

This presentation will summarise the main findings from this project including estimates of visual impairment, refractive error, cataract, diabetic retinopathy, trachoma and glaucoma and touch on areas of ocular and general health that may be expanded upon in future projects.

IMAGING TECHNIQUES IN THE 2RT TRIAL

Kate Brassington, Robyn Guymer

The aim of the 2RT trial at the Centre for Eye Research Australia is to slow the progression of age-related macular degeneration (AMD) by using a specially designed laser by Ellex. This laser is a nanosecond low-impulse laser designed to target the retinal pigment epithelial (RPE) cells in the hope of reducing progression of AMD. Since starting the 2RT trial our ability to perform a variety of new imaging techniques has enhanced our ability to monitor these patients. At the beginning of the trial, the stratus OCT and fundus photos were heavily relied on for monitoring patients progression. Since then we have gained access to cameras that enable us to perform autofluorescence and higher quality OCTs. The Heidelberg autofluorescence, the Zeiss Cirrus OCT and the Heidelberg Spectralis machines have made it possible to see evidence of the Ellex laser which were not visible previously. These machines not only enable us to see changes in the RPE but also allows us to observe changes in drusen morphology far more precisely than in a fundus photo and to monitor these changes over time.

CAN HMG CO-A REDUCTASE INHIBITORS (STATINS) DELAY AMD PROGRESSION? THE AGE-RELATED MACULOPATHY STATIN STUDY (ARMSS)

Mary Varsamidis, Luba Robman, Peter Dimitrov, Galina Makeyeva, Khin Aung, Paul Baird, Algis Vingrys, Robyn Guymer

Aim: To determine whether simvastatin can delay the progression of early age-related macular degeneration (AMD).

Method: ARMSS is a 3-year randomised controlled double-masked trial. One-hundred-and-fourteen participants aged 50 years or over with high risk of AMD progression were randomised to receive either a placebo or 40mg simvastatin per day for 3 years. They underwent visual and ophthalmic examination, venepuncture, fundus photography and visual function tests biannually. Digital macular images from baseline and the last follow-up visit were assessed side-by-side for AMD progression in a masked-to-the-date-of-visit mode.

Results: A total of 104 participants contributed to study follow-up, 10 withdrawing after randomisation. The mean age of participants was 74.4 (±6.4) years in placebo and 74.8 (±7.5) years in the simvastatin group. Gender ratio was equal between the groups. Smokers constituted 47% of the placebo group and 65% of those receiving simvastatin (p=0.06). Thirty-two percent of participants receiving placebo and 53% receiving simvastatin had late AMD in one eye at baseline (p=0.03). There was no significant difference for worsening of AMD status, adjusted for age, gender and smoking, between the groups for the total sample, OR=1.29 (95%CI, 0.52-3.17). However, for those who had no late AMD in either eye, worsening of AMD status on follow-up was strongly associated with the placebo group compared to the simvastatin group, OR=3.54 (95%CI, 1.02-12.28).

Conclusion: Preliminary analysis showed a considerable difference in early AMD progression between the active treatment and placebo groups.

VERTICAL INTERLINE SPACING AND WORD RECOGNITION USING PERIPHERAL RETINA

Alannah Price, Meri Vukicevic

Slow reading is a common complaint of people with central vision loss who need to use their peripheral vision. The crowding phenomenon in the peripheral retina has been proposed as a contributing factor to slower reading speeds. Papers published in the area of psychophysical aspects of reading have found that increased interletter spacing above the standard 1x does not result in a significant improvement in reading speeds when using peripheral retina. Therefore researchers have focused attention on vertical interline spacing and reading. At present the results from studies within this area are conflicting.

Participants with normal vision were recruited and required to identify sets of target words that were flanked above and below by 'x' to simulate vertical crowding. The target words were rendered in lowercase "courier new" font, with the interline spacing either 1x, 1.5x or 2x presented at both the fovea and 6 degrees eccentricity on the inferior retina. Stimuli were presented on the Tobii Eye Tracker which allowed for the monitoring of participants fixation. Speed of word identification was measure along with word accuracy. The results will be presented.

PLAQUENIL TOXICITY SCREENING: WHAT MORE CAN WE DO?

Mara Giribaldi

Plaquenil toxicity is very rare, however well documented along with its associated risk factors. Despite its rarity and thus its infrequent diagnosis in clinical practice via our current assessment regimes, how best can we screen for the early signs of plaquenil toxicity? What are our current screening tools and how can other tests be utilised such as ocular coherence tomography (OCT), photography including fundus autofluorescence (FAF) and multifocal electroretinography (mfERG).

The aim is to detect the very early signs of ocular and retinal changes in order to prevent irreversible plaquenil toxicity. This presentation will provide an overview of the effects of plaquenil and its toxicity, patient monitoring and follow-up protocols, current screening methodologies as well as highlighting screening pitfalls and limitations.

DANGEROUS DIPLOPIA: WHAT TO LOOK OUT FOR

Celia Chen

Diplopia may be due to congenital or acquired causes. It may be the presenting symptom of a life-threatening systemic disease such as myasthenia gravis or a cerebral aneurysm. In this presentation, Dr Chen will present a systematic approach to evaluating patients with diplopia and alerting to the danger signs that one should look out for.

OCULAR TRAUMATOLOGY: THE BASICS

Ferenc Kuhn

Eye injury remains one of the most important causes of preventable blindness throughout the world. Every person dealing with ocular diseases must understand the types of trauma; their importance and recognition; and must be able to discuss the implications with the patient as well as to perform the basic tasks of emergency intervention. The patient must then be referred to an institution where all elements of the optimal treatment are available: an ocular traumatologist dedicated to the cause and properly trained in the most up-to-date techniques and a facility that offers 24/7 service including a properly equipped facility and a knowledgeable, dedicated staff. This lecture will review the details of these fundamentals.

OCULAR MORBIDITES IN PRETERM CHILDREN

Deepa Taranath

Advances in neonatal care have increased the survival rates of preterm infants. Retinopathy of prematurity (ROP) and other ocular morbidities such as strabismus, refractive errors, amblyopia, cortical visual impairment can occur in these children in isolation or in the background of developmental delay. Assessment of preterm children can be challenging to orthoptists and ophthalmologists alike particularly in the face of overburdened clinics.

A PATIENT'S PERSPECTIVE OF GLAUCOMA MANAGEMENT

Ivan Goldberg

All chronic, incurable diseases present particular challenges for health care workers, as treatment necessarily is life-long. Glaucoma is such a condition: if untreated or inadequately treated, it is progressive, and the visual damage it causes is not recoverable.

Successful management, from diagnosis through ongoing assessment and employment of various strategies of treatment requires a team approach for involved eye care workers and the building of a therapeutic alliance between them and the patient, and if possible his/her family or carers. Eye care team participants need to be aware of quality of life issues for the patient. These include effects from the disease as it threatens visual disability as well as the deleterious effects of treatment strategies.

Major challenges include: (i) understand how the disease and its treatment are affecting the quality of life for an individual patient, (ii) patient adherence to and perseverance with medical therapy; ensure s/he understands the importance and realistic goals of treatment, (iii) build an alliance between the therapeutic team and the patient against the disease and (iv) effective communication; have a store of lay-friendly stories to tell.

THE EFFECT OF LATANOPROST ON CENTRAL CORNEAL THICKNESS IN PSEUDO-EXFOLIATION GLAUCOMA

Tracey Lee, Linda Malesic

Aim: Studies have found a change in central corneal thickness (CCT) in primary open angle glaucoma and ocular hypertension populations following the use of prostaglandin analogs. Current literature supports the notion that latanoprost use is associated with a decrease in CCT. The effect of latanoprost on CCT in pseudo-exfoliation (PXF) glaucoma has not been investigated.

Objective: To investigate the influence of a latanoprost on CCT in patients with newly diagnosed PXF glaucoma.

Methods: Patients with newly diagnosed PXF glaucoma who were prescribed the use of latanoprost were sought from The Royal Victorian Eye and Ear Hospital. A total of five patients (10 eyes) with a mean age of 67.2 years (SD 19.08), who met the inclusion criteria were included in this study. CCT was measured at baseline and repeated 8 weeks post latanoprost use.

Results and Conclusion: Topical latanoprost use over an 8-week period (+/- 1 week) was associated with a statistically significant mean decrease of 1.07% ($p = 0.036$) in CCT. Our finding in this cohort of PXF glaucoma patients of a decrease in CCT over an 8-week period signifies the need for conducting long-term follow-up of the effects of prostaglandin analogs on CCT. It raises the issue of whether prostaglandins should be prescribed to this group of secondary glaucomas if corneal integrity is compromised long-term. Since true interpretation of intra-ocular pressure readings are influenced by a patient's CCT measurement our findings also strongly support the need for repeating CCT measurements in an ophthalmic setting when reviewing patients with PXF glaucoma and utilising topical latanoprost.

AMBLYOPIA: WHAT'S NEW?

Liane Wilcox

The treatment of amblyopia is constantly evolving as PEDIG studies reveal results of randomised controlled trials performed over the last 10 years. The PEDIG studies have also encourage many other study groups to expand our knowledge of what types of amblyopia treatment are best suited to the type of amblyopia that presents in our clinics.

This presentation will seek to summarise the latest research from around the globe and encourage the audience to translate research data into clinical protocols.

HOW DO CHILDREN PERCEIVE THEIR PEERS WITH AMBLYOPIA TREATMENT?

Rebecca Moorhead, Connie Koklanis, Zoran Georgievski, Gwyneth Rees

Previous literature has shown that children undergoing amblyopia treatment feel stigmatised and embarrassed of their treatment and worry that their peer relationships may be threatened. Although this research suggests the presence of negative perceptions towards children undergoing amblyopia treatment, to date no research has looked into this. Using questionnaires, we investigated perceptions of 8-9 year old children towards peers undergoing amblyopia treatment and compared the responses towards patching and atropine. The findings of this study will be presented.

OCCLUSION THERAPY

Nicole Mocnay, Susan Carden

Purpose: The aim of this study was to determine the effectiveness of occlusion therapy in children with amblyopia.

Methods: Patients undergoing occlusion therapy who attended orthoptic clinics in February, March and April 2009 were retrospectively reviewed.

Results: Forty patients were found to meet the inclusion criteria. Follow-up from beginning of occlusion ranged from 11 months to 7 years. Initial vision in the amblyopic eye ranged form 2/24 to 3/4.8. Improved vision ranged from 3/9.6 to 6/4pt. Occlusion therapy was found to improve visual acuity in all patients. Seventy-five percent had an improvement to equal vision or one line difference between the eyes. Eighty-four percent of patients had their improved vision remain stable.

Conclusion: Based on the results of this study, occlusion therapy is successful in treating amblyopia in children.

VISUAL DISTURBANCES IN PATIENTS WITH CHRONIC FATIGUE: A CASE STUDY

Thuy Chau, Connie Koklanis, Zoran Georgievski

A three-year-old boy presented to the eye clinic at the Royal Children's Hospital after a bicycle injury involving possible blunt trauma to the right eye. At this time he was diagnosed with a right micro-esotropia, hypermetropia and a mild degree of amblyopia. He was prescribed glasses and underwent ongoing treatment of occlusion until approximately nine years of age. During amblyopia treatment, visual acuity fluctuated, however once the vision was stable he was discharged to a local optometrist. At the age of 14, five years after his discharge, the child returned to the eye clinic complaining of diplopia and visual disturbances, including flickering and distortion of images, and silvery/black spots in his vision. He had also been diagnosed with chronic fatigue syndrome. This paper will present the clinical findings of this case and discuss ocular manifestations in patients with chronic fatigue syndrome.

THE SYNOPTOPHORE IN THE MODERN OPHTHALMIC PRACTICE

Kamil Gorski

Commonly known, uncommonly used, the synoptophore is an outstanding piece of equipment with excellent potential in any comprehensive ophthalmic clinic. The advantages and disadvantages of the synoptophore will be discussed with recent cases.

STRABISMUS SCREENING AT THE CHILDREN'S HOSPITAL AT WESTMEAD

Lindley Leonard

In 2009 an orthoptic-led Strabismus Screening Clinic was developed at The Children's Hospital at Westmead. This clinic was initiated to determine if there could be a reduction in waiting time from referral to an appointment in the CHW eye clinic for children with identified strabismus. An added advantage was to prevent unnecessary eye clinic appointments for children found to have pseudostrabismus. This presentation examines the role that the Strabismus Clinic has within the eye clinic at The Children's Hospital at Westmead and the benefits to patient outcomes as a result.

ESTABLISHING AN ONLINE COMMUNITY FOR ORTHOPTISTS: THE NSW PAEDIATRIC ORTHOPTIC INTEREST GROUP

Sue Silveira

The profession of orthoptics is a well recognised and highly specialised eye health profession. Groups of "orthoptic experts" have developed in all areas of practice including paediatrics. With this specialisation comes the

need for experts to have contact, to mentor one another and to ensure their craft is preserved for future generations of orthoptists.

During 2010 a Paediatric Orthoptic Interest Group was established in NSW for the purpose of professional supervision, development of collaborative research and sharing of resources. An online forum was developed, with a resources area for sharing of ideas, existing protocols and research. The experiences of the orthoptists involved in the Paediatric Orthoptic Interest Group will be shared in this presentation.

OVERVIEW OF CONGENITAL CATARACTS AT THE CHILDREN'S HOSPITAL AT WESTMEAD

Stephanie Crofts, Katie Scanlon

Congenital cataract affects children and their vision from an early age. Early diagnosis and treatment is vital. Following surgical lensectomy, children with congenital cataract will either have an IOL inserted or be fitted with an aphakic contact lens. One possible complication of surgery in these children is pupil block glaucoma. A retrospective review of patients with congenital cataract who presented to the eye clinic at The Children's Hospital at Westmead will be discussed.

IMPORTANCE OF VIRGINITY

Laura Hartley

Importance of Virginity highlights the importance of accurate biometry in IOL calculations for cataract surgery. The importance of a virgin cornea is discussed as over 100 eyes are analysed, highlighting the common errors occurring in IOL calculations. The most common being a tainted cornea. Analysis is conducted by measuring applanation tonometery followed by biometry calculations comparing against results with no applanation tonometry. The results are discussed in great detail and are supported by statistically significant evidence.

CATARACT SURGERY OUTCOMES: A FIVE-YEAR REVIEW

Linda Santamaria

Purpose: To present the results of five years of audits of postoperative clinical outcomes, evaluating the Southern Health Model of Cataract Care.

Methods: A random sample of patients has been selected for each of the last five years, resulting in a total of 1,611 patients. These patients were followed to determine their final clinical and functional outcomes.

Results: In 2009 the mean final best corrected visual acuity was 0.86 decimal (6/7), significantly increased from 0.38 decimal (6/16) preoperatively, with 94% achieving 0.50 decimal (6/12) or better. The mean spherical equivalent outcome refraction was -0.24 DS. The mean absolute refractive prediction error was 0.40 DS, with 72% achieving a refractive prediction error within 0.50 DS and 93% within 1.00 DS. Visual function was measured by the VF-14 questionnaire and the postoperative mean was 87.51, significantly increased from 72.57 preoperatively.

Conclusions: It is important to evaluate clinical outcomes to ensure that they are within international benchmarks. Cataract extraction with intraocular lens implantation is the most frequently performed ophthalmic surgical procedure in Australia and as the population ages there will be an ever increasing need. Therefore a resource-efficient provision of service will become increasingly important. Continual audit and evaluation leads to changes in clinical and administrative practices in order to provide the highest quality of care.

Named Lectures, Prizes and Awards of Orthoptics Australia

THE PATRICIA LANCE LECTURE

1988	Elaine Cornell	Home exercises in orthoptic treatment
1989	Alison Pitt	Accommodation deficits in a group of young offenders
1990	Anne Fitzgerald	Five years of tinted lenses for reading disability
1992	Carolyn Calcutt	Untreated early onset esotropia in the visual adult
1993	Judy Seaber	The next fifty years in orthoptics and ocular motility
1995	David Mackey	The Glaucoma Inheritance Study in Tasmania (GIST)
1997	Robin Wilkinson	Heredity and strabismus
1998	Pierre Elmurr	The visual system and sports perfomance
1999	Kerry Fitzmaurice	Research: A journey of innovation or rediscovery?
2005	Kathryn Rose	The Sydney Myopia Study: Implications for evidence based practice and public health
2006	Frank Martin	Reading difficulties in children - evidence base in relation to aetiology and management
2008	Stephen Vale	A vision for orthoptics: An outsider's perspective
2009	Michael Coote	An eye on the future
2010	John Crompton	The pupik: More than the aperture of the iris diaphragm

THE EMMIE RUSSELL PRIZE

1957	Margaret Kirkland	Aspects of vertical deviation
1959	Marion Carroll	Monocular stimulation in the treatment of amblyopia exanopsia
1960	Ann Macfarlane	A study of patients at the Children's Hospital
1961	Ann Macfarlane	A case history "V" Syndrome
1962	Adrienne Rona	A survey of patients at the Far West Children's Health Scheme, Manly
1963	Madeleine McNess	Case history: Right convergent strabismus
1965	Margaret Doyle	Diagnostic pleoptic methods and problems encountered
1966	Gwen Wood	Miotics in practice
1967	Sandra Hudson Shaw	Orthoptics in Genoa
1968	Leslie Stock	Divergent squints with abnormal retinal correspondence
1969	Sandra Kelly	The prognosis in the treatment of eccentric fixation
1970	Barbara Denison	A summary of pleoptic treatment and results
1971	Elaine Cornell	Paradoxical innervation
1972	Neryla Jolly	Reading difficulties
1973	Shayne Brown	Uses of fresnel prisms
1974	Francis Merrick	The use of concave lenses in the management of intermittent divergent squint
1975	Vicki Elliott	Orthoptics and cerebral palsy
1976	Shayne Brown	The challenge of the present
1977	Melinda Binovec	Orthoptic management of the cerebral palsied child
1978	Anne Pettigrew	
1979	Susan Cort	Nystagmus blocking syndrome
1980	Sandra Tait	Foveal abnormalities in ametropic amblyopia
1981	Anne Fitzgerald	Assessment of visual field anomalies using the visually evoked response
1982	Anne Fitzgerald	Evidence of abnormal optic nerve fibre projection in patients with dissociated vertical deviation: A preliminary report
1983	Cathie Searle	Acquired Brown's syndrome: A case report
	Susan Horne	Acquired Brown's syndrome: A case report
1984	Helen Goodacre	Minus overcorrection: Conservative treatment of intermittent exotropia in the young child
1985	Cathie Searle	The newborn follow up clinic: A preliminary report of ocular anomalies
1988	Katrina Bourne	Current concepts in restrictive eye movements: Duane's retraction syndrome and Brown's syndrome
1989	Lee Adams	An update in genetics for the orthoptist: A brief review of gene mapping
1990	Michelle Gallaher	Dynamic visual acuity versus static visual acuity: Compensatory effect of the VOR
1991	Robert Sparkes	Retinal photographic grading: The orthoptic picture
1992	Rosa Cingiloglu	Visual agnosia: An update on disorders of visual recognition
1993	Zoran Georgievski	The effects of central and peripheral binocular visual field masking on fusional disparity vergence
1994	Rebecca Duyshart	Visual acuity: Area of retinal stimulation

1995–7	Not awarded	
1998	Nathan Clunas	Quantitative analysis of the inner nuclear layer in the retina of the common marmoset callithrix jacchus
1999	Anthony Sullivan	The effects of age on saccades made to visual, auditory and tactile stimuli
2001	Monica Wright	The complicated diagnosis of cortical vision impairment in children with multiple disabilities
2005	Lisa Jones	Eye movement control during the visual scanning of objects
2006	Josie Leone	The prognostic value of the cyclo-swap test in the treatment of amblyopia using atropine
2007	Thong Le	What is the difference between the different types of divergence excess intermittent exotropia?
2008	Amanda French	Does the wearing of glasses affect the pattern of activities of children with hyperopic refractive errors?
2009	Amanda French	Wide variation in the prevalence of myopia in schools across Sydney: The Sydney Myopia Study
2010	Fiona Gorski	Neurofibromatosis and associated ocular manifestations

PAEDIATRIC ORTHOPTIC AWARD

1999	Valerie Tosswill	Vision impairment in children
2000	Melinda Syminiuk	Microtropia – a challenge to conventional treatment strategies
2001	Monica Wright	The complicated diagnosis of cortical vision impairment in children with multiple disabilities
2005	Kate Brassington	Amblyopia and reading difficulties
2006	Lindley Leonard	Intermittent exotropia in children and the role of non-surgical therapies
2007	Jody Leone	Prevalence of heterophoria in Australian school children
2008	Jody Leone	Can visual acuity screen for clinically significant refractive errors in teenagers?
2009	Jody Leone	Visual acuity testability with the electronic visual acuity-tester compared with LogMAR in Australian pre-school children
2010	Alannah Price	Vertical interline spacing and word recognition using the peripheral retina

THE MARY WESSON AWARD

1983	Diana Craig (Inaugural)
1986	Neryla Jolly
1989	Not awarded
1991	Kerry Fitzmaurice
1994	Margaret Doyle
1997	Not Awarded
2000	Heather Pettigrew
2004	Ann Macfarlane
2008	Julie Barbour
2010	Elaine Cornell

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1973-4	Jill Taylor
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1975-6	Megan Lewis
1976-7	Vivienne Gordon
1977-8	Helen Hawkeswood
1978-9	Patricia Dunlop
1979-80	Mary Carter
1980-1	Keren Edwards
1981-82	Marion Rivers
1982-3	Jill Stewart
1983-5	Neryla Jolly
1985-6	Geraldine McConaghy
1986-7	Alison Terrell
1987-9	Margaret Doyle
1989-91	Leonie Collins
1991-3	Anne Fitzgerald
1993-5	Barbara Walsh
1995-7	Jan Wulff
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2002-4	Val Tosswill
2004-6	Julie Barbour
2006-8	Heather Pettigrew
2008-10	Zoran Georgievski

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