

Verbal Skills during
Patient Consultations

Compressive Optic
Neuropathy, Cranial
Nerve Palsies and Males

Vision Screening of
Individuals with Mild
Intellectual Disability

Concordant Esotropia and
Bilateral Hypermetropia
in Monozygotic Twins

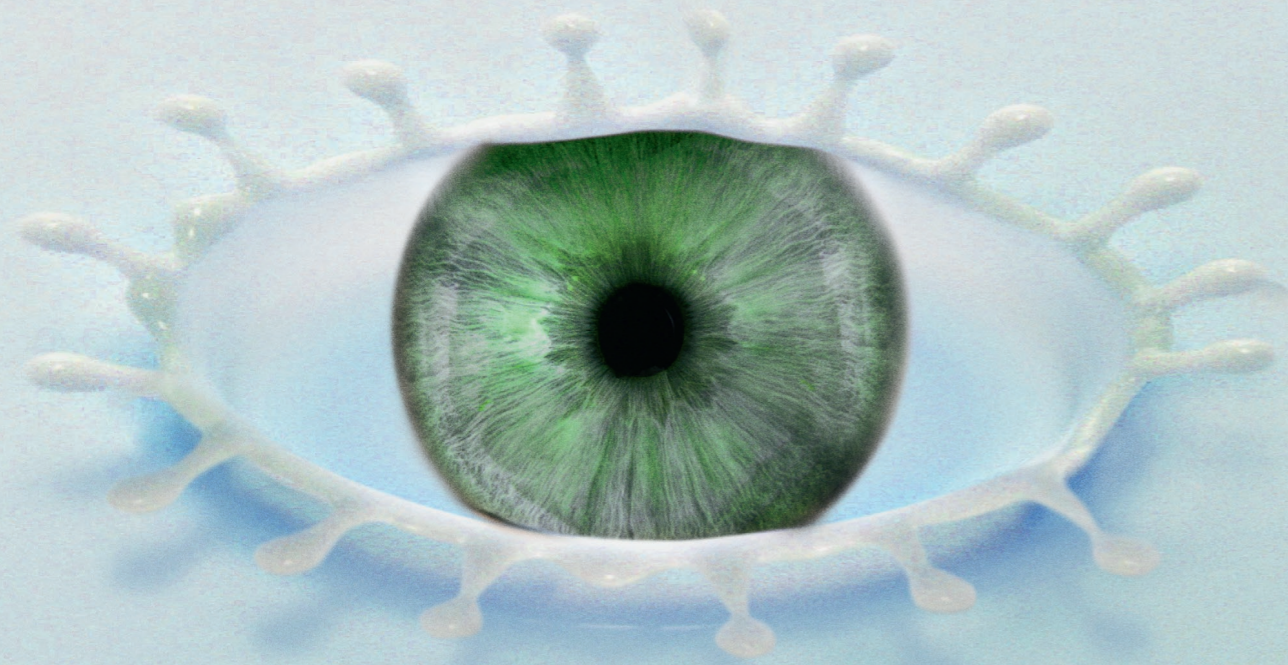
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Editorial

The Importance of Evidence Based Practice

The last decades has seen great changes in health care with the emergence of evidence based practice (EBP). EBP relates to clinical decision making and is often defined as 'the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients'¹. Fundamentally EBP requires us as clinicians to integrate the best available evidence with our clinical expertise when managing patients. Beyond us as clinicians caring for patients, EBP also influences policy and organisational guidelines.

To aid in the evaluation of the available evidence, hierarchies have been developed to assist in ranking the quality of research. Whilst the development of hierarchies of evidence have raised our understanding of differences in research quality, the simplification of such grading systems can be misleading as levels alone do not always reflect the strength of the evidence. The appraising of literature and interpretation of research findings to determine the strength of evidence requires a high level of skill from the clinician. Furthermore, the process of EBP generally involves formulating a clinical question which is operationalised by developing a database search strategy, searching the literature and identifying appropriate papers, in addition to synthesising and appraising the literature and reflecting or evaluating the application of evidence. Hence, whilst clinicians are expected to manage a patients' ocular

condition by considering the best available evidence, this is not often a simple task.

Given the importance of integrating evidence into practice, it is clear that we must equip clinicians with the EBP skills. Future graduates entering the orthoptic profession must also have a sound understanding of utilising evidence to optimise outcomes and minimise risks for patients. Our academics are acknowledging the significance of evidence-based care and have recently further embedded the concept and process of EBP within the new emerging curriculum. In the near future our graduates will be better equipped to provide high quality care by integrating the best available evidence into their practice.

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The Verbal Skills Used by Orthoptists During Private Patient Consultations

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ABSTRACT

Purpose: Verbal communication is an essential part of the medical consultation. It can affect the patient's level of satisfaction, compliance to treatment regimes and recommendations, and may impact on the quality of the patient-practitioner relationship. This study aims to explore the form and patterns of verbal communication that are used by orthoptists in private ophthalmic settings when consulting with patients and the impact of external factors such as experience, patient characteristics and initial or return consultations.

Methods: Twelve orthoptists and 49 patients were recruited from 3 private ophthalmic practices in metropolitan New South Wales. A real-time assessment of duration of clinical tasks and coding of verbal communications into categories

was performed and analysed with the SPSS program using correlation and t-tests.

Results: Orthoptists were found to use extensive explanations, delivery of information and use of rapport, which increased with the orthoptists' clinical experience. Patient characteristics such as age, gender, and cultural background did not affect the duration of tests performed or the verbal communication used.

Conclusion: Orthoptists use a wide range and types of verbal communications in their clinical practice. The level of the orthoptists' clinical experience influences the verbal communications used by the orthoptist. Patient characteristics had little influence on the verbal communications used.

Keywords: verbal communication; patient-practitioner relationship.

INTRODUCTION

In health care, verbal communication can influence the patient-practitioner relationship, and can improve the quality of that relationship^{1,2}. It also has the ability to affect a patient's level of satisfaction, awareness and adherence (compliance) to medical treatments, interventions and recommendations^{3,4}.

Communication is the successful sending and receiving of messages^{5,6} and is divided into two broad components, nonverbal (70%) and verbal (30%). Nonverbal communication involves sending messages or communicating through forms of body language. This form of communicating includes the position of the eyes or an individual's direction of gaze, hand gestures, body posture and the distance between the two people. Different tones in voice and hesitations between phrases are also seen as aspects of nonverbal communication⁶⁻⁸. The function of nonverbal communication is to complete, elaborate and give further meanings to verbal

messages⁹. Verbal communication, on the other hand, is the words and phrases of the spoken language. It is a continuous transmission and repetition of signals and messages. Although verbal communication is thought to play a lesser role in communication exchange, Deveugele¹⁰ suggests that it is the main channel by which health care professionals communicate with patients. Deveugele¹⁰ further suggests that this is due to a shift in emphasis of treating diseases where the whole person is cared for.

There is an inevitable need for partnership building between patient and practitioner and one where the patient's expectations and need for reassurance and support are considered. Medical questioning, examination, giving of advice and information, and counselling are also necessary in communication with patients. Since the 1960s, studies of verbal communication in health care have been undertaken in order to understand the relationship between practitioner and patient. Communication has been found to contribute to the detection, management and prevention of disease and the promotion of health and health information^{3-5,11-16}.

Verbal communication is reported in literature to be influenced by many factors. In the patient, it can be influenced by

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patient age¹⁷ and gender¹⁸ and in the practitioner by gender¹⁸, experience¹⁹ and competence^{1,20,21}. All these factors work to develop patient compliance^{3,4,11,18,22} and satisfaction^{1,3-5,8,23-26}. A successful interaction between practitioners and patients aims to develop rapport²⁷, demonstrate competence of the clinician and potentially support patient compliance.

While there are over 100 published studies about the verbal skills of physicians, published information about verbal communication by allied health practitioners with their patients is minimal; and research into the relationship between orthoptists and their patients does not exist. The current project aims to expand the knowledge about orthoptists' patterns and styles of verbal communication with their patients and to explore the impact of external factors such as experience, patient characteristics and initial or return consultations.

METHOD

Orthoptists from three private clinics in metropolitan New South Wales were recruited to participate in the study. Each practice sub-specialised in anterior segment disorders, glaucoma, cataract and refractive surgery. Orthoptists who agreed to participate in the study were provided with information about the study, completed a consent form, and invited patients to participate in the study. To aid ease of data collection, inclusion criteria required the patients to be over the age of 18 and English speaking.

Once the patient had agreed to participate and had provided written consent, the orthoptist conducted a routine clinical assessment relevant to the patients' presenting condition and reason for attendance. Each clinical task undertaken within the consultation was analysed for the verbal skills used by the orthoptist. During each task, the types of verbal skills used by the orthoptist were recorded in code onto a data collection sheet (Table 1). A stopwatch was used to record the time taken to complete each task within the orthoptic consultation. One researcher trained in collecting this data undertook this role.

At the completion of the clinical assessment, the participating orthoptist provided the researcher with information regarding the patient's ocular diagnosis in order to broadly classify conditions as an acute or chronic. This would then enable comparison with other studies using these broad categories. Demographic information was also sought about the practitioner (orthoptist) and the patient, including variables that have been shown to affect interpersonal verbal communication. These included age, gender, and self-identified cultural background, years of practitioner experience, reasons for patient attendance, and diagnosis.

Table 1. Form used to record practitioner and patient information, including verbal communications, during each orthoptic consultation.

SECTION 1: Practitioner and Client Information		
Type of Clinic		
Orthoptist Gender	Male / Female	
Orthoptist Age		
Orthoptist Cultural Background		
Orthoptist Previous Experience (in years)		
Patient Gender	Male / Female	
Patient Age		
Patient Cultural Background		
Patient's Visit	First Visit / Follow Up	
Patient's reason for attending visit		
Broad Diagnosis given		
SECTION 2: Tests Performed & Verbal Communications		
Test Performed	Time Taken	Verbal Communication Type Used*
E.g. History	E.g. 3min 14sec	E.g. X O / C / M M C / O S I I / X X X

* See Table 2 for more information regarding verbal communication types

THE INVESTIGATION TOOL

A number of assessment tools have been used to identify, monitor and interpret the verbal interaction that takes place between the practitioner and the patient. Boon and Stewart²⁸ reported 44 different instruments for assessing practitioner communication developed between 1986 and 1996. With the development of many methods of recording, various sets of categories for coding different types of verbal interactions are available and up to 34 different types of verbal skills have been used to analyse a single medical interview²⁸. As a result many researchers have adjusted and reduced the number of categories in order to make the coding a less complex task and to meet the specific purposes of their study.

The assessment tool created for the purpose of our study consists of two sections (Table 1). The first section related to demographic details of the orthoptic practitioner and the patient, and included items reported in the literature to significantly impact upon verbal communications. The second section provided space for the researcher to identify the tests performed, the time taken for each clinical task, and the coded details of the verbal communication patterns. The 41 well established categories of verbal communication developed by Roter²⁸⁻³⁰ were merged to concentrate on the verbal skills used by practitioners and exclude those used by patients. For example, Roter's categories of "Personal remarks, social conversation and laughs and tells jokes"³⁰ were condensed into one main category "General non-medical comment" for the purposes of this study. This resulted in section two consisting of 14 main categories. Each category was given a symbol for the researcher to document the medical conversations as they occurred (Table 2).

Table 2. Verbal Communication categories and codes used for recording communications

Verbal Communication Category	Description	Symbol
Open medical question	A question asked regarding the patient’s physical or medical condition, previous treatments or family history that enables the diagnosis, treatment or management of the patient’s physical disease. The question requires more than one word to answer. For example, O is coded for “How has your vision changed since your last visit?”	O
Closed medical question	A question asked regarding the patient’s physical or medical condition, previous treatments or family history that enables the diagnosis, treatment or management of the patient’s physical disease. The question requires only one word to answer. Eg. “Do you wear glasses?” is coded as C.	C
Open social question	A question that asks about the patient’s psychological or emotional well being and includes questions that address the patient’s non-medical issues, topics and concerns. These questions require more than one word to answer. Eg., “How are your daughters?”	OS
Closed social question	A question that asks about the patient’s psychological or emotional well being and includes questions that address the patient’s non-medical issues, topics and concerns. These questions require only one word to answer. Eg., “is it very hot outside?”	CS
Instruction	An instruction or a statement of orientation given to the patient. For example, “Hold still” or “read down the vision chart.”	I
Repetition	A repetition of a single phrase or word that a patient spoke.	R
Agreement	A statement of agreement with the patient. For example, “Yes”	Y
Disagreement	A statement of disagreement. E.g., “no” or “I don’t think so”	N
Encouragement	A phrase or word of encouragement given to the patient such as “good” or “well done.”	E
Explanation	A phrase that explains diagnostic tests; treatment, management or diagnosis of the patient’s medical condition	X
Back channel	Words or sounds that imply or indicate attentive listening or encourage the patient to continue talking. Examples are ‘Mm Hmm’, ‘Yeah’. ‘Go on’.	M
Concern	Statements or questions of concern for the patient’s comfort. For example “is the height of the chair reasonably comfortable?”	Co
General non-medical comment	A phrase or statement that does not relate to the patient’s physical status but addresses social topics. Such as “it’s a beautiful day today”.	-
Patient Speaking	Indicative of when the patient speaks. This does not code the number of phrases the patient says or the verbal skills the patient uses.	/

RESULTS

Participants

Twelve orthoptists (1 male and 11 female) aged between 21 and 43 years (mean = 32.6 years, SD = 8.8) participated in the study. Their experience ranged from less than 1 year to 22 years (mean = 5.6 years, SD =9.7). Six orthoptists (50%) described their cultural background as Australian and 6 indicated backgrounds from other cultures.

Forty-nine patients (14 male and 35 female) met the criteria to participate. Their ages ranged from 20 to 80 years (mean = 57.2 years, SD = 16.3). Twenty-five patients self-identified as having an Australian cultural background and 24 identified themselves as having a background from other cultures. Thirteen patients (27%) attended the eye clinics for initial visits and 36 patients (73%) attended for a review consultation. Reasons for attending the consultations are shown in Table 3.

Table 3. Reasons for patients’ attendance at orthoptic consultations.

Reason for Consultation	Number of Patients (%)
Glaucoma or suspected glaucoma	7 (14.3%)
Cataract	8 (16.3%)
Dry Eyes	3 (6.1%)
Regular check-up	5 (10.2%)
Diabetes	4 (8.2%)
Decreased visual acuity	2 (4.1%)
Flashes or floaters	4 (8.2%)
Retina	2 (4.1%)
Cornea	3 (6.1%)
Refractive Sx	6 (12.2%)
Red eyes	2 (4.1%)
Other	3 (6.1%)
Total	49 (100%)

Consultations

A total of 49 consultations were included in this study. The total time for an orthoptic consultation averaged 12 minutes. The range was 42.4 minutes for an initial assessment to 2.8 minutes for a short review. During the consultations, several clinical tasks were undertaken and all involved verbal communications. Some of the tasks consisted entirely of verbal interaction (e.g., history-taking, closing), and other tasks involved a physical action accompanied by verbal interactions (e.g., assessing visual acuity). Within each verbal interaction were several verbal communication subtypes such as explanation, instruction, closed questions and open questions. The definitions of these subtypes are outlined in Table 2.

Clinical Tasks Performed

A total of 19 different types of clinical tasks (such as history-taking and measuring visual acuity) were observed. A total of 347 tasks were undertaken across the 49 consultations, with 81 being primarily verbal interaction only tasks such as history-taking and closing, and 266 being combined physical testing/verbal interaction tasks such as measuring visual acuity. The individual clinical task durations ranged from as little as 4 seconds to up to about 20 minutes. Table 4 identifies the ten most frequently performed clinical tasks observed during the consultations, listed in order of average duration, and identifies tests involving verbal-only interactions.

Verbal Communication Subtypes

Orthoptists were found to use the entire range of verbal communication subtypes included in the study. Statements

Table 4. Most frequently observed clinical tasks, listed in order from the maximum (max.) to minimum (min.) mean duration

Clinical Task	No. of Patients	Time Taken for Clinical Task (Minutes : Seconds)			
		Min.	Max.	Mean	SD
Subjective refraction for distance	23	1:05	18:23	4:56	3:39
History taking	45	0:34	8:19	2:28	1:43
Distance Visual Acuity	43	0:14	8:01	1:46	1:11
Secondary history taking	13	0:22	5:03	1:35	1:19
Applanation Tonometry	34	0:08	4:23	1:32	0:58
Instilling dilating drops	30	0:17	8:58	1:12	1:33
Instilling anaesthetic and fluorescein drops	34	0:15	4:20	0:52	0:42
Near visual acuity	29	0:06	2:33	0:49	0:38
Closing	23	0:07	3:56	0:47	0:52
Pupils assessment	15	0:04	1:05	0:35	0:18

of explanation (mean frequency per consultation = 37.5, or 22.3% of total communications) and instruction (mean frequency per consultation = 29.7, or 17.7% of total communications) were used most frequently during the clinical consultations. Table 5 lists the verbal communications used in descending order from the most frequently used type.

Cumulative verbal communications such as rapport and the exchanging and gathering of information were identified.

Table 5. Frequency and percentage* of verbal communication types used by the orthoptists per consultation.

Verbal Communication Type	Minimum frequency per consultation	Maximum frequency per consultation	Mean frequency per consultation	Standard Deviation	%
Explanation ^	7	141	37.5	25.2	22.3
Instructions ^	2	66	29.7	16.2	17.7
Closed questions ^	2	71	28.0	19.2	16.7
Back channel**	1	68	22.1	14.0	13.2
IEncouragement**	2	68	17.7	12.7	10.5
Agreements ^	0	47	9.1	7.9	5.4
Open questions ^	1	20	7.2	4.3	4.3
Repetitions**	0	23	7.0	5.9	4.2
General comments**	0	43	6.8	7.5	4.1
Concern	0	10	1.4	1.9	0.8
Closed social questions**	0	4	0.6	1.0	0.4
Disagreements	0	4	0.6	1.0	0.4
Open social questions**	0	6	0.4	1.0	0.2
Total	46	376	167.9	77.9	100

* Percentage is the proportion of mean frequency of verbal communications to the total mean number of verbal communications per consultation. Percentages are rounded to the nearest 0.1% ** Indicates the types of verbal communications representing rapport. ^ Indicates the verbal communication subtypes representing the exchange of information.

Rapport is defined as the sum of general comments, back channel, open and closed social questions, repetitions and encouragement. Statements of rapport formed a mean of 32.6% of the verbal communications used by orthoptists in a patient encounter (Table 5).

Practitioner Experience, Patient Characteristics and Consultation Type

Spearman's correlation was used to examine the relationship between the amount of practitioners' experience and the frequency of the practitioners' use of the various communication subtypes during the more common clinical tasks. Spearman's correlation was used as the practitioners' experience was recorded as ordinal groupings covering ranges of years: "0-5 years", "6-15 years", "15+ years".

Patient characteristics such as gender, cultural background, age, and whether they were attending for an initial or return consultation were also recorded and analysed for differences in verbal communications used by the practitioners between the relevant patient groups. In these analyses, only the total frequencies per consultation of each of the verbal communication types were analysed, without further breakdown into clinical task types. Details of the results follow.

Orthoptists' Experience

The results suggested that as practitioners' experience increased, the total number of statements or questions of concern per consultation decreased ($r_s = -0.43$, $p = 0.002$), and statements of agreement increased ($r_s = 0.37$, $p = 0.009$). During the history-taking section of the consultation, which is primarily a verbal clinical task, the number of closed social questions ($r_s = 0.31$, $p = 0.038$), instructions ($r_s = 0.34$, $p = 0.022$) and statements of disagreement ($r_s = 0.36$, $p = 0.014$) all increased as practitioner experience increased. In the closing section of the consultation, another verbal interaction only task, there was also an increase in several types of communication with increasing practitioner experience, namely closed questions ($r_s = 0.44$, $p = 0.035$), agreement ($r_s = 0.45$, $p = 0.021$) and encouragement ($r_s = 0.44$, $p = 0.035$), and also an increase in duration of this task ($r_s = 0.45$, $p = 0.037$).

However, there were generally decreases in verbal communications and clinical task durations with increasing practitioner experience in those sections of the consultation that primarily involved physical testing. When testing for distance visual acuity, there was a decrease in several types of verbal communications with increasing practitioner experience, namely open questions ($r_s = -0.42$, $p = 0.005$), instructions ($r_s = -0.56$, $p < 0.001$), agreements ($r_s = -0.31$, $p = 0.047$), and encouragement ($r_s = -0.47$, $p = 0.001$), and also a decrease in clinical task duration ($r_s = -0.38$, $p = 0.013$). For subjective refraction for distance, there were decreases in closed questions ($r_s = -0.69$, $p < 0.001$),

explanations ($r_s = -0.51$, $p = 0.014$), expressions of concern ($r_s = -0.56$, $p = 0.005$), and duration ($r_s = -0.58$, $p = 0.004$). For instilling drops, there were decreases in instructions ($r_s = -0.49$, $p = 0.003$) and explanations ($r_s = -0.37$, $p = 0.031$). For applanation tonometry, there were decreases in instructions ($r_s = -0.37$, $p = 0.028$), and explanations ($r_s = -0.37$, $p = 0.028$), although there were increases in closed questions ($r_s = 0.47$, $p = 0.005$).

Patients' Gender

Independent groups t-tests revealed that the only significant difference in the practitioners' use of verbal communication between male and female patients was for the total frequency of open questions during the consultation ($t = -2.03$, $p = 0.048$), with open questions being used more often for female patients (mean = 7.9) than for male patients (mean = 5.3).

Patients' Cultural Background.

Patients were grouped into those who described themselves as having an "Australian cultural background" and "Other cultural background". Independent groups t-tests were performed on the frequency of different verbal communication types and on the consultation durations between these two patient groups, but these showed no significant differences between the groups due to the small sample size.

Patients' Age

Pearson's correlation analyses were performed on the relationship between the patients' ages and the total frequency of each of the communication types per consultation. No significant correlations were found.

Consultation Type: Initial Or Return Consultations

Differences in verbal communication and consultation duration between initial and return visits were investigated using independent groups t-tests. It was found that initial consultations (mean = 17.2 min) were significantly longer than return visits (mean = 10.1 min, $t = 3.34$, $p = 0.002$). There were also significant differences in the frequency of many types of verbal communication between initial and return consultations, including open questions (initial mean = 11.1, return mean = 5.8, $t = 4.68$, $p < 0.001$), closed questions (initial mean = 41.41, return mean = 23.2, $t = 3.21$, $p = 0.002$), instructions (initial mean = 38.8, return mean = 26.4, $t = 2.48$, $p = 0.017$), repetition (initial mean = 9.9, return mean = 5.9, $t = 2.17$, $p = 0.035$), explanation (initial mean = 51.5, return mean = 32.4, $t = 2.47$, $p = 0.017$), and back channelling (initial mean = 30.1, return

mean = 19.2, $t = 2.54$, $p = 0.014$). In each case, there was a greater frequency of each type of verbal communication in initial consultations than in return consultations.

DISCUSSION

Verbal communications are an essential component for orthoptist-patient consultations and all related clinical tasks undertaken within the private ophthalmology subspecialty sector. In this study 23.3% of clinical tasks were entirely verbal, including history-taking and closing of the orthoptic consultation. The remaining 76.7% consisted of clinical tasks that required both verbal and orthoptic skills and included testing visual acuity, applanation tonometry, instillation of eye drops and the assessment of pupils. The duration of orthoptic consultations can be minor from 2.8 minutes or up to 42.4 minutes. With this in mind, orthoptists should be aware of the importance of verbal communication during consultations, and use their verbal skills to be effective in the assessment and management of patients.

An overview of the results indicates that the verbal communications of orthoptists during consultations would typically consist of 32.6% rapport, that is, language that addresses the patient as a whole being, and conveys practitioner's care. These verbal skill subtypes include encouragement, repetitions, general comments, closed and open social questions. The exchange of information, particularly explanations of clinical procedures have also been shown in previous research to enhance levels of patient satisfaction²⁴, and are rated as more important than the location or pleasantness of the clinic, cost of surgery and the waiting time for appointments²⁴. In this study a mean of 22.3% of the total verbal communications in the orthoptic consultations were related to explanations of clinical procedures.

The results of this study suggested that the orthoptists' level of experience affected the type and range of verbal interactions. In general, it appears that verbal communication during clinical assessment and duration for the clinical testing parts in the consultation tends to decrease as practitioner experience increases, while the primarily verbal parts of the consultation (such as history-taking and closing) including their duration tends to increase with practitioner experience. These results reflect similar findings for paediatricians in the study by van Dulmen³². Although the practitioners were not asked about their strategies for communicating with their patients in this study, it is possible to speculate that the more experienced practitioners may have developed a deliberate strategy of concentrating much of their communication with their patients in those sections of the consultation that were primarily verbal in character while minimising communication during physical testing, this may be to avoid trying to communicate during those phases of the consultation where the attention of the practitioner

and patient are likely to be distracted by the demands of the test procedures. Future research might investigate orthoptists' conscious use of communication strategies with their patients, and the satisfaction of patients with these communication strategies.

The orthoptists also showed a decrease in the number of statements and questions of concern overall as their years of experience increased. This suggests that as orthoptists' experience increases and they become more competent in the testing procedures, they provide fewer reassurances to their patient in relation to their comfort. It should be noted, however, that most of the correlations that were found between the practitioners' level of experience and their communication styles were only of moderate strength, suggesting that factors other than experience are also likely to be influencing communication styles.

Patient characteristics such as gender, age and cultural group had minimal effect on the type and quantity of practitioner verbal communications during consultations. A higher total number of open questions were used by the orthoptists for female patients compared with male patients, but this was the only significant finding for patient gender differences. Unfortunately, due to the small sample of male orthoptists ($n=1$) in this study, there was insufficient data to investigate similarities and differences in the verbal communication patterns of male and female orthoptists.

Contrary to expectations from previous literature, the cultural background of the patient did not have a significant effect on the orthoptists' use of verbal communications. The results may have been due to the incorrect grouping of cultural backgrounds, a small sample, or problems in defining a person's 'cultural background'. Another possibility for the non-significant findings can be found in the context of the study. Previous studies on the effect of culture took place in areas such as Japan and parts of the America where multiculturalism is not as diverse as the Sydney metropolitan region. The absence of significant relationships may be seen as indicative of the orthoptist's response to the promotion of multiculturalism where individuals are treated with equality.

The results for the effects of patient age on communication types used were also unexpected. There were no significant relationships found between the patients' age and the duration of consultation or total frequency of each type of verbal communication per consultation. However it should be noted that this sample included only adult patients. It's possible that child patients would elicit different communication patterns.

Finally, there were significant differences between initial and return consultations, with longer consultation durations and more verbal communication in initial visits compared with return visits. These results were not surprising given that initial consultations would be likely to require relatively

lengthy exchanges of information, and the results were similar to previous studies where initial consultations had longer duration than review consultations³³.

CONCLUSION

It can be concluded that the verbal communications used by the orthoptists cover a wide range of types. In particular, this study found that practitioners' experience had a significant effect on their verbal communications, while patient characteristics had relative few effects on communication types. This suggests that the orthoptist's own qualities have a greater influence on their verbal communications than the patient's qualities. Further investigation is recommended to understand the communication process and its outcomes on patient satisfaction and adherence to ocular treatment and therapy.

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Why are Males with Compressive Optic Neuropathy Predisposed to Developing Cranial Nerve Palsy and Binocular Vision Problems?

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ABSTRACT

Background: The aim of this study was to investigate the prevalence and characteristics of diplopia and cranial nerve palsies in a group of consecutive patients presenting with suspected compressive optic neuropathy.

Methods: Fifty patients aged 17 to 93 years diagnosed with a brain tumour and possible compressive optic neuropathy were referred to an outpatient orthoptic clinic. The orthoptic investigation included an ocular motility assessment to determine the characteristics of the problems reported. All patients presented with a diagnosed brain tumour and possible compressive optic neuropathy.

Results: Thirteen patients (26%) presented with complaints of diplopia pre-operatively and a cranial nerve palsy was found in 8 of these patients (61.5%) and all were male. This result was statistically significant ($\chi^2 = <0.001$).

Conclusion: The prevalence of cranial nerve palsy found in this cohort of participants was consistent with some of the literature. Interestingly only males with compressive optic neuropathy were affected with cranial nerve palsy. It was not possible, however, to identify a causal factor in this study.

Key words: compressive optic neuropathy; cranial nerve palsy, diplopia.

INTRODUCTION

Compressive optic neuropathies resulting from tumours cause progressive vision loss. Pituitary adenomas cause the most commonly occurring compressive optic neuropathies and account for 6 to 12 % of all intracranial tumours^{1,2}. Tumours are usually grouped by size, with a micro-adenoma being less than 10 millimetres (usually arising within the pituitary fossa) and macro-adenomas being larger than 10 millimetres (which grow within the sella and spread from below, superiorly resulting in optic pathway and optic chiasm compression). Classification of the tumour can also be based upon the mass effect of the pituitary secretory function, although one tumour can secrete more than one hormone³.

Pituitary apoplexy is also associated with pituitary adenomas and is present in 2 to 22% of patients. Males may be more susceptible to the condition⁴⁻⁷. The diagnosis is often dependent upon the exact definition of apoplexy used and this varies between researchers. Apoplexy can be diagnosed when only haemorrhage is present in the pituitary gland

and this may lead to a higher incidence of the condition. Presenting symptoms of apoplexy usually include severe headache, nausea, vomiting, altered consciousness, ocular paresis and visual field loss caused by haemorrhage or ischaemic infarction of the pituitary tumour^{8,9}.

Cranial nerve (CN) palsy present as a result of pituitary tumour has been well documented^{8,10-13}. There also seems to be a correlation between paralysis of the cranial nerves, pituitary apoplexy, aneurisms, pituitary adenomas and meningiomas^{10,14,15}. Aneurisms can cause CN damage by the sudden dilation of the aneurism and intra-neural haemorrhage and research suggests that women over the age of 50 years are more affected by intra cavernous aneurisms¹⁶. Meningiomas are more common in women than in men and may cause compressive optic neuropathy and CN palsies¹³. The other mechanism that can cause CN damage occurs when the adenoma grows laterally out of the sella and into the cavernous sinus. This causes compression of the cranial nerves resulting in paralysis^{10,15,17}. CN palsy occurs in 10% of patients with pituitary adenoma and CN III is reported as most often affected, followed by CN VI and CN IV respectively¹⁸ although differing rates of CN involvement have been reported. A large retrospective study of 508 patients by Kim¹¹ found that 2.4% of patients had CN dysfunction and retrospective investigation revealed

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that all had apoplexy, with a higher incidence of CN palsy in males. In a much smaller retrospective study investigating 40 patients with pituitary apoplexy, Lubina⁹ reported an incidence of 40% of patients with CN palsy. Another large retrospective case series by Elkington¹⁷ found that only 5% of patients had CN palsy and of 98 patients with symptoms of diplopia¹⁴ of these 14% presented with paresis. The researcher suggested that the reason for diplopia symptoms in the remaining patients without paresis can be attributed the phenomenon of "hemifield slide" resulting from a bi-temporal visual field defect where there is difficulty in accurately registering the image in the intact hemifield. The consensus among all researchers, however, is that CN III is the most commonly affected nerve. It also appears that decompression of the tumour reduces the CN palsy and improves ocular motility^{5,11}.

The aim of this prospective study was to investigate the prevalence and characteristics of diplopia and CN palsy in consecutive patients presenting with a brain tumour and with a possible compressive optic neuropathy.

METHODS

This study comprised of 50 consecutive patients diagnosed with a brain tumour and a possible compressive optic neuropathy who were referred by a neurosurgeon to an outpatient orthoptic clinic for investigation of their ocular status within one month prior to neurosurgery. All procedures used in the study were approved by the hospital human research and ethics committee and all participants provided written consent for testing procedures. In addition, patient anonymity was preserved at all times.

A comprehensive ocular history was taken for each participant, including the reason for referral to the orthoptic clinic. Complaints of diplopia were documented and thorough investigation of visual acuity and ocular motility was conducted pre- and post-operatively. The ocular motility examination included a cover test at near and distance and prism cover test in 9 positions of gaze. Where participants complained of diplopia, careful assessment was conducted to differentiate diplopia resulting from paralytic or non paralytic strabismus and also between binocular and monocular diplopia. Where there was evidence of a manifest strabismus or decompensating phoria with corresponding diplopia, this was classified as binocular diplopia. Monocular diplopia, which occurred when viewing with only one eye and was due to pathology of the cornea or lens, was also documented.

If a participant was found to have an ocular motility disorder, a complete diagnosis was made, based upon the orthoptic investigation. To ensure that the researcher was blind to any potential cause of CN palsy, the participant's neurology results were examined after the initial diagnosis. This included results of MRI or CT scans, radiology reports

operation reports and correspondence letters which enabled determination of evidence of lateral extension of the optic neuropathy which may have caused compression of CN III, IV or VI in the cavernous sinus. Any evidence of aneurism, apoplexy, haemorrhages or signs of previous brain surgery were also documented. Retrospective analysis of patients' neurological records was also conducted to confirm which participants had true compressive optic neuropathy.

RESULTS

The age range of the participants in this study was 17 to 93 years with a mean age of 53 years (SD=16.2). There was a slightly higher ratio of males (58%) compared with females (42%). All participants underwent surgery to remove the tumour and trans-sphenoidal resection was performed on 48 participants (96%). The remaining 2 participants underwent craniotomy. Evidence of previous brain surgery was found in 12 participants (24%). However, this was investigated retrospectively and was based upon investigation of the participant's clinical file; it is therefore possible that some participants with previous surgery were missed in this analysis. Signs and symptoms of apoplexy or haemorrhage were found in 10 participants (20%) and were based on the participant's clinical file for documented apoplexy. This finding may have also been skewed due to the method of investigation of this particular variable.

The most commonly occurring pathology was macro adenoma, found in 68% of participants and the retrospective analysis of the patient files indicated that 35 participants (70%) had compression of the optic pathway. An overview of tumour types and confirmed visual pathway compression is show in Table 1.

The best corrected visual acuity of each participant was measured pre- and post-operatively and was found to range between 6/4 and 6/60 at both testing times with an average acuity of between 6/6 and 6/7.5. Seventy six percent of participants had visual acuity better than 6/6 in the right eye prior to surgery and post surgery 88% were found to have visual acuity better than 6/6. For the left eye, 72% had acuity better than 6/6 with 84% of participants with acuity

Table 1. Tumour type and confirmed compression

Tumour Type	Frequency (%)	Confirmed Compression (%)
Macro adenoma	34 (68%)	29 (58%)
Micro adenoma	5 (10%)	0 (0%)
Cyst	8 (16%)	4 (8%)
Craniophayngioma	1 (2%)	1 (2%)
Meningioma	2 (4%)	1 (2%)
Total	50 (100%)	35 (70%)

better than 6/6 post operatively. The improvement in visual acuity was found to be statistically significant for both eyes after removing the tumour (Right eye: $Z=-3.39$, $P<0.05$; Left eye: $Z=-2.09$, $p<0.05$).

In this study, fourteen participants (28%) complained of diplopia. Thirteen participants (26%) presented with complaints of diplopia at the first clinic visit and 1 participant complained of diplopia post-operatively as a result of a CNIII palsy with an onset after surgery. This participant was removed for the purposes of data analysis in this study.

CN palsy was found in 8 of the 50 participants (16%) and the most commonly occurring CN palsy involved CN III, followed by CN IV and CN VI respectively. Eight participants (61.5%) of the 13 who reported diplopia pre-operatively were also diagnosed with a CN palsy. Of the remaining 5 participants, 3 were diagnosed with a decompensating phoria and 1 with monocular diplopia as a result of cataract. The remaining participant, who did not present with CN palsy but with diplopia, had an unconfirmed diagnosis. He reported the diplopia to occur when he was feeling unwell or tired, but his clinical signs were complicated with the presence of cataract and bitemporal haemianopia. It is therefore possible that he could be suffering from either monocular diplopia, "hemifield slide" as described by Elkington¹⁷ or decompensating phoria which could not be decompensated during the clinical visits.

Table 2 shows a summary of participants with complaints of diplopia. Of the participants with pre-operative CN palsy ($n=9$), all were male. The higher ratio of males was found to be statistically significant ($\chi^2 = <0.001$).

Investigation of the clinical file revealed that an underlying

cause of CN palsy could be found for 6 of the 8 participants (75%). Lateral extension of the tumour was found in 3 participants (37.5%) and 3 participants (37.5%) had evidence of apoplexy pre-operatively. Evidence of previous brain surgery was present in the remaining 2 participants (25%) and it is possible that residual scar tissue may have contributed to the CN palsy, however this could not be confirmed.

Thirty-five participants of the total group had compression on the optic pathways and 10 (28.57%) of these patients evidenced true compression with binocular vision problems. The evidence of compression was found on participants radiology reports. Within the group of participants with pre-operative CN palsy all had true compression and all were male.

The CN palsy was found to be reduced after decompression of the tumour in 2 participants (25%), stable in 3 (37.5%) and resolved in 3 participants (37.5%) within the first 1 to 3 months of presentation to the orthoptic clinic (Table 2).

Whilst apoplexy or evidence of haemorrhage within the pituitary gland was found in 10 of the 50 participants (20%), only 3 participants with binocular vision problems were found to have apoplexy (Table 2). There was no statistically significant difference in the rate of apoplexy present between participants with and without binocular vision problems ($\chi^2=0.40$). Due to the extremely high proportion of males with CN palsy, the difference between males and females and presence of apoplexy for all participants in this study was also investigated but no statistically significant difference was found ($\chi^2 = 0.58$). There was one female patient who presented with complaints of diplopia, and

Table 2. Summary of participants with complaints of diplopia, investigated prospectively

ID	Age	Sex	Diplopia	CN palsy	Type of Compressive optic neuropathy	Reason for diplopia if no CN palsy present	Apoplexy	Status of CN palsy after surgery
IC	56	M	Binoc.	IV	Macro adenoma*	-	-	Reduced ^(a)
TK	17	M	Binoc.	III,IV & VI	Macro adenoma*	-	Yes	Resolved ^(b)
JL	70	M	Binoc.	VI	Macro adenoma*	-	-	Resolved
MM	41	M	Binoc.	III	Macro adenoma*	-	-	Stable ^(c)
OM	61	M	Binoc.	III	Macro adenoma*	-	-	Stable
RD	79	M	Binoc.	IV	Macro adenoma*	-	-	Stable
GS	69	M	Binoc.	III	Macro adenoma*	-	-	Reduced
WT	50	M	Binoc.	III	Macro adenoma*	-	Yes	Resolved
AT	42	M	Binoc.		Macro adenoma*	#	-	-
PR	44	F	Binoc.		Macro adenoma*	Decomp. phoria	-	-
MS	53	F	Binoc.		Meningioma	Decomp. phoria	-	-
PM	70	F	Binoc.		Macro adenoma*	Decomp. phoria	-	-
LP	66	M	Monoc		Micro adenoma	Cataract	-	-

* Participants with evidence of compression on the pathways, investigated retrospectively. # Diplopia could be attributed to decompensating phoria, hemifield slide or cataract. (a) Reduced: the diplopic images are closer together and the angle of the strabismus was reduced compared with the first visit (b) Resolved: no diplopia, evidence of binocularity and no measured manifest strabismus (c) Stable: no change in diplopia or measured angle of strabismus compared with the first visit.

a meningioma was diagnosed when the researchers investigated the neurological reports retrospectively, but no evidence was found for a CN-palsy.

The relationship between previous brain surgery and binocular vision problems was examined as was the difference between previous brain surgery and CN palsy and no statistically significant relationships were found (Binocular vision: $\chi^2 = 0.27$; CN palsy: $\chi^2 = 0.43$).

DISCUSSION

Pituitary adenomas are reported as the most commonly occurring intracranial tumour^{8,18} and the findings of this study are consistent with the literature. However, the prevalence of adenoma was significantly higher in this cohort of participants (78%) compared with the reported prevalence of between 6 and 12%. This finding may be skewed in this study as a large proportion of patients with compressive optic neuropathy are specifically referred to the orthoptic clinic.

The prevalence of CN palsy found in this cohort of participants was 16% and is similar to that reported by Elkington¹⁷ and Ironside². This differs significantly to the studies of Kim¹¹ and Lubina⁹ who report a prevalence of 2.4% and 40% respectively. However, these researchers only included patients with evidence of apoplexy. A CN III palsy is described as the most commonly occurring palsy and the findings of this study are consistent with the literature.

The most interesting finding in this study was that only males with a compressive optic neuropathy were affected with CN palsy. It seems that males are more susceptible to developing apoplexy⁴⁻⁷ and this may contribute to the development of a CN palsy. It was difficult to identify a causal relationship between CN palsy and apoplexy in this study, however as previously explained, the definition of apoplexy may differ and the presence of this condition was noted upon retrospective investigation of the participant's file notes and may have skewed the findings. Other possible causes for the higher presence of CN palsy in males such as the type of tumour, presence of apoplexy or haemorrhage or lateral extension of the tumour could not be identified as part of this study.

Almost a third of the participants in this study presented with diplopia of varying aetiology. This significant figure may be due to the fact that all participants were examined by an orthoptist, specifically trained in the detection and diagnosis of such ocular motility disorders. Diplopia was a presenting complaint to the orthoptic clinic and careful investigation of the aetiology of the diplopia was important to distinguish monocular from binocular and careful examination was also required to detect CN palsy. Whilst some binocular vision problems could be explained by decompensating phorias, most were as a result of CN palsy and it was found that the

CN palsy was either reduced or completely resolved in a high proportion of participants after decompression of the tumour.

CONCLUSION

Whilst the researchers were not specifically investigating whether males or females were more likely to suffer with binocular vision problems, the finding of a higher prevalence of males with CN palsy cannot be answered here and is worthy of further research. A more thorough examination of the effects of the presence of apoplexy or the type and characteristics of the compressive optic neuropathy upon palsy is needed. However, this type of investigation was beyond the scope of the present study.

A significant proportion of patients with compressive optic neuropathy may present with diplopia or CN palsy. Often the symptom of diplopia is considered less important by neurosurgeons compared with the other symptoms experienced by the patients which, in the case of apoplexy, may be very severe. However, diplopia can be disconcerting for sufferers and patients require thorough investigation of the ocular motility problem when referred to an orthoptist and possible reassurance that, in the case of CN palsy, may resolve post trans-sphenoidal resection or craniotomy.

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Vision Screening of Individuals with Mild Intellectual Disability

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ABSTRACT

A pilot vision screening of secondary school students with mild intellectual disability was conducted as part of the La Trobe University orthoptic clinical education program. The screening included a visual acuity assessment, cover testing, examination of ocular motility, stereo acuity and convergence near point. Two hundred and nineteen

participants (n = 219) aged 12 - 18 years participated. Of these, 73 (33.3%) failed the screening on the basis of reduced vision, strabismus and or nystagmus. This suggests a great prevalence of ocular disorders in children with mild intellectual disability and highlights the importance of vision screening within this community.

Keywords: vision screening, vision impairment, intellectual disability

INTRODUCTION

It is well documented that individuals with intellectual disability have a higher risk of vision impairment or blindness¹. However, the literature cannot easily be compared as different populations of individuals with intellectual disability have been studied. The age of the individual, degree of intellectual disability, and the associated syndrome have all been reported to influence the prevalence of vision impairment²⁻⁴. For instance, a large Dutch epidemiological study of adults with intellectual disability recently reported that the prevalence of vision impairment ranges between 2.2% and 66.7%, and for blindness between 0.7% to 38.9% depending on age, syndrome, and degree of intellectual disability².

In adults with intellectual disability, a high prevalence of refractive error, strabismus, lens opacity, and keratoconus have been reported¹⁵⁻⁹. Furthermore, in relation to refractive error, studies have found extreme values contrasting the general population^{5-6,10}. Epidemiological studies on vision disorders and impairment in children and teenagers with intellectual disability are less common². However, recent studies have reported that children with intellectual disability have a significantly greater incidence of various ocular conditions, the most common being strabismus

and refractive error¹¹⁻¹². As with adults, the presence of a syndrome and the degree of the intellectual disability influences the prevalence of vision impairment¹¹.

Despite the increased risk of vision impairment or ocular disorders for children with intellectual disability, vision screening programs rarely include high risk children. This most likely relates to the need for specially trained clinicians to assess children with intellectual disability and the fact that many of these children are under medical care. This paper reports the findings of a vision screening program piloted in a Victorian school for students with mild intellectual disability.

METHOD

As part of the orthoptic clinical education program at La Trobe University, final year students became involved in a program for vision screening of children with special needs. In 2008 and 2009, vision screening was undertaken at a school in Melbourne's eastern suburbs for secondary aged students with mild intellectual disability. Classification of students' disability had previously been determined at the time of enrolment and was based on criteria set by the Victorian Department of Education and Early Childhood Development, which relate to World Health Organisation guidelines.

Parents of students enrolled at the school were provided an information sheet and only those with completed consent forms participated in the screening. In 2008, all enrolled

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students were invited to participate, and in the following year only newly enrolled students were invited.

The vision screening was conducted at the school by senior orthoptic students under the supervision of a University academic and registered orthoptist. The screening was not a comprehensive ocular dilated examination, but included an ocular motility examination in addition to vision assessment. Visual acuity was tested using a Lea chart at 3 metres with each eye randomly occluded. Refractive correction was worn if available. A cover test to detect ocular misalignment was performed at both near and distance using both accommodative and non-accommodative targets depending on the cooperation and ability of the participant. Ocular movement, convergence near point and stereoacuity using the Lang II stereotest were also assessed.

Participants were deemed to fail the vision screening if they demonstrated one or more of the following: (i) less than 6/9 vision in either eye (ii) greater than a 2 line difference in vision (iii) intermittent or constant manifest strabismus (iv) an ocular movement disorder (e.g. nystagmus). Participants with reduced stereo acuity who passed all other aspects of the screening were deemed to pass, as this was likely to relate to their cooperation or understanding of the test or task. In addition, participants with a convergence near point more remote than 10cm but who passed other aspects of the assessment were not considered a fail since asthenopic symptoms could not reliably be determined for the diagnosis of convergence insufficiency. At completion, parents were provided with a letter outlining the result of the screening. Participants whose vision failed the standard were recommended for a comprehensive ocular examination by an ophthalmologist, orthoptist or optometrist.

RESULTS

Two hundred and nineteen participants ($n = 219$) aged 12 - 18 years were included in the vision screening. Visual acuity measurement of each eye was attained for all except one who would not tolerate occlusion. This ranged from 3/1.9 to 3/30 and one participant demonstrated 'hand-movements vision' only in one eye. The participant whose vision was performed with both eyes open achieved 6/24.

Fifteen (6.8%) had visual acuity worse than 6/12 in their better eye and 44 (20.1%) had visual acuity worse than 6/12 in the poorer eye; vision less than 6/12 often defining vision impairment. During the screening, it was not determined if the impairment was due to refractive error and correctable with glasses. At the time of assessment, 14 (6.4%) participants wore glasses for refractive error, half failing the vision screening despite their being 'corrected'. A further 29 participants (13.3%) demonstrated a convergence near point more remote than 10cm (up to 20cm).

Of the 219 participants screened, 73 (33.3%) failed. The

most common finding was reduced visual acuity, followed by strabismus and nystagmus (Table 1). Twenty-six of these participants had more than one condition (Figure 1). In relation to strabismus, esotropia was fractionally more prevalent than exotropia (Table 2).

Reason for failed screening	Number	Percentage of those (n=73) who failed screening	Percentage of total (n=219)
Reduced Vision	56	76.7%	25.6%
Strabismus	27	37.0%	12.3%
Nystagmus	7	9.6%	3.2%

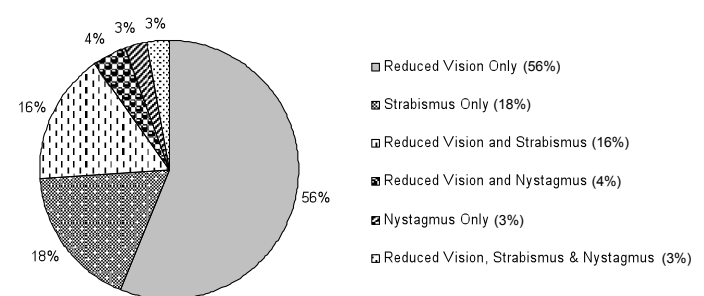


Figure 1. Pie graph representing the proportion of participants who failed the vision screening and respective causes.

Type of Strabismus	Number (and %) of participants
Esotropia	14 (6.4%)
Exotropia	11 (5%)
Hyper/Hypotropia	4 (1.8%)
Browns syndrome	1 (0.5%)
Duanes syndrome	1 (0.5%)

DISCUSSION

This paper reports on the findings of a pilot vision screening program conducted in a school with students who have mild intellectual disability. Whilst the vision screening did not include a comprehensive ocular examination for the diagnosis of disease, it was found that one-third of participants failed a component of the screening and were referred for further assessment. The most common reason for referral was reduced vision, followed by strabismus.

It is difficult to compare the referral rate in our study with prevalence rates of ocular disorders reported in the literature. Whilst reduced vision was the greatest reason for referral, we did not establish the cause or determine the specificity

and sensitivity of our testing. Furthermore, although all participants were considered to have mild intellectual disability we did not record the cause of intellectual disability or any co-morbidities. As mentioned, prevalence rates are affected by a number of factors including degree of intellectual disability and associated syndrome^{2-4,9}.

Referral criteria for vision screening programs vary and are in part dependent on the age of the individual screened. However, most screenings are conducted when children are of pre-school age and or primary school and commonly use the referral criteria of less than 6/9 vision. A large scale Australian study by Junghans et al¹³ reported a 25% referral rate for children aged between 3-12 years without disability. However, the referral criteria in this study was based on the presence of one or more of the following: stereoacuity less than 70", accommodative facility of less than 8 cycles per minute, convergence near point more remote than 9 cm, near exophoria greater than 10 prism dioptres, or near esophoria greater than 5 prism diopters, shift in phoria between distance and near greater or equal to 4 prism diopters, astigmatism of at least 1D, myopia greater than 0.75D, or hypermetropia greater than 1.5D. The referral rate in this study was substantial given that the criteria were extremely rigorous, and thus questionable as to whether reflecting likely functional impairment. Despite their very high referral rate, we found a greater proportion of children with intellectual disability to have ocular disorders with more conventional referral criteria. In addition, there was a clear difference in the presence of strabismus between the two studies with Junghans et al¹³ reporting a 0.3% prevalence, whilst we found a 11.4% prevalence.

Interestingly, another Australian population based study of 12 year old children reported vision impairment in 5%¹⁴, where vision impairment was defined as acuity less than 6/12 in the worse eye. In contrast, we found that 20% of children with mild intellectual disability demonstrated vision impairment at the time of assessment, though we did not determine whether this was correctable with glasses. Whilst both Australian studies¹³⁻¹⁴ have assessed a younger population of children and perhaps not directly comparable, there appears to be a trend towards a higher prevalence of ocular disorders in our participants with intellectual disability, consistent with the literature.

In conclusion, the vision screening referral rate in a secondary school population with mild intellectual disability was 33.3%. In comparison with other Australian general population studies, it is suggested that ocular defects are more common in individuals with mild intellectual disability. This emphasises the importance of vision screening for this group. Whilst vision has the potential to be overlooked in children with other medical needs, ultimately vision

can play an important part in social interaction, academic performance and quality of life. Future research should focus on epidemiological studies on vision impairment in Australian children with intellectual disability and developing further programs for the early detection and management of ocular disorders in this population.

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Concordant Esotropia and Bilateral Hypermetropia in Young Monozygotic Twins

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ABSTRACT

Monozygotic twins with concordant essential infantile esotropia and bilateral hypermetropia are reported. They are discussed in relation to the importance of early surgical

alignment before the age of two years and the influence of high hypermetropia on visual development post operatively.

Keywords: Infantile esotropia, congenital esotropia, hypermetropia, timing, surgery

INTRODUCTION

Essential infantile esotropia, or congenital esotropia, is a large angle esotropia occurring in the first six months of life^{1,2}. It is generally associated with anomalies including dissociated vertical deviation, inferior oblique over-action, latent nystagmus, limitation of abduction associated with crossed fixation and asymmetrical optokinetic nystagmus^{1,2}. The majority of patients require surgical correction of the angle of deviation as it can lead to muscle and conjunctival contracture, and because the size of the esotropia is cosmetically unacceptable¹. It has also been established that patients are likely to develop a subnormal form of binocular single vision, usually in the form of a microtropia, if operated on before the age of two years^{1,3,4}.

The twins who are reported on have concordant (the presence of the same trait in both twins) essential infantile esotropia and bilateral hypermetropic refractive errors. They will be discussed in relation to the genetic influence on the development of essential infantile esotropia and hypermetropia, the importance of early surgical alignment and the influence of hypermetropia on visual development in patients with essential infantile esotropia.

CASE REPORT

Monozygotic twin girls, Twin 1 and Twin 2, were born prematurely at thirty-three weeks gestation. They had a family history of squint and amblyopia in a maternal aunt.

The twins were referred for squint surgery by a private ophthalmologist, and were first seen at fifteen months of age. The parents had first noticed the twins' squints at three months of age. Both twins had been wearing glasses full-time and undergoing occlusion of the amblyopic eye for half an hour per day for the past six months, at the direction of the referring ophthalmologist. Twin 1's current glasses prescription was R +5.00/-2.00x180°, L +4.00/-1.00x180°, and Twin 2's was R +4.50/-1.50x175°, L +4.00/-1.00x100°.

The twins were booked for strabismus surgery at their initial appointment. Results of orthoptic testing were reasonably consistent at each subsequent visit. Findings were as follows:

Twin 1

On examination, Twin 1 fixed and followed a light stimulus and displayed objection to cover of the left eye. Cover test with and without glasses revealed a moderate to large right esotropia which briefly held fixation, measuring 40Δ by Krimsky reflections. Ocular movements showed a slight limitation of right abduction and right inferior oblique over-action. Latent nystagmus was also noted.

Twin 1 was instructed to undertake patching of the left eye for six hours per day, which proved difficult to achieve. Consequently patching was substituted for Atropine 1% to be instilled into the left eye every second day. It was initially found that Twin 1 would not take up fixation with the left eye occluded; however over a period of three months of amblyopia treatment Twin 1's mother began to notice the alternation to a left esotropia on occasion, indicating that the right visual acuity had improved.

Pre-operatively the right esotropia was measured to be 40Δ

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by Krimsky reflections (patient cooperation could not be gained for a prism cover test). A bimedial rectus recession was performed to correct the esotropia at 23 months of age. Post-operatively, an esotropia of 4 Δ was measured by Krimsky reflections. Ocular movements appeared full, the inferior oblique over-action previously noted appearing to have resolved.

Twin 2

Twin 2 also fixed and followed a light stimulus but did not object to cover of either eye, suggesting near equal visual acuity. Cover test with and without glasses showed a small to moderate left esotropia, at times holding fixation/alternating. Measurement by Krimsky reflections with and without glasses was approximately 30 Δ . Ocular movements showed cross fixation on versions, again indicating near equal visual acuity. Twin 2 was instructed to undertake two hours of patching of the right eye per day for treatment of amblyopia, with which she was compliant.

At her pre-operative orthoptic assessment, the size of the deviation was measured by prism cover test to be 40 Δ . A left recess/resect procedure was undertaken to correct the strabismus when Twin 2 was 18 months old. Post-operatively no deviation was apparent upon cover testing. Ocular movements showed a restriction of the left eye on abduction and a right inferior oblique over-action.

DISCUSSION

Twin studies have shown a 94.1% concordance rate of infantile esotropia in monozygotic twins as compared to a 26% concordance rate in dizygotic twins, suggesting a strong genetic component⁵. The higher concordance rate of concomitant strabismus found between dizygotic twins than siblings suggests that environmental factors also play a part in the development of concomitant strabismus⁶. Environmental risk factors for the development of childhood strabismus have been identified to be advanced maternal age, maternal smoking during pregnancy, and low birth weight (<1500g).^{6,7} Hypermetropia has also been shown to be a risk factor for the development of childhood strabismus⁸. A twin study on the genetics of refractive error predicted the heritability of hypermetropia to be 89%⁸. These twins illustrate concordance in both hypermetropic refractive error and essential infantile esotropia.

There are two main theories relating to the development of essential infantile esotropia. Worth's sensory theory states that the development of infantile esotropia is due to a congenital deficit of fusion, and as such the restoration of normal binocular single vision is not possible^{1,2}. Chevasse later put forward the theory that binocular reflexes gradually develop in the first five years of life, and that the development of infantile esotropia is due to interference with the development of the conditioned binocular reflexes^{1,2}.

It has been well established that there is an increased likelihood of patients developing a subnormal form of binocular single vision if operated on before the age of two years, usually in the form of a microtropia^{1,3}. Various studies have advocated that surgical alignment before six months of age results in a finer form of stereoacuity than those aligned after the age of six months^{9,10}, but a weakness to these results is that these studies could not take into account the possibility of spontaneous resolution of the esotropia¹¹. Conversely there has also been a study on the effect of surgical alignment on functional binocular status in adults and children over the age of eight years who previously had had no surgical treatment for their infantile esotropia.¹² The study found that 88% of patients surgically realigned to within 8 Δ of orthotropia who had shown a suppression response pre-operatively on testing with Bagolini striated glasses demonstrated binocular function on testing with Bagolini striated glasses post-operatively¹². Generally it is recognised that the earlier surgical alignment is performed, a higher degree of binocular function will be attained^{9,10,12}.

The presence of latent nystagmus, dissociated vertical deviation (DVD) and amblyopia can be barriers to the proper development of sensory fusion and stereopsis. Consequently, bifoveal binocular single vision is unobtainable after successful surgery for essential infantile esotropia and a microtropia is the expected outcome¹. Early surgery also can lessen any mechanical component from muscle and connective tissue contracture¹.

The measurements of the angle of the esotropia in our twins taken at each visit were reasonably consistent, suggesting that they were reliable enough to base squint surgery on. Surgery to correct the strabismus was booked at the twins' first appointments, with the aim of performing surgery as soon as possible. As the twins were aged fifteen months at their first appointment, it was important that surgery was not delayed beyond their second birthday.

As a result of surgery, Twin 1 was left with a residual esotropia of 4 Δ , a good result considered that ocular alignment tends towards divergence with age. Twin 2's surgical result was of orthotropia, and while this may initially be a good result cosmetically, in the long run a consecutive exotropia may develop due to the tendency for ocular divergence with age if binocular single vision and fusion fail to develop. For this reason a residual esotropia of 5-10 Δ would have been the preferable surgical outcome. As both twins have only recently undergone surgical correction, the long-term stability of ocular alignment is as yet unknown.

It has been advocated that alignment between 15 Δ esotropia and 10 Δ exotropia is acceptable, but a small residual esotropia if 5 Δ -10 Δ is preferred¹. Kushner & Fisher reported that the ideal surgical outcome was that of orthotropia, followed by a residual small-angle esotropia, the least preferable being a consecutive small-angle exotropia¹³. They found

that patients who were orthotropic six months after surgery showed better alignment and binocularity five years after surgery than those patients who were esotropic or exotropic six months after surgery¹³.

A refractive element to the esotropia does not appear to be present in either twin as the size of the deviation, measured by the Krimsky method, was the same with and without glasses. In this case the hypermetropic correction has been prescribed to ensure normal visual development. The prevalence of high hypermetropia (> +2.50D) in essential infantile esotropia has been found to be 14.4%¹⁴. Surgery should be performed to correct the amount of the deviation that the hypermetropic correction does not control after 2-3 months of spectacle wear¹⁴, this being the total deviation in the twins. To prevent the development of a superimposed accommodative esotropia, the hypermetropic correction should be continued to be worn subsequently to surgery due to the presence of subnormal binocular single vision¹⁴.

These twins give an example of early surgical alignment (before two years of age) for essential infantile esotropia. They also demonstrate the co-existence of high hypermetropia with essential infantile esotropia, and its influence on visual development.

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**Selected Abstracts from the OAA 66th Annual Scientific Conference,
held in Brisbane, 15-18 November 2009**

OPENING ADDRESS

Jennifer Gersbeck

CEO of Vision 2020 Australia

With over 20 years experience working in the government and not for profit sectors, Jennifer Gersbeck has been involved in a wide range of social marketing programs aimed at raising awareness, changing behaviour and influencing key decision makers. Jennifer has qualifications in Political Science and Business Marketing and has worked extensively in the health and community services sector. Prior to joining Vision 2020 Australia, she held the position of National Marketing Manager with World Vision. Jennifer commenced as CEO of Vision 2020 Australian October 2004.

With ten years to go until 2020 Jennifer Gersbeck provides an overview of the global VISION 2020: The Right to Sight movement and achievements in Australia and our region. While significant progress has been made the eye health and vision care sector still faces many challenges as it comes together to eliminate avoidable blindness and improve vision care by 2020.

PATRICIA LANCE LECTURER

Michael Coote

Dr Coote is currently the Clinical Director of the Royal Victorian Eye and Ear Hospital (RVEEH) and has been from January 2009. He is also on the board of Mercy Health - an organisation with two major public hospitals and 1200 aged care beds. He runs a research project through the Centre for Eye Research Australia (CERA) - trying to develop a new implant for glaucoma. Dr Coote has developed and now collaborates in the GONE (Glaucomatous Optic Neuropathy Evaluation) Project (on-line education tool). Prior to RVEEH Dr Coote was the Head of Ophthalmology at The Northern Hospital. His main organisational goals are to put the RVEEH on a sustainable footing with substantial redesign of outpatients and work roles. This includes a substantial work change for orthoptics - with increased independent decision making and involvement in auditing and quality control. By proper triage and 'risk stratification' Dr Coote aims to make the Hospital effective and efficient in its role in the Community.

WORKFORCE SURVEY REVISITED

Val Tosswill, Sue Heathcote, Wendy Holland

The Australian orthoptic workforce was last surveyed in 2006/2007. One of the aims of this was to provide evidence of change in the profession. An edited version of the survey results was posted on the Orthoptic Association of Australia website in July 2009. In Brisbane, the contributors will highlight some notable changes and trends in the profession.

THE SIX MILLION DOLLAR ORTHOPTIST

Zoran Georgievski

We are quickly learning that we must develop the orthoptic workforce differently to before. We emerged from the "orthoptic heyday" of

strabismus decades ago and expanded into the area ophthalmic assisting, by and large, simplistically perhaps, by upskilling ourselves to do various 'tests', like refraction, perimetry, tonometry, biometry and so forth.

'Times are changing' is a cliché, but a stop-watch is being held to ophthalmology services as to how we will race to respond to the facts that we have - (i) More people requiring eye care, this is increasing, (ii) Limited resources, and (iii) Workforce challenges

Hospital outpatient departments are being required to reform, to work smarter. We're told we need to reduce non-value adding activity ('waste'), increase efficiency and improve the quality of care.

The Eye & Ear Hospital provides the highest number of ophthalmology occasions of service and the largest single cataract surgery throughput in the country. The orthoptists diligently assist, but are now being leaned on to help with management strategy. We have too many patients, so we are now asking the question "do they all need to see a doctor now?" Can orthoptists be delegated certain responsibilities, to monitor patients with eye disease that doesn't yet require ophthalmological attention? Does every diabetic patient need to see an ophthalmologist? What about those with early cataract?

In this presentation, I will speak about the encouragement from government and healthcare providers to improve the way allied health professionals, including orthoptists, are utilised. It's perfectly reasonable; and as a profession we should want this. I will provide examples of clinic initiatives, beyond strabismus, of how orthoptists can secure their relevance to the eye care landscape, how this is positive step, and how our profession's leaders need to be supporting the enhancement of our scope of practice.

A CASE OF ECTASIA - WHAT NOT TO DO

Ana Alexandratos

Corneal ectasia is a rare problem in the refractive world when treatment parameters and standards of best practice are adhered to. In this case presentation, an extreme case of high myopia treated by a surgeon without future consideration for the patient's well being are discussed. The problem of measuring for cataract surgery and dealing with unpredictable outcomes falls on the now treating Ophthalmologist

KERATOCONUS FROM THE INSIDE!

Laura Hartley

Keratoconus more than meets the eye. Ever thought beyond the orbiscan or keratometry readings of your KC patient? KC from the inside presents an inside view of the journey travelled by a Keratoconus patient. It discusses the increasing blur, abnormal keratometry readings, increasing cyl in glasses, contact lens journey and the resultant disaster and panic. Some other matters discussed will be the trials and tribulations such as dry eye leading to eczema, costs involved, decision and reasoning behind lubricants, choices and decisions to be made with surgery from the patient's perspective. The reasoning behind the type of surgery chosen will be discussed. Postoperative experience will conclude the journey.

WHAT TO DO WITH ASTIGMATISM?

Nhung Nguyen

With the increasing choices in the range of options in IOLs, this study compared which is the best option for patients undergoing Cataract surgery that has corneal astigmatism greater than 0.75 diopters cylinder. The study looked at the post-operative results of Marsden Eye Specialists patients comparing groups who've had the Rayner Toric IOL implanted with other astigmatic corrections such as Corneal Astigmatic Keratotomy and Laser refractive surgery post cataract. The study also looked at the difference in keratometry reading in Orbscan topography in comparison with IOL master keratometry and the Bausch and Lomb Keratometry.

THE ROLE OF THE OPHTHALMIC ASSISTANT IN OPHTHALMIC DAY SURGERY

Ana Alexandratos, Richard Smith, Margaret Kearns

Traditionally, Orthoptists have been employed in Ophthalmology practices in a clinical assistant role. The compatibility of the Modern Day Surgery was evident as a perfect partner to Ophthalmology; so many Day Surgeries evolved on the site of existing Ophthalmology practices.

A new role became apparent for Orthoptists as surgical ophthalmic assistants. This meant there was a natural transition for the Orthoptist from the clinical setting to the surgical arena. Certain training opportunities are discussed.

The technical and surgical knowledge an Orthoptist possesses makes them an integral part of the Day Surgery Team. The advantages to both the patient and facility are discussed.

THE SURVEILLANCE OF CHILDHOOD OPTIC NEURITIS RECOVERY POST TREATMENT USING THE VISUAL EVOKED POTENTIAL

Stephanie Sendelbeck, Katie Scanlon

Childhood optic neuritis presents with symptoms of sudden onset visual loss, visual field loss, changes in colour vision and swollen optic discs. It can be associated with a viral infection. Visual prognosis is excellent in the majority of cases. The visual evoked potential (VEP) assesses optic nerve function and is used to monitor optic nerve recovery in childhood optic neuritis. This paper discusses the orthoptists role in the investigation of childhood optic neuritis and the role of the VEP test.

WIDE VARIATION IN THE PREVALENCE OF MYOPIA IN SCHOOLS ACROSS SYDNEY: THE SYDNEY MYOPIA STUDY

Amanda N. French, Ian G. Morgan, Paul Mitchell and Kathryn A. Rose

Purpose: To examine variability in the prevalence of myopic refractive errors by school in two age samples from the Sydney Myopia Study (SMS).

Methods: The SMS examined two cross-sectional age samples; Year 1 children (aged 6, n=1741) and Year 7 children (aged 12, n=2367) from 55 randomly selected primary and secondary schools in Sydney. A mixture of public, private, religious and academically selective schools were included in the study. All children had a comprehensive eye examination; including cycloplegic auto-refraction (cyclopentolate 1%, Canon RK-F1). Myopia was defined as a right spherical equivalent (SE) refraction of ≤ -0.50 dioptres (D).

Results: The proportion of children with myopia was 1.5% in the 6 year olds and 12.8% in the 12 year olds. The percentage of children with myopia

within each school varied widely, more so for the secondary schools, with a range of 0% – 7.14% (mean 1.47% \pm 2.04) in the Year 1 sample and 2.68% – 59.22% in the Year 7 sample (mean 11.87% \pm 12.1). Entry to the two schools with the highest percentage of myopic children (23.44%, 59.22%) was academically based.

Conclusions: The proportion of children with myopia varied widely across schools in Sydney, but more so in the secondary schools. As the schools with the highest levels of myopia were academically selective, this may be attributed to the frequently observed link between educational attainment and myopia. A number of other factors that may be associated with educational attainment include socio-economic status, ethnicity, near work and outdoor activity.

INTERESTING CASES RELATED TO THE MANAGEMENT OF EPILEPSY

Louise Brennan

Research suggests that 2-3% of the Australian population will develop epilepsy. Epilepsy is a broad term that includes the many reasons why a child may have repeated seizures. Most children with epilepsy achieve good control through the use of antiepileptic medication and many become seizure free. However, a number of children will continue to have seizures that are difficult to manage. There is a wider range of options available for children with epilepsy that have seizures that are not well controlled with medication. Two interesting cases will be presented that attended the Eye Clinic at The Children's Hospital at Westmead for visual problems related to their epilepsy management.

RAPID FIRE - MODELS OF PAEDIATRIC EYE CARE SERVICES

Connie Koklanis

Many models of service care delivery have emerged to meet the challenges of providing eye health care services. Providing a high-quality eye service that is efficient and effective and which improves the patient journey is critical to developing a sustainable service. In late 2007 we implemented an orthoptist led clinic at the Royal Children's Hospital to address the growing demand on paediatric eye care services. This presentation will discuss the key elements of the implemented model of care in our outpatient department and its outcomes.

RAPIS FIRE - STRATEGIES FOR IMPROVING COMPLIANCE WITH OCCLUSION

Dee Garland

Distillation of 20 years of experience of patching, including inducements and bribery strategies, psychological insights for parents and children, recording of patching.... These strategies have spectacular results and will be presented.

RAPID FIRE - A PAEDIATRIC CASE OF THYROID EYE DISEASE AND MYASTHENIA GRAVIS.

Katie Scanlon, Stephanie Sendelbeck

Myasthenia Gravis and Thyroid Eye Disease are diseases that usually affect the adult population.

The clinical findings of an interesting case of a 9 year old with these 2 conditions will be presented.

RAPID FIRE - DARWIN: THE ORTHOPTIST ROLE

Aimee Leong

To showcase the role of the Orthoptist in the Northern Territory interesting case studies (both ophthalmic and orthoptic), an overview of the position and a brief overview of life and attractions in Darwin will be presented.

REFERRAL PATHWAYS IN METROPOLITAN QUEENSLAND

Jane Fleming, Johnson G, Knight K, Ebrahim B, Lindsell B, Te Whiu D and Wharton G

Queensland Vision Initiative Inc (QVI) has been investigating eye health services in Queensland, with the aim of reducing the incidence of avoidable vision impairment and blindness across the State. Recently a Federal Government funded project has been completed, into referral practices of eye and allied health professionals and awareness of the low vision, peer support and community services in Metropolitan Brisbane. The findings from this study have now been submitted to Government, and an extension of this project is currently underway for regional, rural and remote Queensland.

Part of this Referral Pathway Pilot Project was a survey of 96 eye and allied health professionals - including one orthoptist, four occupational therapists and a social worker working in low vision clinics. These health professionals indicated that 60% of eye and allied health practitioners are still unaware of the services provided by each agency. Other issues included the length of time taken to get an appointment and no information received back from agencies regarding referrals.

Overall, to improve eye health services in metropolitan Brisbane, these health practitioners recommended, increased continuing education on the services provided by low vision, peer support and community organisations; and a website to detail the services available. These results suggest that improving communication between agencies will achieve a better service for those with low vision or blindness.

THE BATTLE AGAINST MACULAR DEGENERATION - NOW WE HAVE A WEAPON!

David Hilford

One in seven Australians over 50 years of age experience some degree of macular degeneration (MD). This, combined with Australia's ageing population, accounts for the fact that MD is the leading cause of blindness in Australia's senior citizens. More specifically, it is the exudative form of MD which accounts for the majority of vision loss, and until recent years treatment modalities for exudative MD have had limited results at best. Anti-Vascular Endothelial Growth Factor (anti-VEGF) therapy has changed the face of treatment for wet/exudative age-related MD, along with its potential use in other vaso-proliferative ocular diseases. The use of anti-VEGF therapy in clinical practice will be reviewed in this presentation, along with a brief summary of relevant studies and presentation of actual patient cases, which reflect the clinical efficacy of this treatment.

RETINAL REGENERATION LASER TREATMENT IN EARLY AGE-RELATED MACULOPATHY

Kate Brassington, Professor Robyn Guymer and Peter Dimitrov

Age Related Macular Degeneration (AMD) is one of the leading causes of blindness in Australia with 15% of the population over 50 displaying early signs of AMD. To date there is minimal understanding of the underlying mechanisms of AMD. It is known that in early AMD there are drusen and an increase thickening to Bruch's membrane. This in turn can cause a

decrease in the level of nutrients passing from the Choriocapillaris to Photo Receptors. This may lead to altered Photo Receptor function. Our Aim is to clear the drusen and Bruch's membrane using Retinal Regeneration Therapy. The Retinal Regeneration Therapy Laser utilises low energy, nanosecond pulses to selectively target RPE cells. The hypothesis is the low level energy from the laser is expected to lead to RPE cell division and migration and elaboration of matrix metalloproteinase which will help to rid debris from Bruch's membrane. This should improve the health of the retina which we hope to demonstrate by using the retinal functional tests we have been developing over the past 5 years. So far 17 patients have been treated with laser therapy two showing promising results. These results will be discussed.

WHY ARE MALES WITH COMPRESSIVE OPTIC NEUROPATHY MORE LIKELY TO DEVELOP BINOCULAR VISION PROBLEMS?

Meri Vukicevic, Inez E Elderman

Purpose: The aim of this study was to investigate the prevalence and characteristics of diplopia in 50 consecutive patients presenting with suspected compressive optic neuropathy.

Methods: Fifty patients aged 17 to 93 years who were referred to an out-patient orthoptic clinic were investigated for reported complaints of diplopia and their ocular motility was assessed to determine the characteristics of the problems reported. All patients presented with a diagnosed brain tumour and possible compressive optic neuropathy.

Results: Thirteen patients (26%) presented with complaints of diplopia and a cranial nerve palsy was found in 8 (16%). Of the patients with cranial nerve palsy, 9 (87%) were male and this result was statistically significant ($\chi^2=0.03$).

Conclusion: the prevalence of cranial nerve palsy found in this cohort of participants was consistent with some of the literature and the most interesting finding was that males with compressive optic neuropathy were more significantly affected with cranial nerve palsy compared with females. It was not possible, however, to identify a causal factor in this study.

RAPID FIRE - THE PROBLEM OF ESOPHORIA IN THE DISTANCE

Zoran Georgievski, Connie Koklanis

Distance esophoria is often thought of in the context of divergence insufficiency or weakness. However, a patient with esophoria in the distance should present the clinician with some level of concern, as this case study will highlight. What are the causes? What should be looked for? When is it a sixth nerve palsy? What can cause that?

This presentation will tell of a 45 year old male patient who had an esophoria in the distance with dubious lateral incomitance. It will highlight the clinical investigations and decision making that lead to neuro-imaging that revealed a trigeminal schwannoma, and how the function of the abducent nerve can be implicated by such neuropathology.

RAPID FIRE - COMPARISON OF KEITH-WAGENER BARKER AND WONG-MITCHELL CLASSIFICATION SYSTEMS OF HYPERTENSIVE RETINOPATHY

Carly D'Sylva, Connell PP, Hodgson L, Downie L, McIntosh RL, Wang JJ, Mitchell P, Wong TY

Purpose: To assess the inter and intra-observer reliability between the Wong-Mitchell and Keith-Wagener Barker classifications of hypertensive retinopathy.

Method: 50 digitized retinal vascular images of normal and hypertensive fundi were randomly graded by an orthoptist, optometrist and retinal specialist in three ways: (i) Grade 1- Keith Wagener-Barker (KWB) Grade (ii) 2- Wong Mitchell (WM) (iii) Grade 3- WM following training. The inter and intra-observer agreement was then assessed between grade1 and 2 and between grades 2 and 3.

Results: A pilot study of 50 images from an ethically approved study (SiMES) graded by three clinicians including orthoptist, optometrist and retinal specialist has generated pilot data. The interclass correlation coefficient for the KWB (0.83-0.93) was higher, but less homogenous, than that for WM (0.74-0.86), particularly after a period of training (0.85-0.89). We now propose to examine 150 images in a similar fashion.

Conclusions: With training, the WM classification grading system of Hypertensive Retinopathy demonstrates high reliability with greater homogeneity. However, the KWB showed higher correlation than WM on initial grading (n=50). Future studies will address increased numbers to ascertain the optimal system for classification purposes.

RAPID FIRE - IS THERE A PLACE FOR GLASSES IN THE MANAGEMENT OF CONGENITAL COLOUR BLINDNESS?

Jessica Crippa

It has been a widely accepted fact that there is no treatment or means to improve perception of colour in a person with congenital colour blindness. "Treatment" has dealt with teaching the patient to be aware of their limitations and educating those people in the patient's life (such as teachers, employers and family members) who have certain expectations of the patient. The impact of their limitation often extends to occupation, driving and every day tasks.

Tinted lenses are being sold by a small number of Optometrists in Australia, which claim to improve perception of colour. This forces us to re-evaluate what we know about colour blindness, how we test for it and what we advise our patients.

We will examine the basis for these claims as well as clinical and lifestyle implications.

RAPID FIRE - COLOUR VISION: ASSOCIATIONS WITH ETHNICITY AND REFRACTIVE ERROR IN AN AUSTRALIAN CHILDHOOD POPULATION

Katrina Rogers, Paul Mitchell, Kathy Rose, Chameen Samarawickrama, Michael Cosstick, George Burlutsky

Purpose: To examine colour vision anomalies (CVA) and associations with ethnicity and refraction in school-aged children.

Methods: 4,093 Year-1 and Year-7 students from 55 randomly selected schools participated in the Sydney Myopia Study. A comprehensive ocular assessment was performed including ocular biometry and cycloplegic autorefractometry (cyclopentolate 1%). Measures of the right eye only were analysed. CV was assessed using the Ishihara and the City University (TCU) tests, illuminated using a LUXO.FL 18/AN table lamp (colour temperature 5000K), presented at recommended distances.

Results: The Ishihara test identified 27 (1.57%) and TCU test identified 13 (0.75%) Year-1 children with CVA, and 56 (2.38%) and 28 (1.19%) Year-7 children, respectively with CVA. CVA was found predominantly in males: 92.5% on Ishihara and 92.7% on TCU. There was no overall association with ethnicity and CVA ($p=0.23$); however, after adjusting for height and age, European Caucasian Year-7 boys with CVA had significantly longer axial length (AL) than those without CVA ($p<0.001$), but without more myopic spherical equivalent refraction. This association was not present in younger boys or other ethnic groups.

Conclusion: While CVA were associated with longer mean AL in European Caucasian boys aged 12, there were no significant associations found with refraction. This contrasts with a Chinese childhood study that reported shorter AL and less myopic refraction in children with CVA. The variations in these findings could reflect differences in ethnicity or refractive error or a mechanism not yet explained

STROKE AND THE OAA - INTERACTIVE AUDIENCE DISCUSSION TO FOLLOW

Neryla Jolly

The occurrence of vision problems in people who have experienced a stroke is great and can be either as a direct consequence of the stroke or pre existing. Identification and care of vision defects in stroke patients is valuable to assist maximal response to rehabilitation.

A working Group sponsored by GMCT and supported by NSW Health has been developing several strategies to assist the identification and care of the vision defects. These strategies include: (i) Developing key identifiers for the existence of vision defects. (ii) Developing educational material for associated health disciplines (iii) Developing material to educate patients and relatives about vision and stroke

These strategies will be reported followed by discussion on how to progress the issues. All conference attendees are invited to join the both the discussion session at the conference and future meetings, which are held by tele conference.

VISION AND FALLS - A PROFESSIONAL PERSPECTIVE ON THE CURRENT LITERATURE

Kylie Green

Purpose: There is a strong relationship between vision impairment and falls, with the literature suggesting that those with low vision are twice as likely to fall. Defects of visual acuity, contrast sensitivity, stereopsis and visual fields have all been mentioned as possible contributing factors. However, conflicting evidence exists as to which aspects of vision impairment increases the risk of falls. It is essential to accurately identify aspects of vision impairment that increase risk of falls so high-risk patients can be identified.

Method: A literature review of the aspects of visual function and their relationship to falls was undertaken. The research methods were examined, outlining the tests used and their interpretation. The clinically accepted normal values of all aspects of visual function are discussed and contrasted to the interpretations evident in falls literature.

Results: A review of the literature identified that the methods of testing visual function and the interpretation of clinical information vary significantly in falls literature, causing contrasting results. The literature demonstrated that researchers often do not use the standard clinical tests to evaluate visual function and furthermore do not adhere to the standard interpretation and normative values of these tests. This makes the translation of research into clinical practice extremely difficult. The type of visual function tests and the application of the tests vary, with tests often inappropriately performed leading to conflicting research outcomes.

Conclusion: It is essential that the aspects of vision loss that cause falls are properly understood so high-risk patients are identified and introduced to falls prevention programs. To achieve this, it is necessary for eye care professionals to become more involved in falls research and prevention.

LOW VISION IN A RURAL SETTING REVISITED - CONTINUING TO BROADEN HORIZONS ONE YEAR ON

Rebecca Schostakowski

Three months after graduating last year I had successfully set up a low vision clinic at the first ophthalmology practice I had ever worked for. Making the decision to set up the clinic was relatively straight forward, finding the clients to sustain the service proved to be slightly more challenging.

The big question was, "What sustains a low vision service?". After visiting the two other low vision clinics I was aware of in the North Queensland region I realised I needed to be more proactive in advertising what we offer, how it is different and also how we compliment the other services already available.

I also needed to introduce the clinic to the main group of practitioners that are our largest referral base, which are mainly optometrists, and also raise awareness within the other ophthalmology practices running in Townsville. The past year has also further broadened my definition of service requirements at a low vision clinic and made me more aware than ever of the importance in providing such a service.

EYE HEALTH SERVICE PROVISION FOR INDIGENOUS QUEENSLANDERS

Jane Fleming, Greg Johnson, Karen Knight, Bashir Ebrahim, Damien Te Whiu and Ghislaine Wharton

Since 2007, the Queensland Vision Initiative Inc (QVI) has been investigating eye health service provision for Indigenous Queenslanders, with the aim of reducing the incidence of avoidable vision impairment and blindness for this at risk group. A State Government funded project² has now been completed, and the findings and recommendations from this study have been submitted to the Queensland Government.

A survey of 218 eye and allied health professionals, including four orthoptists, found that the main issues affecting access to eye health services included: a lack of education regarding eye conditions; clients are unable to access services because of transport issues; and a need for a consistent, clear and culturally appropriate eye health message for Indigenous Queenslanders.

Seven recommendations and an implementation plan for the prevention of vision loss and provision of eye care for Indigenous Queenslanders have now been submitted to the Queensland Government. These recommendations include: targeted eye health resources for communities; increased support and training for Indigenous health workers; successful models of eye care services to be replicated across the State; improved partnerships between all eye and allied health care sectors; reduced gaps in service provision; and, cultural awareness information for practitioners. Together these recommendations rely on better communication between all Government and non-Government agencies to work together to 'close the gap' in eye health in Australia.

THE CRYSTALENS HD ACCOMMODATING IOL AND ITS ROLE IN TREATING PATIENTS WITH CATARACTS

Shandell Moore, Russell Phillips

The Crystalens HD is the only FDA approved accommodating IOL. It is now available in Australia as an alternative to the standard monofocal intraocular lens. This choice of lens allows for clear distance, extended intermediate and near vision by using the eyes natural accommodating ability. As of May 2009, our practice has provided Crystalens HD to patients who have undergone cataract surgery. This paper will discuss the Crystalens HD IOL and report on the use of an accommodating IOL in the treatment of cataracts and reducing the patients dependence on glasses. Visual outcomes following the implantation

of the Crystalens HD, as seen in a private cataract practice setting will be reported. Up-to-date results will be presented. Initial data suggests very good visual outcomes.

THE 5 PERCENT

Nhung Nguyen

Patients who come under the umbrella of Laser Refractive Surgery care have different requirements and expectations which require specific counseling and consultation methods. Although most patients are generally well informed and have undertaken some research before attending a consultation, this assumption should not replace the need to provide patients with appropriate counseling by an expert clinician.

The clinician should be highly skilled in assisting patients through their decision making process and should be able to put the client at ease before and after the surgery. The pre-surgery counseling and evaluation is crucial in preparing patients for their post-operative expectations.

The counseling helps to mentally prepare the patient, reducing the tension and apprehension most patients feel leading up to the surgery and during the recovery period. This presentation is designed to give the audience hints, methods and skills that can be adopted and used in their own clinic especially for those who are new to the laser refractive surgery specialty.

DOES SIZE MATTER? AN INVESTIGATION OF ANISOMETROPIA

Kristen Saba, Ross Fitzsimons

We aimed to identify the limits of anisometropia that commonly gives rise to symptoms in patients and to differentiate the cause of these symptoms in terms of anisokonia (difference in image size) and anisophoria (varying induced heterophoria). The amount of anisometropia that causes image size difference which can be perceived by the patient and amount of anisometropia that causes diplopia were used as outcome measures. Results will be presented.

TWO WORLDS APART - ONE VISION

Frances Myint

The Union of Myanmar, formally known as Burma has the world's highest recorded prevalence of blindness: 8% of a population of 55 million. The Myanmar Eye Care Program organised by Australian ophthalmologists is a volunteer project that has equipped and trained monastery communities to be able at low cost to manage the needs of their blind.

As the overwhelming bulk of the serious problems fall on to a small team, Ophthalmic Technicians ("OpTechs"), are trained to be orthoptists and accept multiple responsibilities. They take a history and examine, draw conclusions, prescribe glasses, consent and advise the patients and families, administer local anesthetics, set up operating facilities, sterilise instruments, scrub and assist, and take on the postoperative care.

In July 2009 I volunteered in a clinic at Mount Popa Taung-Kalat, a rural region in central Myanmar, where one of the programs is located. The pathology was ubiquitous, and of every kind such as agricultural injury, cataract, angle closure glaucoma, blepharophimosis, old keratomalacia, trachomatous entropion, pterygiums occluding the visual axis, severe corneal opacities due to measles, chicken pox, herpetic and mycotic keratitis.

It was an amazing experience to be part of a team that was so passionately generous, motivated and dedicated to the poor people of Myanmar. Within two weeks 267 operations were performed and 920 people were screened. Additionally, prior to our arrival the OpTech team with two visiting general practitioners had screened over 2000 patients in surrounding villages.

STEPS - PRESENTATION AND ANALYSIS OF CLINICAL FINDINGS FROM SYDNEY HOSPITAL AND SYDNEY EYE HOSPITAL AND ST GEORGE HOSPITAL EYE CLINIC

Gillian May and Chantelle Palmer

Statewide Eyesight Pre-schooler Screening (StEPS) was introduced by the NSW Department of Health in 2008. StEPS is a vision screening program for four to five year old pre-school children.

The vision screening is conducted by trained lay screeners. Children who do not meet the "pass" screening criteria undergo comprehensive secondary vision and ocular motility assessment by an Orthoptist employed by the program. Failure to pass the secondary screening results in further referral.

The Orthoptic Departments at Sydney Hospital and Sydney Eye Hospital and St George Hospital are involved in the assessment and management of StEPS referrals in the South East Sydney Illawarra Area Health Service (SESAHS). This presentation outlines the clinical findings of 88 children referred from the StEPS program between October 2008 and August 2009.

Results to date confirm that the majority of children referred had some form of ocular pathology requiring treatment or further review. These findings confirm that vision screening can be performed accurately and effectively in this younger age group and are in line with similar studies reported in literature.

THE STEPS PROGRAM - A 12 MONTH REVIEW OF THE IMPLEMENTATION AND OUTCOMES FROM THE SOUTH EAST SYDNEY ILLAWARRA AREA HEALTH SERVICE

Kylie Green

The Statewide Eyesight Preschooler Screening (StEPS) Program is an initiative of NSW Health which offers free visual acuity screening to all 4 year old children. Across NSW various models have been utilised to implement the StEPS program. In South East Sydney Illawarra Area Health Service (SESAHS) a model of Primary and Secondary Vision screening was designed to ensure the StEPS program is available across the whole area. The StEPS program involves a monocular visual acuity assessment, therefore Lay Screeners have been employed to conduct the vision screening in all preschools and child care facilities across the area. Children requiring further assessment are referred in the first instance to a Secondary Screening Orthoptic clinic where the child receives a comprehensive visual acuity and ocular motility assessment and is then either referred or discharged. This model of care has proven to be highly successful in SESAHS. The StEPS program was introduced in SESAHS in July 2008 and since then over 11,000 children have been screened with over 1300 children requiring referral. The Lay Screeners have maintained an accurate referral rate of 12% throughout the first year of the program and the value of the Secondary Screening Orthoptic clinic has been demonstrated by 11% of referrals resulting in discharge following secondary screening thus avoiding unnecessary referral and overcrowding of public hospital eye clinics. This review discusses the model of care and implementation of StEPS in SESAHS as well as highlighting significant outcomes which provide vital new information for Orthoptists.

USE OF AN EYE TRACKING SYSTEM TO VALIDATE A SIMULATOR TO TEST DRIVER SKILLS

Jodie Attard, Neryla Jolly, Hamish McDougall, Rob Heard

Over recent years driving simulators have been used for training, vehicle design and safety research. Past research has investigated the validity of using simulator technology by comparing data collected from a simulator with that collected on road. However, no research has investigated the

use of eye movements on the simulator. When analysed, a driver's eye movements can give insight into the ability to react to and perceive aspects of the changing road environment. A Valid driving simulator would provide an opportunity to investigate skills in a safe road environment that can be purposefully designed and manipulated.

This study aims to validate the use of the driving simulator as a means of investigating and assessing a person's use of eye movements whilst driving.

Participants aged from 19-28 years with a minimum of 2 years driving experience under went preliminary visual assessment to confirm they did not have a vision, ocular motility or field defect. This group then completed a course on the driving simulator and on road wearing eye tracking goggles. These goggles had cameras which recorded the scene in front of the driver and infra red light which plotted their eye position. The journeys were then broken down into matching important road situations, events or features. At each of these important situations the participant's eye movements were analysed and ranked. To validate the simulator the data from the on road and simulator environments were statistically compared using Kendall's coefficient of concordance.

AN OVERVIEW OF CHILDREN PRESENTING WITH AUTISM SPECTRUM DISORDERS AT THE CHILDREN'S HOSPITAL WESTMEAD

Katie Scanlon and Louise Brennan

Autism Spectrum Disorders (ASD) are characterised by impairments in social interaction and communication, along with restricted repetitive and stereotyped patterns of interests and behaviour. The exact cause of ASD is unknown although research has shown that there are similar ways in which affected individuals brains develop and function. There is also evidence supporting a genetic basis to ASD. The reported prevalence of ASD has increased over the past 15 – 20 years in Australia and worldwide. This paper discusses the Orthoptists role in the assessment and management of a patient with ASD. An overview will be given on patients with ASD attending the Eye Clinic at The Children's Hospital at Westmead in 2009.

ASSESSING THE VISION OF VERY YOUNG CHILDREN AND CHILDREN WHO HAVE LIMITED COMMUNICATION SKILLS

Louise Rosati

Assessing a very young child or a child with significant communication difficulties presents a challenge, as their ability to participate in the vision assessment is limited. Often the child has useful vision but this can be difficult to quantify using standard practices.

Assessment of functional vision is important as it provides information for optimising the use of vision and providing appropriate opportunities for learning and development.

Suggestions about a range of standard and non-standard approaches for gaining an understanding of a child's vision, and how they use their vision, will be described in the presentation.

VISUAL ACUITY TESTABILITY WITH THE ELECTRONIC VISUAL ACUITY TESTER COMPARED WITH LOGMAR IN AUSTRALIAN PRE-SCHOOL CHILDREN

Jodi Leone, Kathy Rose

Purpose: To establish testability rates in Australian preschool children for the electronic visual acuity (EVA) tester using HOTV letters and to compare these findings with the standard LogMAR visual acuity (VA) chart.

Methods: The Sydney Paediatric Eye Disease Study (SPEDS) is a population-based, cross-sectional study of children aged 6 months to 6 years. Measurement of presenting monocular distance VA using the EVA tester was attempted on all children, who were aged 30 to 84 months. Testability was determined by the ability of the children to have VA tested monocularly in both eyes. Children aged >60 months also had repeat VA tested with the LogMAR chart

Results: EVA testing was attempted on 865 children. Testability rates were 55.9% for children aged 30 to <36 months, 91.4% for children aged 36 to <48 months, 98.5% for children aged 48 to <60 months, 98.9% for those 60 to <72 months, and 99.1% for those aged 72 months or older. Of the children aged ≥60 months, 247 had their vision tested using both EVA and LogMAR charts, with a LogMAR testability of 84.5%. There was a statistical and clinically significant difference of a mean of 5 letters between the EVA and EDTRS ($p < .0001$), and between the EVA and HOTV LogMAR charts ($p < .0001$).

Conclusions: Monocular threshold VA testing using the EVA can be completed by the majority of Australian pre-school children at most ages, with 97% testability in children aged at least 36 months. The EVA overestimated VA by comparison with the logMAR.

PRESCHOOL VISION SCREENING: OUTCOMES OF CHILDREN REFERRED TO THE HOSPITAL EYE CLINIC

Jenni Spink, Nocola Anstice, Anmar Abdul-Rahman

Purpose: To assess the outcomes of children referred to the hospital eye clinic from three different preschool vision screening programmes in the Counties Manukau District Health Board area.

Methods: A retrospective study was conducted of all children referred over a six month period, January to June 2009. Children included were either screened by Plunket, Pre-School Check or specialist vision screeners. A small number ($n=7$) of children of screening age referred from other sources were also included. All children were initially assessed by an Orthoptist or Optometrist. Distance visual acuity was measured monocularly and recorded in logMAR notation. Other tests included cover test, ocular motility and assessment of binocular single vision (BSV).

Results: 424 children were referred during the specified period, of which 128 (30.2%) were eligible for inclusion in data analysis. Thirty-seven children were discharged after their initial assessment (29.1%); remaining children underwent full cycloplegic refraction and ocular health check. Preliminary analysis shows a low percentage of myopia and a high percentage of astigmatic errors ≥ 2.00 DC (10.2%). Results suggest a screening programme carried out by Orthoptist- trained screeners with a continuous process of feedback and self-audit provides higher positive predictive value than other methods of training.

Conclusion: The timing, mode of delivery and efficacy of vision screening in childhood continues to provoke discussion amongst the Ophthalmology community. This study provides useful prevalence data for the ethnically diverse South Auckland population and provides evidence for the continuation of preschool vision screening.

OCULOMOTOR NERVE PALSY DUE TO EXTENSIVE SINUS DISEASE

Priya Narayan

An interesting case of ischaemic oculomotor nerve palsy resulting from sinus disease is presented. Both the superior and inferior division of the right third nerve were affected except the pupil resulting from extensive inflammation of the sphenoid and ethmoid sinuses on the right side.

Ischaemia is a common cause of acquired non-traumatic oculomotor nerve palsy seen in the Neurophthalmic setting. The majority of these

cases are due to systemic vascular disease most commonly Diabetes Mellitus. Sinusitis related oculomotor nerve palsy is comparatively rare in occurrence and is not well documented within literature. The clinical and investigative pathway of the patient is presented in light of the reasoning behind specific diagnostic tests performed.

A CASE OF RECURRENT ABDUCENS PALSY IN A 4 YEAR OLD

Rebecca Schostakowski

A 4 year old male presented as an emergency patient to our clinic as a result of a sudden onset of a recurrence of his left abducens palsy which was present upon waking in the morning. A similar episode had been apparent 2 years prior and had resolved. Upon examination visual acuity was equal at 6/6 in each eye; anterior segments were healthy along with ocular motility apart from a complete left sixth nerve palsy (graded at a -4). He was not ill at the time of assessment and had only vomited as a result of the diplopia induced by the abducens palsy. His local practitioner had noted fluid in both ears during a consultation that morning and he was commenced on antibiotics to resolve this. An MRI had been performed 2 years prior after the first episode and no pathology was present. As a result Recurrent Abducens Palsy was diagnosed.

AN ANALYSIS OF TORSION IN SUPERIOR OBLIQUE PALSY

Kara Muecke, Zoran Georgievski, Connie Koklanis

The differentiation of unilateral and bilateral superior oblique palsy (SOP) can be challenging. Clinical signs can assist, such as the presence of reversing hypertropia, unilateral or bilateral oblique muscle dysfunction, the size of the V-pattern and findings from Bielschowsky head tilt testing. However, in cases of asymmetrical bilateral SOP, clinical features may confirm unilateral involvement only, with the amount of torsion being the only clue of SOP also existing in the fellow eye. A reported 5% to 38% of cases showing clinical features of unilateral SOP become "unmasked" as having bilateral involvement after surgery directed at the confirmed unilateral superior oblique weakness. While torsion measurements are important in SOP, particularly bilateral, and in planning surgery, controversy remains as to the amount of torsion that predicts or distinguishes bilateral from unilateral involvement.

This study builds on a pilot study (by Zoran Georgievski) and investigates patients with SOP experiencing torsion. It aims to establish if an expected torsion increase from primary position to downgaze can differentiate between unilateral and bilateral SOP, so torsion can perhaps be regarded as a predictive index in cases where it is otherwise difficult to diagnose. In this study, torsion was measured using the Torsionometer®, double Maddox rod test and synoptophore. The findings of our research will be presented and discussed.

MANAGEMENT OF ACCOMMODATIVE ESOTROPIA: AN INTERNATIONAL SURVEY OF ORTHOPTISTS' PRACTISE PATTERNS

Katrina Lee, Connie Koklanis, Zoran Georgievski

Fully or refractive accommodative esotropia was first described by Donders in 1864, and hypermetropic correction has long been recognised as an effective treatment. It is also often thought that patients with accommodative esotropia may be able to discard their glasses into adolescence. However, retrospective studies have shown that only a minority of patients can be expected to discontinue wearing their hypermetropic correction without further treatment.

Whilst there has been some recent research, there is insufficient high-level evidence to inform clear clinical guidelines for management of

accommodative esotropia. Health professionals are increasingly required to ensure that their practice is based on robust evidence, yet it is unknown how orthoptists currently manage these patients. A study that aimed to explore the practice patterns of orthoptists in the management of accommodative esotropia will be discussed. This study involved the international distribution of an online survey, which focused on orthoptists' decisions regarding optical and orthoptic intervention. A further aim was to explore whether practice patterns varied depending on demographics, and to compare trends with the evidence offered by the current literature. The results of this study will be presented.

INVESTIGATION OF VERGENCE EYE MOVEMENTS ELICITED BY APPROACHING IMAGES PROJECTED ON A FRONTOPARALLEL SCREEN

Frances Corkin, Elaine Cornell, Hamish MacDougall

Vergence eye movements are initiated by tonic, fusional, accommodative and proximal factors. In this research we set up the experiment to remove the first three cues and focus on proximal vergence alone. Proximal vergence has been defined as an 'awareness of nearness' and it has been found to be closely linked with radial optic flow which is the radial pattern of image motion on each retina as an individual moves forward through their surroundings. This research has shown situations with optic flow causing a vergence response however much of this relied on dot patterns to induce the optic flow. Our study was designed to investigate the amount of vergence induced when subjects view images that appear to come towards or away from them on a flat screen. Subjects were seated in an immobile car in a driving research laboratory and were instructed to watch images on a screen simulating the view of the driver as they move down the road. Of the eight subjects tested three showed a strong and unequivocal convergence response, two a moderate response and three a poor (or no) response.

PARENTS TAKE ON EYE EXERCISE

Sarita Ibbotson, Frank Martin

We often see vast clinical improvements in children with intermittent exotropia when treated using orthoptic exercises. We were interested in determining whether this clinical improvement translated into parent, and patient satisfaction.

We devised a short questionnaire to be filled out anonymously by parents relating to perceived success and satisfaction with orthoptic eye exercises.

We asked a total of 44 patients to participate in the survey. The inclusion criteria consisted of presently performing orthoptic eye exercises (convergence exercises, or red filter anti-suppression treatment).

We have yet to compile the results of the satisfaction survey. We hope to present some positive, and exciting results!

VISION REHABILITATION TRAINING ON CHILDREN WITH LOW VISION

Norliza Bt Mohamad Fazdil, Kerry Fitzmaurice, Linda Malesic

Visual impairment can have significant impact on a person's functional abilities (such as reading, writing, walking) and independence. In children with low vision this impairment may affect learning processes as it may restrict the child's motor and social development. The aim of this study was to determine the usefulness of vision rehabilitation training in improving the efficiency of visual performance of children with low vision. Students attending the Special Education School, Kuala Lumpur were provided with eccentric viewing training (n=8) or null zone training (n=11). Each student received 10 sessions of one hour training. Reading speed and print size were measured pre and post training. Results of the study indicate improvements in reading speed of both related and unrelated words (tNP related = -2.36, p = 0.04; tNP unrelated = -2.32, p = 0.04; tEV related = -5.10, p = 0.001; tEV unrelated = -4.24, p = 0.004) and print size of the students in both groups after training. These results support the use of eccentric viewing and null zone training to improve the efficiency of reading performance of children with low vision.

VISUAL SCANNING AND EMOTIONAL FACIAL RECOGNITION IN TRAUMATIC BRAIN INJURY: A CASE REPORT

Suzane Vassallo, Emma White, Jacinta Douglas

Purpose: Neurological damage may cause the interpretation of facial expression to breakdown at various stages of processing. Visual scanning and feature extraction underpin the process of stimulus encoding and enable the generation of an adequate percept for subsequent processing. While visual scan paths to facial expressions have been examined extensively in non-patient groups and in other individuals (e.g., schizophrenia), this is not the case in those with a traumatic brain injury (TBI). We have investigated visual scanning in those with TBI and present an interesting case report to highlight the deviation in the scan path from neurologically normal controls.

Method: Participants were one adult male (LY) with impaired ability to interpret facial expression as a result of severe TBI and 3 neurologically normal male controls. Stimuli were 18 pictures of facial expressions depicting the six basic universal emotions (sadness, happiness, anger, surprise, fear and disgust). The Tobii 1750 binocular infrared eye tracker (Tobii Technology, Stockholm, Sweden) recorded eye movements as participants viewed stimuli.

Results: LY's pattern of scanning differed significantly from that of the neurologically normal controls. For the controls, the majority of fixations fell within the internal facial region (that area including the eyes, nose and mouth). In contrast, LY's scanning was more dispersed (hyperscanning), with frequent foveal fixations to external peripheral regions (hair, ears, forehead, and blank stimulus background).

Discussion: These results indicate that, at least in some cases, impaired visual scanning contributes to impaired interpretation of facial expression after TBI.

Named Lectures, Prizes and Awards of the Orthoptic Association of Australia Inc.

THE PATRICIA LANCE LECTURE

1988	Elaine Cornell	(Inaugral)
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	
1997	Robin Wilkinson	Heredity and strabismus
1998	Kerry Fitzmaurice	Research: A journey of innovation or rediscovery
1999	Pierre Elmurr	
2005	Kathryn Rose	The Sydney Myopia Study: Implications for evidence based practice and public health
2006	Frank Martin	
2008	Stephen Vale	A vision for orthoptics: An outsider's perspective
2009	Micheal Coote	

THE EMMIE RUSSELL PRIZE

1957	Margaret Kirkland	Aspects of vertical deviation
1959	Marion Carroll	Monocular stimulation in the treatment of amblyopia exanosis
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 convergence 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 Coil	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 Galaher	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
1999	Anthony Sullivan	The effects of age on saccadic mode 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

PAEDIATRIC ORTHOPTIC AWARD

1999	Valerie Tosswill	Vision impairment in children
2000	Melinda Symniak	
2001	Monica Wright	
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 activity 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

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

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1963-4	Leonie Collins	1980-1	Karen Edwards		

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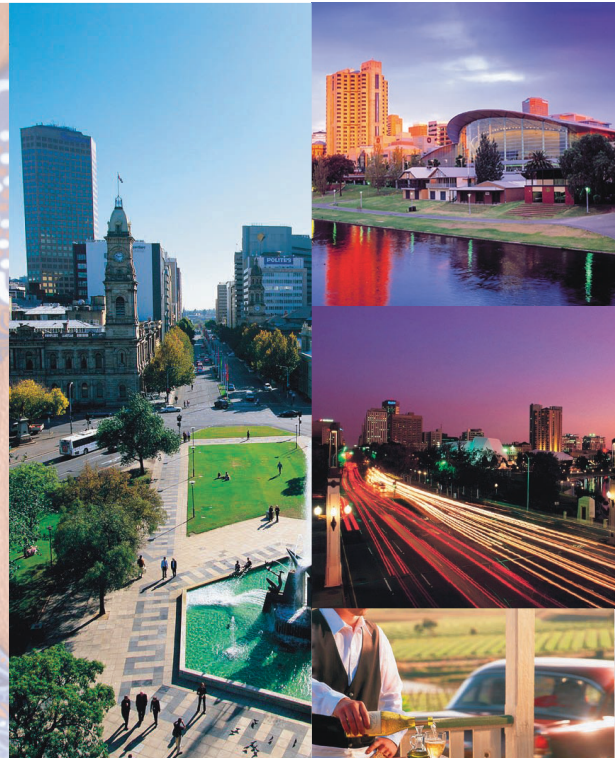
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