AUSTRALIAN ORTHOPTIC JOURNAL

1977

Volume 15

TRANSACTIONS OF
33RD AND 34TH ANNUAL SCIENTIFIC MEETINGS

Wholly set up and printed by ROTOGRAPHIC PRODUCTIONS, 41 Turner Street, Redfern • 698 3624

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** *Emmie Russell Prize Contribution, 1977*

Corrigendum: *Australian Orthoptic Journal, 1975,* Vol.14, page 32, 16th line from bottom
For *'superior oblique overaction'* read *'inferior oblique overaction'.*

EDITORIAL

The Orthoptic Association of Australia went west in 1976 to hold the annual general and scientific meetings in Perth for the first time. There our patron for the year, Dr. C. Wilson, welcomed us warmly and bade us watch new ideas with an open mind. Our president, Megan Lewis with her Western Australian colleagues was likewise welcoming and provided a pleasant time in that sunny city. But readers of papers for publication were few. Lack of suitable material forced us to forego issuing a journal in 1976.

Theme of the 1977 congress was "The Way Ahead" and light on this way was shed by our new patron, Dr. Gillies, with news that the Royal Australian College of Ophthalmologists will accept Orthoptic Associate Members of the College. For further illumination came exhortations from an academic, Vivienne Gordon of the Lincoln Institute Orthoptic School, and a clinician, Shayne Brown of the Sydney Eye Hospital, and informative papers from guest speakers and others.

Among other contributions have come normative reviews of the performance on binocular tests of young children in three cities, based in part on orthoptic screening for visual defects. These, and a report on orthoptic work in "Far Out" inland Australia foreshadow the theme of next year's meetings — "The Eyes of Three Cultures" — Asiatic, Caucasian, and Aboriginal.

The 1978 Conference of our Orthoptic Association of Australia will be held at the Singapore Hyatt Hotel from May 1 to May 5. (Convenor: Miss Mary Carter, P.O. Box 470, South Yarra, Victoria, 3141) Members registering for this, may if they wish, register at the same time for the Third Meeting of the International Strabismological Association to be held in Kyoto from May 10th to May 12th.

The Fourth International Orthoptic Congress will take place in Berne in 1979, from the 4th to the 6th September inclusive. President of the organisers' committee is Mrs. R. Esser-Leeman (Basle, Switzerland) and the General Secretary is Ursula Altmann, Himmeriweg 8, CH-8052 Zurich.

Diana Craig

PATRON'S ADDRESS TO THE ORTHOPTIC ASSOCIATION OF AUSTRALIA

W.E. Gillies, D.O., FRCS, FRACS, Melbourne.

Melbourne seems a very appropriate choice for this 1977 meeting of orthoptists. It may not be the first city in Australia, if this title is conferred on the basis of size, and other cities may dispute our claims to be the most beautiful city. However, none can dispute that this is a lively city with fine gardens, a bracing though changeable climate - perhaps a little feminine in its moods. Surely an exhilarating and charming city for orthoptists to meet.

The choice of theme for the Congress is also apposite. Although it is fascinating to look back at how far orthoptics has come, it is far more important to look at the way ahead, to see where you are going and how you may more effectively get there. The incorporation of the Orthoptic Course into the Paramedical Colleges has helped to raise academic standards. This progress will be particularly enhanced if the long awaited three year course is at last realised, enabling the expanded field in which orthoptists are now practising to be properly covered academically.

The expansion of the field in which orthoptists practice is both significant and exciting. While remaining primarily orthoptists, now you also function throughout the whole clinical field of ocular physiology. In fact orthoptists have become specialists in applied ocular physiology in contra-distinction to a rival group which specialises in applied physiological optics.

It is most important with these developments that orthoptist defend their professional integrity; A true profession is to a large extent self regulating with its own ethical rules and its own definition of the conditions under which its members work. Orthoptists are professionals as part of the health team with a recognised role and independence. You do not sell optical or other materials for profit but work for a set fee or sessional payment. You may regulate your profession partly through their representation on the Orthoptic Board of Australia, and partly through your own professional association. This may involve you in forms of political activity which is at times difficult but it is important that your association is strong and active and enjoys the support of all orthoptists. If you feel that too much is done by too few, then become involved yourself.

This political activity is inevitable in a healthy professional body. If you do not actively maintain and protect your professional status you will lose it. You must be very careful with whom and for whom you work. If there is any doubt as to the wisdom of working in any particular situation seek the advice of your association and do not act against it. If you are part of the health team you should guard your position in this team carefully. It is almost always unwise to attempt to act on your own. Unfortunately a few, very few, ophthalmologists have at times worked against the interests of orthoptists and against the interests of their own College, so be careful where you seek and accept advice. If a few orthoptists were to work outside the normal health team, for another group not normally part of the team the whole position and status of orthoptists might be endangered.

More happily I am able to say that the prolonged negotiations between your association and the College of Ophthalmologists have been concluded and orthoptists will be able to become Orthoptic Associate Members of the College with access to its scientific meetings and proceedings.

So on a rising note and looking forward to the future success of orthoptics it is my pleasant duty to open this Congress. I hope that it excels any of your previous meetings and sets a standard which future meetings must try to meet..

PRESIDENTIAL ADDRESS – 1977

ORTHOPTICS – THE EXPANDED ROLE

Vivienne J. Gordon, Melbourne.

The expanded role of the modern orthoptist can no longer be described entirely in terms of ocular motility. Orthoptics is a specialised branch of medical science in the area of applied ocular physiology. The orthoptist is a responsible and clinically trained professional, working as part of the ophthalmic team within the scope and ethics of ancillary medical practice.

Orthoptists provide specialist services in the investigation and treatment of disorders of ocular motility, the importance of which must not be overlooked. The expanded role includes visual field testing, glaucoma investigation techniques, ancillary diagnosis including areas relating to applied electro-physiology and preventive visual screening. The orthoptist may also assist the ophthalmologist in the management of eye diseases which require special investigation and control and in patient education and counselling.

There is a need to contribute to patient care through an increased awareness and understanding of the team approach, by placing particular emphasis on knowledge of preventive measures and by maximising cost-benefit effectiveness. To meet these needs, orthoptists must be highly educated but broadly trained, able to evaluate and analyse and be skilful in performing modern techniques.

In anticipating our future role we must continue to develop within the structure of ancillary medical practice, working not in a primary care relationship with patients but always by referral from a registered medically qualified practitioner. We are a rapidly growing profession and as such it is essential that we guard jealously our professional position, ensuring that in all states there is an awareness of inter-professional views and relationships and, in particular, that the newer members of our Association are fully aware of all implications of orthoptic practice.

THE CHALLENGE OF THE PRESENT

Shayne Brown

Are orthoptists doing all we should for the good of the community? This is the question that we must all answer and answer now.

Traditionally, orthoptists worked under close supervision of an ophthalmologist – in his rooms, in hospital eye clinics, or in private practice. Initially, orthoptists were required to treat patients only on circumscribed lines and mostly at the synoptophore. Over the years, an increased knowledge of physiology has led to a greater understanding of different types of binocular disorders and as new instruments have been introduced, the orthoptist's role as a therapist and diagnostician has extended. Hence the fields of knowledge and clinical skills have broadened also. The Orthoptic Association of Australia and State Orthoptic Associations have kept orthoptists informed of the latest trends by means of the journal and scientific meetings, but could more be done?

The introduction of Medibank has drawn to the attention of the community the need to provide adequate and efficient medical services at a reasonable cost. In the large hospitals medical care is becoming more specialised and sophisticated.

Computer services are being introduced and must bring change. There is a definite movement for patient care to be provided in smaller regional hospitals, community health centres, rehabilitation centres and homes for the aged. Are we ready to meet these needs?

Orthoptists must know, then, of all such centres in the community. We must acquaint ourselves with the needs and functions of these community centres. To do so, we must continually update and extend our understanding of the underlying relationship between binocular anomalies and congenital and other disorders.

We must be fully aware of these changing trends in medicine and what these changes mean. Firstly, for the benefit of our patients, and secondly, for the sake of our profession, so that opportunities are provided for professional and self-development of our members.

Medical authorities involved in these new developments must be made aware of the orthoptists' important contribution to good, efficient patient care, not just in diagnosis and treatment but in the very vital field of preventive medicine. This is an area in which the orthoptist's knowledge and training could be utilised,especially in schemes such as the school and pre-school screening programmes and in baby health centres.

An ophthalmologist said recently to a group of orthoptists that we should no longer hide our lights under a synoptophore – the orthoptists must give more to the community. This is not only sound advice; it is essential. Meeting this challenge will provide better care for our patients, and isn't that our prime objective? But the planning must be forward-looking, responsive to change and follow sound administrative and financial principles.

There is no doubt that these changes and proposals have created a definite need for administrators. Administration courses are essential to train orthoptists in the efficient running of orthoptic clinics within the hospital framework.

The Associations must become organised to foster awareness within ourselves of the needs of the community, to examine our shortcomings and determine how they may best be rectified.

How is all this to be achieved?

We need a vigorous council, which meets often, not just once a year; a council which accepts the responsibility to represent orthoptics to Government and other professional groups and organisations and the community; a council which is the guardian of standards of clinical patient care, and, therefore, has the responsibility of maintaining and evaluating the effectiveness and availability of our service.

We need to maintain our close contact with the educational bodies and work together to ensure that the students are educated for the demands the community places on orthoptists.

There is an obvious need for post-graduate possibilities, and for the graduates to gain recognition for their qualifications.

We need vigorously planned meetings to spread knowledge gained among orthoptists of all ages.

We need some subsidy for interstate council members and for our international representatives; we need to spend a little more on our development.

Orthoptics is perhaps one of the few paramedical professions which has developed and progressed from a very specialised and limited practice into more general ophthalmic fields. This characteristic is a strength and must be encouraged.

Orthoptics is fortunate because we have a large association membership, but for too long have we been in a rut of status quo? The responsibility for our future lies with us; the possibility of improved patient care lies with us; orthoptists must accept these responsibilities because as Oscar Wilde said, "The longer I live the more keenly I feel that whatever was good enough for our fathers is not good enough for us."

CURRENT CONCEPTS IN THE INVESTIGATION OF MACULAR DISEASE

James D. Cairns, FRCS (Ed), FRCS, FRACS, MRACO*

Introduction

An understanding of the structure and function of the macular area is of paramount importance to a correct approach to this particular area of the fundus.

In children with strabismus many useful tests such as visual acuity, foveal fixation testing, colour vision testing, the four dioptre prism test, the Haidinger brush phenomenon, the 2 log-unit neutral density filter test, the Amsler grid test, the Macular Photostress test, to name just some of the tests, form part of the armamentarium used by the ophthalmologist and orthoptist in the evaluation of the function of the macula.

This paper describes another method of investigating the macular area – fluorescein angiography– a technique widely used in adults and used to a limited degree in children. In the normal clinical situation this test is usually not able to be done in children under the age of 7 or 8 years of age, therefore its application is restricted to the age groups from 8 onwards.

Intravenous injection of fluorescein has been used for many years in fundus diagnosis but it was not until 1961 that*Novotny and Alvis described a method of photographing fundus fluorescence thus marking the origin of fluorescein angiography.

Since that time fluorescein angiography is used routinely in ophthalmology in all major eye centres throughout the world.

Anatomy of the Macula

Before discussing the normal fluorescein angiogram it is important that the correct terminology of the posterior segment of the eye is adhered to.

The **Macula**, contrary to what is commonly believed, is an area of approximately 5,000 μ in diameter centred on the foveola.

The **Foveola** is an area of 500 μ in diameter corresponding to that area of the retina at the posterior pole which is thinner than its surrounds and devoid of rods.

The **Fovea** is an area of 1,500 μ in diameter surrounding the foveola.

The **Retinal Pigment Epithelium** strictly the outermost layer of the retina, situated in front of the choroidal circulation and behind the retinal circulation, is an effective partial filter to the visibility of fluorescein in the choroid. This layer is more dense in the macular area thus more effectively screening the background choroidal fluorescence in this area.

There are two distinct and separate circulations in the posterior segment of the eye. **The Choroidal Circulation** is supplied by approximately 10 short straight vessels, the short posterior ciliary arteries arising from the ophthalmic artery. **The Retinal Circulation** is supplied by the longer, more devious central retinal artery and for this reason intravenously injected fluorescein enters the choroidal circulation approximately one second before the retinal circulation.

Fluorescein angiography depends on the principle of fluorescence. When light falls upon a substance it may be transmitted, reflected, or absorbed. If it is absorbed it may be transformed into heat or chemical energy, or into light of a different wave length. This later property is called luminescence, and fluorescence is that which has a duration of less than 10^{-4} seconds.

When light in the blue wave length band falls upon fluorescein, emission of light in the green wave length band occurs.

The technique of fluorescein angiography therefore depends on photographing this fluorescence using a standard fundus camera modified in the following way:

(a) A blue filter is placed in front of the flash lamp thereby allowing stimulation of the fluorescein within the eye. This filter is known as the excitation filter.

* Department of Ophthalmology, University of Melbourne.

(b) In front of the film is placed a yellow filter which transmits light only in the green wave length band – so that only the structures in the eye which are fluorescent are recorded on the photographic film. This filter is known as the barrier filter.

Procedure in Conducting Fluorescein Angiography

The patient on arrival is given dilating drops. The usual ones used are Mydrilate 1% and Viscous Neo-synephrine 10%. This allows maximum dilatation of the pupils which is more important for high quality fundus photography.

A brief explanation of the procedure and side effects of fluorescein angiography are given to the patient. Particular attention is paid to explaining the yellowish discolouration of the skin and urine for 24-36 hours after the dye is injected.

The patient is then sat at the camera and a small test dose (0.1ml) of fluorescein is injected intravenously to detect any possible side effects of fluorescein in the patient. After waiting 2-3 minutes, 5ml of 20% fluorescein is rapidly injected into the ante-cubital vein. During this time the fundus is viewed by the photographer through the camera and upon the first appearance of dye at the optic nervehead rapid sequence photographs are then taken at approximately every 1-2 seconds. Photography of the appropriate areas is continued at this rate into the venous phase whereupon a break is taken in the sequence. Late photographs are always taken approximately 20 minutes or even longer after the initial injection of the dye. This is important to detect the occurrence of a fluorescein leakage from the intraocular vessels. If necessary a repeat run is done on the fellow eye.

The complications of fluorescein angiography are mild and infrequent. Transient nausea occurring a few seconds after the injection of the dye may occur but usually passes off within half a minute or so and rarely necessitates cessation of the angiography. Occasional allergic phenomenon occurs such as urticarial rash or broncho-spasm. Fainting occasionally occurs, not as a specific reaction to the fluorescein but as a vasovagal response to the whole procedure. Resuscitation equipment is always kept on hand in the angiogram room in case of need.

The Normal Fluorescein Angiogram

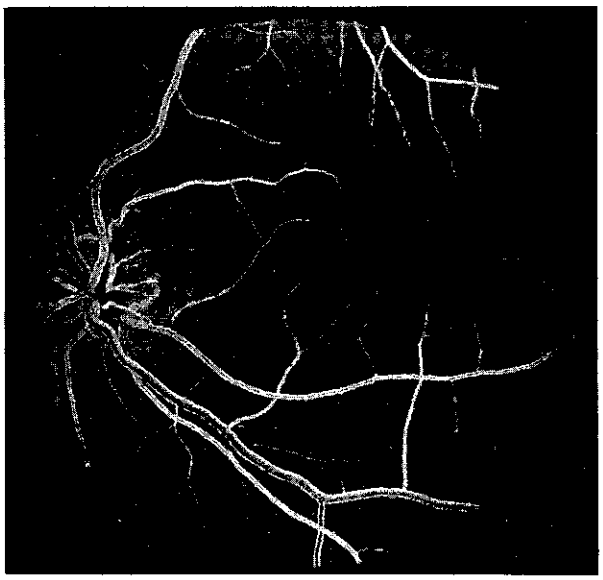

FIGURE 1: Normal Fluorescein Angiogram mid venous phase.

Five to fifteen seconds after fluorescein is injected into the arm vein, it appears in the intraocular circulation. The choroidal circulation is seen to fill first, followed a second or so later by the appearance of the dye in the retinal arterial circulation.

After a rapid transit through the retinal capillary bed, the dye enters the retinal veins where laminar flow is frequently seen in the early phases. The dye then gradually fades from the retinal circulation, small amounts remaining for some hours during recirculation of the dye.

Some Applications of Fluorescein Angiography

The young patient is particularly suitable for investigation by fluorescein angiography The healthy cardio-vascular system, the clarity of the ocular media, and the excellent mydriasis usually obtained, allow good quality angiograms to be obtained.

Conclusion

Fluorescein angiography therefore adds to the ophthalmologists understanding of pathological changes in the retinal and choroidal blood vessels, the optic disc and the retinal pigme epithelium.

Subtle changes seen on clinical examination will often only be properly elucidated by fluorescein angiography.

Children from about the age of 7-8 years are usually suitable for fluorescein angiograph This is a safe test, and apart from a small incidence of nausea immediately following the injection c the dye, it is complication free.

This test may be helpful in cases of unexplained low visual acuity not reponding to normal occlusion treatment, in children who have a family history of macular dystrophy or other hereditary disease of the posterior segment of the eye, or those with any suspected macular pathology as, for example, loss of the normal foveal light reflex.

Apart from adding useful information to the current clinical status of the patient, fluorescein angiography forms a useful baseline for future comparison thus helping in the understanding of the natural history and rate of change of a disease process in that patient. This provides valuable information in stating a prognosis to the parent.

Fluorescein angiography undoubtedly enjoys more widespread use in adults than children, nevertheless it does have a place in the investigation of abnormalities of the structure and function of the posterior segment of the eyes of young people and when discreetly used is a valuabl ancillary investigative procedure.

REFERENCE:

*Novotny, H.R. & Alvis, D.L. *A Method of Photographing Fluorescence in Circulating Blood in the Human Retina.* - Circulation 24: 82-86, 1961

EYE INJURIES IN SPORT

A.H. Toyne *

Eye injuries are usually dramatic, often giving rise to immediate loss of effective vision and are often very serious and painful.

The eyeball is a fragile structure which would seem to be vulnerable to frequent injury in contact sports. Fortunately, surrounded by orbital fat, shielded by the bridge of the nose and the bony cavity with overhanging margins, its protected position minimises the effect of direct impact, or transfers the oncoming force to the surrounding area.

It is readily apparent that the small size of the marginal entrance to the eye, (approximately 3.5cms. high and 4.0cms. wide) will deflect large objects; that is, the golf ball and squash ball are more likely to be offenders than the basketball or football, and the finger is more dangerous than the elbow. Furthermore, small missiles frequently travel at a very much faster speed than a large missile (ball).

Anatomically, sports injuries to the eye can be divided into three main categories: lids, globe and orbit.

Lid Injuries

Bruising of the lids is not a serious injury and resolves quite quickly.

Laceration of the lids, both horizontal and vertical occurs in contact sports. Vertical tears are the worst, as they often involve the canaliculi. Intercanalicular and intercanthal lacerations frequently involve the tear sac region and result in scarring that may occlude the canals, or obliterate the tear sac. Early surgery before oedema occurs is most likely to lead to accurate approximation of the canaliculi and minimise scarring.

In the upper lid, severing the levator may result in ptosis.

Globe Injuries

Subconjunctival Haemorrhages: foreign bodies or trivial injuries to the conjunctiva may cause subconjunctival haemorrhage. Such injuries may be caused by lightly touching the eye with a finger, scorecard or brushing with a jumper. The bright red and localised appearance of this subconjunctival haemorrhage is characteristic. No treatment is required, but other associated injury should be sought. The subconjunctival haemorrhage usually disappears over a period of ten to fourteen days.

Corneal and Conjunctival Foreign Bodies

These may be blown into the eye especially in windy conditions on dusty pitches and courts. There is an immediate sensation of pricking in the eye with watering and redness.

In good light (daylight, or using a good torch) the foreign body can usually be seen resting on the cornea or conjunctiva. Corneal foreign bodies invariably cause an associated corneal abrasion, and this abrasion will show up as a bright green mark when a small fluorescent drop is instilled.

Eversion of the upper eyelids should always be performed as foreign bodies commonly lodge in the groove of the tarsal conjunctiva lining the upper eyelid.

Corneal Abrasions

These occur frequently in sports such as water polo, wrestling and boxing, which involve a close physical contact. They are due to fingers catching the eye (in water polo especially), and the sportsman experiences a sudden sharp pain in the eye. After a few minutes the eye becomes very red, photophobic and waters a great deal.

Diagnosis is easily made by instilling a drop of fluorescein into the eye and this stains the area of the abrasion a bright green colour (the fluorescein stains only the part of the cornea where the epithelium is absent). First aid treatment is to place a firm pad and bandage over the eye, ensuring the eyelids are closed behind the pad.

* Hon. Treasurer, Federation Internationale de Medicine Sportive ("FIMS")

Hyphaema *(haemorrhage into the anterior chamber)*

Concussion injuries to the eyes such as with a squash, tennis or football can cause haemorrhage into the anterior chamber of the eye. The haemorrhage comes from damage to the small vessels on the iris and should always be regarded as potentially serious.

The patient immediately experiences severe blurring of vision and an aching pain in the eye. Within minutes the eye becomes red and photophobic. A corneal abrasion is often present. Examination reveals fresh blood in the anterior chamber, preventing a clear view of the pupil and iris. The haemorrhage settles quickly to form a 'fluid level' of blood if the patient keeps still.

An eye pad should be applied to the eye and the patient sent directly to a hospital ophthalmic department. Secondary haemorrhage into the anterior chamber may occur in the first few days after the injury, and admission to hospital is usually necessary for bed rest to help avoid this complication. The secondary haemorrhage can be more severe than the primary hyphaema and give rise to secondary glaucoma.

Most hyphaemas absorb within a week of the injury, providing a secondary haemorrhage has not occurred. After absorption of the hyphaema the pupil should be dilated to inspect the retina for associated damage.

Penetrating Injuries

Any moderately sharp object or high velocity small ball may cause penetration of the globe. A broken racquet, a fall skiing, or a hard-hit squash ball can cause rupture of the globe and urgent hospital admission is required for the patient.

There is immediate loss of vision in the eye, pain and redness. There is usually prolapse of iris through the wound and hyphaema.

Emergency treatment is to cover the eye with a clean pad and arrange for the patient to be admitted to hospital urgently.

Retinal Detachments and Retinal Injuries

A concussion injury to the eye causes retinal haemorrhages, ruptures in the choroid, retinal breaks (tears and disinsertions), and rarely, avulsion of the optic nerve. All give rise to sudden failure of vision.

Retinal haemorrhages and breaks (usually in the form of a disinsertion or dialysis) should be suspected in any severe concussion injury to the eye. Balls, fists, racquets, sticks and boots are all liable to give rise to concussion injuries.

Retinal Haemorrhages

These are fairly easy to recognise if a clear view of the retina is possible with the ophthalmoscope. The retinal haemorrhages and oedema occur most commonly in the macular area, or sometimes in the part of the retina adjacent to the blow, the temporal part of the retina being the most vulnerable. Retinal oedema and haemorrhages following injury usually resolve in a few weeks without treatment and with complete recovery of vision in many cases.

Choroidal Ruptures

These occur frequently in association with traumatic retinal haemorrhages. Their ophthalmoscopic appearance is of whitish circumscribed areas close to the disc, the whitish colour being due to sclera exposed by the choroidal rupture. Choroidal ruptures and retinal haemorrhages can only be treated by the patient resting at home or in hospital and avoiding strenuous physical activity for two or three weeks.

Retinal Detachments

They are always associated with a break in the retina, and following a concussion injury to the eye, the retinal break takes the form of a retinal dialysis or disinsertion. The disinsertion of the retina probably occurs at the time of injury but the retinal detachment which follows this may not occur for weeks or months after the injury.

The retinal dialysis appears as a red area, well demarcated, in the extreme periphery of the retina, almost invariably temporally because of the vulnerability of this area to injury. When there is an associated detachment, the detached retina looks greyish in colour and the vessels almost black when seen with the ophthalmoscope.

If the retinal dialysis can be diagnosed before the retinal detachment occurs, then the prognosis for vision is greatly improved. A retinal dialysis can be sealed off using the technique of photocoagulation (light coagulation) or cryotherapy to the retina. Once a retinal detachment has occurred, then a surgical operation is required to replace the retina.

Where severe penetrating injuries to the eye occur the retina is frequently torn in several places with immediate detachment occurring. The prognosis for vision in such cases is very poor and treatment is initially directed at repairing the penetrating wound.

Orbital Injuries

Severe concussional blows to the orbital region usually cause bruising and oedema of the eyelids. This swelling may be so severe that the eyelid cannot be opened either by the patient or the examiner. Such patients should be seen by a specialist as soon as possible to exclude the presence of an associated injury to the eye.

Retrobulbar haemorrhage causes proptosis of the eye which in turn hinders the opening of the eyelids; this makes an examination of the globe of the eye difficult. Patients with severe eyelid and orbit haematomas require X-rays of the orbit to exclude fractures of the orbital walls and floor ('blow-out' fractures).

'Blow-out' fractures are caused by concussion injuries to the orbit giving rise to fracturing of the orbital floor. This gives rise to:

(a) enophthalmos (the soft tissues of the orbit herniate through the fracture causing the eye to sink back in the orbit).

(b) diplopia, often on looking upwards (the inferior rectus muscle is bruised or possibly tethered to the fractured floor).

(c) Anaesthesia or hypoaesthesia of the skin of the cheek (due to damage of the inferior orbital nerve).

No emergency treatment is usually required, but as with all severe concussion injuries to the orbit, the patient should be examined by a specialist, preferably within a few hours of the injury so that damage to the globe can be excluded, and correction of any deformity of the bones carried out.

In conclusion, eye injuries do occur in sport. Many are relatively minor, but some are severe. Early first aid, recognition and treatment of injuries ensures that adequate follow-up treatment is instigated. Careful examination of the eye with good illumination is essential for diagnosis.

FAR OUT ORTHOPTICS

G. O'Sullivan, A. McIndoe.

This paper concerns the National Trachoma and Eye Health Programme and the role of the orthoptist in the programme.

The National Trachoma and Eye Health Programme (to be referred to henceforth as the NTEHP) is sponsored by the Royal Australian College of Ophthalmologists and is funded by the Commonwealth Department of Health under the provisions of the National Health Insurance Act. The NTEHP has five main aims:

1. The elimination of trachomatous blindness in Australia.
2. The presentation of the ocular health status of persons living in rural Australia to interested agencies.
3. The provision of immediate eye care to persons living in rural Australia.
4. The establishment of ongoing eye care programmes for rural Australia.
5. The training of medical, paramedical and interested lay persons in the skills necessary for providing eye care in rural Australia.

What is Trachoma?

Trachoma, sometimes known as "sandy blight", is a chronic ocular infection which causes blindness and extreme discomfort among people living in rural Australia with its hot, dry, dusty and sunny conditions and is the single most important cause of PREVENTABLE blindness in Australia today. It is a disease which thrives in conditions of poor hygiene and overcrowded living spaces and affects the aboriginal population more than any other group.

The causative agent — chlamydia trachomatis — produces a chronic infection that begins as a conjunctivitis affecting the eyeball and upper eyelid. Active trachoma is easily diagnosed when follicles are seen on the everted eyelid. These can be accompanied by papillae (small scars left by follicles in earlier infections). The continual irritation of the limbal and corneal conjunctiva causes a type of scarring known as pannus. This is an opaque white band across the superior part of the cornea which may eventually cover the cornea and obscure vision completely. Also occurring with pannus are small depressions in the limbus known as Herbert's pits. After repeated infections, the conjunctiva of the upper eyelid becomes scarred and deformed. The lid rolls in on itself, and as in ordinary entropion, the eyelashes also roll in and add further to the intense ocular discomfort. This is called trichiasis and the irritation it causes leaves the eye open to other sorts of secondary infections. This is a very distressing way to go blind, but the most distressing thing about trachomatous blindness is that it is preventable. It is the raison d'etre of the NTEHP.

The Structure of the NTEHP

The Programme consists of a secretariat in Sydney and the teams out in the field; these are both directed by Professor Fred Hollows with the assistance of Mr. Gordon Briscoe (Federal Department of Health, Aboriginal Section) and Dr. Hugh Taylor. At present there are three field teams in operation, travelling long distances in both remote and settled areas, wherever aborigines are living.

Each team is headed by an ophthalmologist and members include an aboriginal liaison officer, field clerk and nursing sister, a field co-ordinator, orthoptist (Gabi O'Sullivan, with the help of Annie McIndoe at times), an optical dispenser from OPSM, microbiologist and last but not least, the motor mechanic, whose difficult job it is to keep the teams on the road. Aboriginal health workers and community leaders supplement the teams and are most important in overcoming the problems of language (there are about 150 aboriginal languages and 600 dialects) and local customs. They enable the teams to operate smoothly and efficiently in otherwise difficult conditions.

Each team is a fully equipped eye clinic with slit lamp, VA charts, trial lenses and

refracting equipment, direct and indirect ophthalmoscopes magnifiers, loupes, Schiotz tonometers, auriscopes, audiometer, scales, tape measures, a comprehensive range of ocular pharmaceuticals,a complete surgical kit for both general and eye surgery and a full dispensing kit from OPSM, so that glasses can be ordered whether the team is in Alice Springs or out in the Great Victoria Desert. Apart from clinical equipment, each team has all its own food, cooking and camping gear and a comprehensive tool kit.

Each community is approached some time before the team's anticipated arrival and the council of elders or governing body informed of the planned activities. Full consent must be given before the team can even enter the community. The team is organised so that it can operate within fifteen minutes of its arrival. The "clinic" is held wherever the people usually congregate. Sometimes the team works off the side of the truck, known as "Big Bertha" or the backs of the Range Rovers, at some gathering place, be it tree, shed or wiltja. A tent is used on occasions to protect patient, examiner and equipment from the vagaries of the climate and the local fauna (the NTEHP holds a magnetic attraction for dogs). Not every person is seen in the "clinic". The team goes out to the camp wiltjas, to the local schools, visits railway and road gangs, stock camps and broken-down vehicles at the roadside. The various teams have spent time (voluntary) in gaols — at Alice Springs, Port Augusta and Kalgoorlie, in hospitals, hotel bars and out hunting ..... you name it and we've used it as a clinic!

As soon as all discussion is finished, the clerical staff can start receiving patients. All relevant information is recorded...white name, skin name, age, relatives, tribe, place of origin etc. Sometimes, at this stage, weight, height, head circumference, blood pressure and urine are measured, as heart disease, malnutrition and diabetes have a higher incidence in the aboriginal than in the white community. The orthoptist then checks each person's vision with the E chart and also notes any other problems e.g ocular motility (It is important for the orthoptist to assess each person fully as the team can examine up to 300 children in a morning and 160—200 adults in a day), trauma, trichiasis, corneal opacities or scarring, lens opacities or dislocations, infected or running eyes, presbyopic symptoms (these occur at an earlier age for aborigines than whites); also noted is otitis media (prevalent in children), scabies, impetigo, nits, congenital abnormalities and paediatric problems. The person is then graded by the ophthalmologist for trachoma and ear disease and anyone with a problem is examined and treatment or surgery carried out immediately, except for major surgery. The latter is handled by a visiting surgical team at a later date. So far, surgery has been done at Katherine, Santa Teresa, Nepabunna, Coober Pedy, Ceduna, Alice Springs, Amata and Utopia.

The orthoptist working with the NTEHP has an important and often difficult part to play in the smooth running of the team. Working often a sixteen hour day, driving long distances, unloading vehicles and setting up clinics seven days a week under poor working conditions and living conditions is a strain on everyone. As the orthoptist is often the first person into the camp. she plays an important part in liaison, especially with the women, children and old people. The latter are usually very shy and hesitant about the testing procedures, especially with the entire community looking on and giving advice!

The equipment and supplies are mainly the orthoptist's responsibility. It's no good running out of drops, globes or batteries when the nearest town is 800km away — hell hath no fury like an ophthalmologist with flat batteries in his ophthalmoscope!! Other jobs performed by the orthoptist include optical and pharmaceutical dispenser, theatre sister and surgical assistant.

On completion of a clinic, a full interim report is drawn up and presented to the community leaders or whoever is in charge of health for the area. Within the community, the percentage of active trachoma found determines whether treatment is carried out on the entire community or just on affected people and their immediate families. The infection pool has to be eradicated before there will be any lasting effect on the control and eventual elimination of trachoma.

Treatment is by means of a sulphanimide(Septrin), given orally for three weeks. Last year (1976), the Pitjantjatjara people in north-west South Australia were treated and at the present time (March 1977), some 9000 in the Northern Territory are under treatment. As you can see, vast areas of Australia are being treated at the same time and this is where the aboriginal health workers are invaluable with their basic skills, knowledge of hygiene and concern for their people's welfare.

Reports of field work done so far have shown:

- that aboriginal blindness rates are ten times greater than the rates for white Australia.
- one in every four aborigines over the age of 60 years is certifiably blind.
- nine in every ten aborigines seen in the dry areas of Australia have signs of trachoma.
- one in every five aboriginal old people requires surgery.
- advanced trachoma scarring occurs in many aboriginal children under the age of eight years.
- every second middle-aged aborigine requires the services of an ophthalmologist.

The NTEHP is not a "here today, gone tomorrow" scientific group interested only in collecting data. Each aboriginal community will be the target of an ongoing ophthalmological service and will not be forgotten as in the past.

ORTHOPTICS AND SQUINT MANAGEMENT OF THE CEREBRAL PALSIED CHILD

Melinda Binovec

This paper hopefully will create more interest among orthoptists in working with cerebral palsied children as the openings in this field must expand in view of the multiplicity of ocular muscle defects found.

By definition "cerebral palsy" is a persistent but not unchanging disorder of movement and posture appearing in the early years of life and due to a non-progressive disorder of the brain, the result of interference during its development." Mental retardation may be associated with cerebral palsy but is by no means always present.

Many orthoptists will recall Vicki Elliott's stimulating paper "Cerebral Palsy and Orthoptics" (1975). This paper's aim is to expand on the assessment of visual acuity of non-verbal children, i.e. those children with no speech, and to describe the treatment programme undertaken as well as to comment on surgical management of squint.

A. VISUAL ACUITY ASSESSMENT OF NON-VERBAL CHILDREN.

The following standard methods could be used:

1. **The Sheridan Gardiner Method,** except where limited by the degree of physical handicap (especially of the upper limbs), perhaps has been the most successful.

2. **Snellens 'E' Test** may be used — a child's response could be turning head, hand or eyes in the direction of the arms of the 'E',

Further methods utilising skills taught to these children by Speech Therapists, Occupational Therapists and School Teachers include:

3. **The Yes/No response.** Being self-explanatory in regards to the meaning, the following ways could be considered:

   (a) Smile and frown of facial expression

   (b) Nod and shake of head.

   (c) Head or arm pointing in direction of "yes" or "no" sign on tray attached to a chair.

   (d) Foot tapping for yes and no response for no.

   (e) Movement for yes, sit still for no.

   (f) A child may have his own method to express yes or no, e.g. a certain action or noise.

The child is asked in relation to the visual acuity test, whether pictures or letters, "Is this a . . .?" and he responds accordingly. This Yes/No method is usually accurate, as it is the first way a non-verbal child is taught to communicate.

4. **Communication Symbols** are usually set out on a portable board or tray attached to the child's chair, and as the child learns them, the number is increased. This can be used in association with the picture visual acuity test, the child using his hand or finger and placing it on the relevant symbol. If he cannot see it, he falters or points to the "I don't know" sign. A child may have the letters displayed on a board and will point to them instead.

5. **Deaf Signs** are used by deaf children to communicate an object or idea. Once again the picture visual acuity test is used, and the child matches with the deaf sign.

The next method could probably only be used where one has access to the facilities.

6. **The Clock Face Pointer or Selector** - each have a clock face appearance showing letters plus a pointer which moves to each letter. A Snellen's chart is shown and the child uses this apparatus to show the letter to which the tester is pointing. A foot or hand control may be used and this is raised once the required letter is reached, so the pointer stops at the required letter. The clock-face pointer is used to teach the children how to handle the control and learn the alphabet. They then progress to the selector which, once mastered, can be attached to a typewriter so the child has a means whereby to write.

7. In future the **Catford – Oliver Drum** will be used more widely and may prove to be most advantageous in testing non-verbal children.

One should remember when testing visual acuity:

(a) to communicate with the parent or guardian, teacher or therapists, as to the child's responses, aids used, and so on, so that the most accurate visual acuity can be obtained.

(b) not to assume the child's limitations or potential until several and varied methods have been tried.

(c) to attempt the tests at close range initially and establish how the child will respond.

(d) The child's response may be accurate but slow. Give him time to tell you his answer. Above all, be patient.

B. THE PLAN OF MANAGEMENT

This is summarised by the following chart, which gives an outline of the need for treatment of these children.

TABLE I

OCULAR DEFECTS FOUND IN 233 CEREBRAL PALSIED CHILDREN OVER THE PAST 15 MONTHS AND TREATMENT UNDERTAKEN

DEFECTS NOTED	NO.	%	SATISFACTORY NO.TREATMENT REQUIRED	UNSUITABLE FOR TREATMENT AT THIS STAGE			RECEIVING TREATMENT			
				Age	Physical Handicap	Other	Gls.	Occl.	Orth.	Surgery
Nil Apparent	60	26	60							
Refractive Error Only	6	3					6	1		
Conv. Insuf. Heterophoria	31	13		1	4	1	2		25	
Intermittent Squint	43	18	9	1	2	3	18	16	18	3
Constant Squint, Nystagmus	89	38	23	2	0	1	49	25	3	3
Other	4	2					4			
TOTALS	233	100	92	4	6	5	79	42	46	6
					15		126			

There are three points to be noted from the chart.

1. As found by Elliot, the incidence of squint, heterophoria, refractive error and nystagmus is high. All require attention.

2. A high percentage of children (38%) received occlusion or orthoptics after an initial assessment and refraction. These treatments should be carried out along normal lines as far as possible. Responses to treatment are similar to those from treatment of ocular muscle problems anywhere. Binocular vision, where present, is easily weakened or lost with time, unless helped through orthoptic treatment. Occlusion is always successful, within the limitations e.g. regarding age, as apply for normal children.

3. Despite the high incidence of squint, the percentage of children undergoing surgery is low.

C. SURGICAL MANAGEMENT OF SQUINT

Reasons for the small amount of surgery include:

1. The unstable muscle tone in these children.

2. Many children are also undergoing extensive orthopaedic surgery which is considered to be of prime importance for posture, walking, the use of the upper limbs, and so on.

3. The squints in many children are cosmetically acceptable, satisfactorily controlled if intermittent in nature, or too variable in angle for surgery to be considered.

4. Drug therapy is often administered and may affect the ocular muscle control, and so influence the deviation.

The number of consecutive squints was high, so an investigation of the children with a known ophthalmic history of squint surgery before the age of four years was carried out. The following table was compiled. The children represented below were treated at several different centres before attending the Spastic Centre at Mosman and Allambie Heights.

TABLE II

THE RESULTS OF EARLY SQUINT SURGERY (BEFORE THE AGE OF FOUR YEARS) ON TWENTY TWO CEREBRAL PALSIED CHILDREN

Cosmetically improved	Cosmetically good	Improved control over an intermittent squint	Consecutive squint
4	1	0	17

This shows that 77% of these children now have a consecutive squint. This appears to demonstrate that the muscle tone is unstable. In many children who have not had squint surgery it has been noted that the horizontal angle has varied or decreased with time. The same process may well occur after squint surgery, and therefore result in a consecutive squint. Also, these children, after they have initially presented a constant congenital squint, do not appear to have the capacity to develop any binocular vision.

Therefore surgery should be delayed and consideration given when the problem is cosmetic or has psychological effects on the child. Otherwise a conservative, modified approach such as one procedure instead of two or three, as some of these children had, could be considered. In intermittent squints where binocular vision and satisfactory control can be maintained by other methods such as orthoptics, surgery at a later date would also be more advantageous, and predictable as well.

In recent years, orthopaedic surgeons along with the physiotherapists who handle these children agree that certain surgical procedures are best left until the child is older and muscle tone more stable, unless surgery becomes inevitable due to discomfort or gross changes in muscle actions. Assuming that this current trend in orthopaedic surgery is correct, I consider that early squint surgery in cerebral palsied children is also inadvisable.

The cerebral palsied children who have undergone squint surgery in the past fifteen months at the Spastic Centre were all aged over four years, had been prescribed glasses where needed, occlusion, and/or pre and post-operative orthoptics. The pre and post-operative management with these as with all normal children is important. The results are shown below (Table III) Although there were only six children involved the results are considerably better, and I feel this is due to careful selection, as well as the older age at which squint surgery was undertaken.

TABLE III

THE RESULTS OF SURGERY (ABOVE THE AGE OF FOUR YEARS) ON SIX CEREBRAL PALSIED CHILDREN OVER THE PAST 15 MONTHS

Cosmetically improved	Cosmetically good	Improved control over an intermittent squint	Consecutive squint
1	2	3	0

Working with cerebral palsied children is rewarding and a challenging experience to say the least. As well as orthoptics and screening one has the opportunity to work with a multidisciplinary team, where everyone is working for the best for each child. There is also scope for research. Because a cerebral palsied child's eyesight may well become his most important asset in adulthood, we must work towards improving his vision in all aspects, encouraging his full potential by our interest and enthusiasm in management, so that he may indeed see "The Way Ahead."

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VISUAL DEVELOPMENT OF 148 PRE-SCHOOL CHILDREN OVER A PERIOD OF 3 YEARS

P. Dunlop, D.B.O.

Summary: *A longitudinal study on 148 pre-school children in the Newcastle area was undertaken beginning in 1973. Results showing the progressive development of visual acuity, lateralisation in the central binocular visual field and stereopsis are discussed.*

In 1973, the subjects for this study were selected from children attending the five Kindergarten Union pre-schools in the Newcastle region by four investigators, Prof. B. Fenelon, Dr. D. Dunlop, Mr. S. Allen and the author. As well as providing sufficient numbers, the pre-schools ensured a relatively uniform standard of pre-school experience for each child.

Criteria for a child's participation in the study were attendance at a Kindergarten Union pre-school during 1973, parental permission, eligibility to enrol in an Infants school in 1974 and the absence of major physical or intellectual handicap.

Of 175 children studied in 1973, 148 children (79 males and 69 females) remained at the end of 1975. Complete psychological, ophthalmological and orthoptic data are available for these children. For the purposes of this paper, only the orthoptic data is being discussed. As a basis for this each child had a full ophthalmological examination including retinoscopy and fundal examination under full cycloplegia early in the study. This procedure was repeated with some children where visual acuity or other findings suggested that some change had occurred. The orthoptic examination was carried out in the pre-school in 1973 and subsequently in a central orthoptic clinic. This included visual acuity, cover test, ocular movements, binocular function - including sighting eye and reference eye, and convergence. Colour vision was estimated using the Matsubara test. No child underwent any ocular treatment regime during the course of the study.

At the onset of the study it was expected that reference eye would be elicited provided the children were co-operative and the result should be clearly 'right' or 'left'. But this was not so. Statements indicating alternation or movement of both indicators, sometimes with a tendency to normal or to crossed correspondence with the preferred hand, were elicited. This condition may be more properly termed immature or undeveloped reference in the central binocular field.

FIGURE I

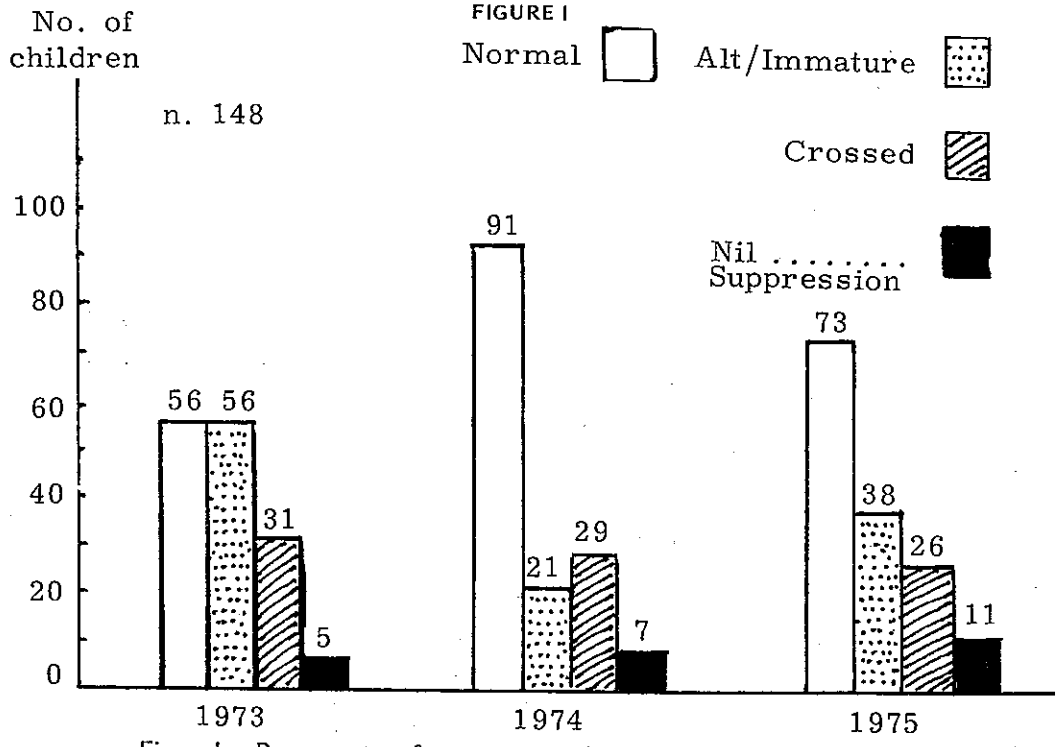

Figure I — Response to reference eye test in 148 children over a 3 year period.

Figure I illustrates the number of children and their responses to reference eye testing in each of the three years of the study. It is evident that in some children a normal correspondence pattern was replaced by an immature pattern, and vice versa during this period. However the children who presented with crossed correspondence at 4½ years appeared to remain in that state over the next two years.

The variation of the normal and alternating/immature responses follows a pattern of "inconsistencies" explained by Touwen (1976) and should be regarded as part of normal neurological development. On the other hand the consistency of crossed responses suggests that these children may not be following a normal pattern of neurological development. Further study along these lines is being pursued by the four original investigators and will be published later.

The eleven cases in 1975 where suppression occurred and no reference eye was possible in the central binocular field were made up of 4 esotropias; 4 esophorias; 1 exotropia and 2 exophorias, i.e. 7.4% ocular muscle imbalance in the group. Five cases of amblyopia were found, one of whom had already been successfully treated prior to the study (3%). Ten children (9 males and 1 female) had defective colour vision, i.e. 7% which indicates that this group is fairly representative of the general population.

Convergence was measured using the range of fusion elicited on the synoptophore and the act of convergence to a near object. Voluntary convergence was also looked for. In 1973, 46 (31%) of the children had achieved it. In 1974, 66 (44%) and in 1975, 86 (58%) had achieved it. This shows a gradual attainment of frontal control of the vergence system of eye movements.

FIGURE II

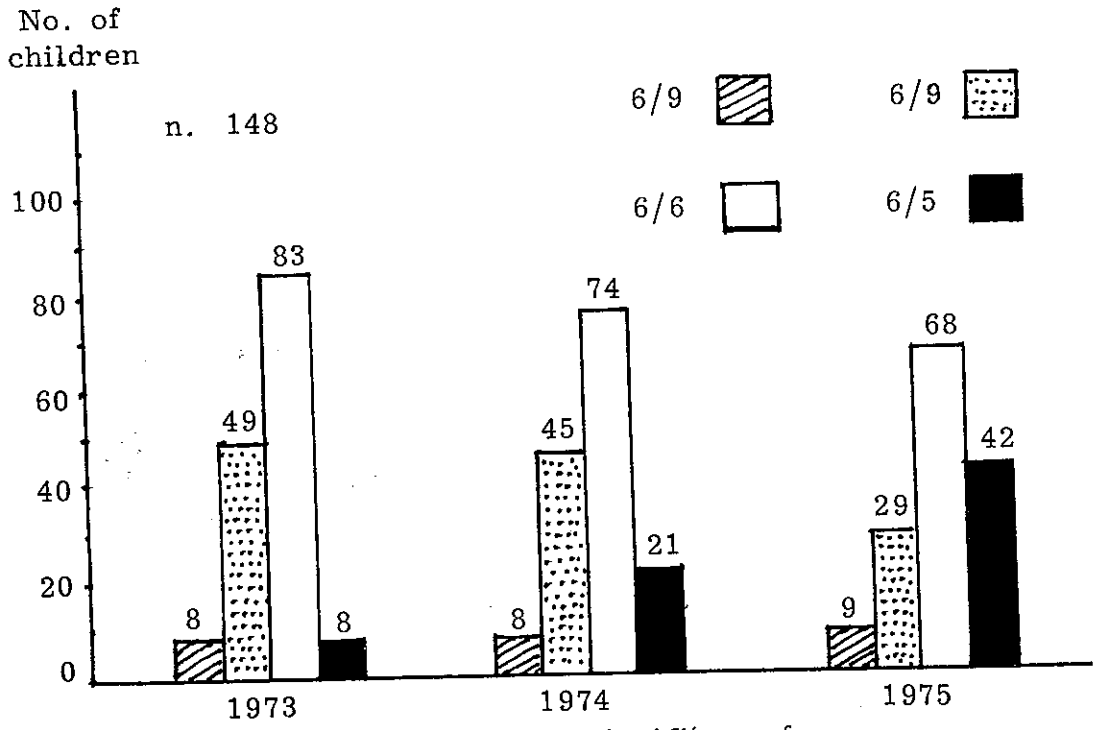

Figure II - Changes in visual activity between 4½ and 6½ years of age.

Figure II and Table I show the number of children and their level of visual acuity (in both eyes) over the three year period. Where vision was not equal in both eyes the child was categorised at the level of the weaker eye.

As time passed, the number of children attaining 6/5 visual acuity in both eyes increased with a corresponding decline in the numbers in the next two categories. The number of children who failed on 6/9 in one eye at least did not alter throughout the three year period.

TABLE I

TABLE SHOWING VISUAL ACUITY (OF WEAKER IN BOTH EYES) OF CHILDREN OVER A 3 YEAR PERIOD (BETWEEN 4½ and 6½ YEARS OF AGE).

		<6/9	6/9	6/6	6/5	Total
1973	Boys	4	24	46	5	79
	Girls	4	25	37	3	69
	Total	8	49	83	8	148
1974	Boys	6	23	38	12	79
	Girls	2	22	36	9	69
	Total	8	45	74	21	148
1975	Boys	6	16	34	23	79
	Girls	3	13	34	19	69
	Total	9	29	68	42	148

Stereopsis was tested with standard synoptophore slides depicting multiple objects at various distances, e.g. Birds in the cage (D.49 and D.50) and Christmas Tree (D.53 and D.54). Responses were graded on 0-4 scale* as done in previous studies (Dunlop 1972 and Dunlop et al 1973). There was very little change in responses over the three year period, i.e. between 4½ and 6½ years of age. Those children who showed good stereopsis with this test at 4½ remained good, and those with a poor response remained defective.

* Stereopsis Grades
0 — Full
1 — Good with one mistake
2 — Good but slow and needing stimulation
3 — Weak, several mistakes
4 — Nil.

TABLE II

A. STEREOPSIS RESPONSES ON SYNOPTOPHORE TEST

Year	4 (nil)	3	2	1	0 (full)	Total
1973	1	1	9	66	71	148
1974	1	1	6	63	77	148
1975	2	0	7	64	75	148

B. STEREO-ACUITY RESPONSES ON WIRT-TITMUS TEST

Year	Nil	800"	400"	200"	140"	100"	80"	60"	50"	40"	Total
					seconds of arc						
1973	1	0	2	2	1	9	62	12	15	44	148
1974	2	0	1	3	2	5	35	17	27	56	148
1975	2	0	1	1	2	3	18	12	27	82	148

FIGURE III

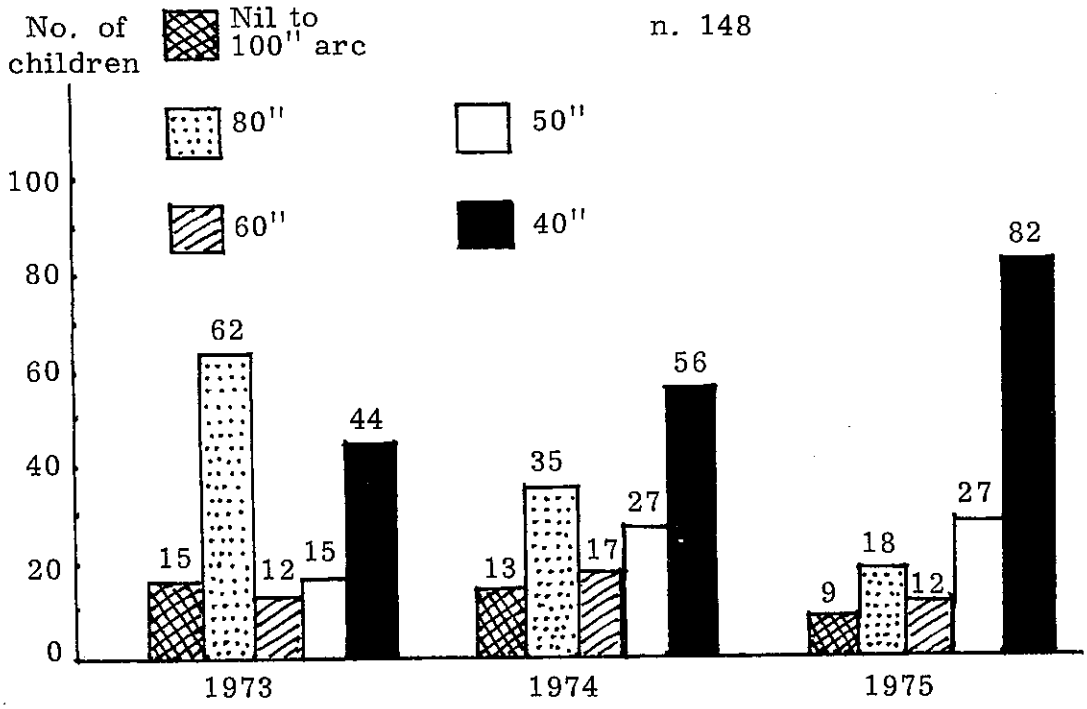

Figure III — Changes in Wirt-Titmus response between 4½ and 6½ years of age

The unchanging pattern of results on the synoptophore tests for stereo-perception, usually called stereopsis, contrasts with the stereo-acuity results on the Wirt-Titmus test. Whereas 80 seconds of arc was appreciated by most children at 4½ years of age, the higher level of stereo-acuity, 40 seconds, was not achieved by most children until 6½ years of age. The number who failed at the 80 second level remained much the same over the three year period. The gradual increase of stereo-acuity with increasing age was also observed by Romano et al (1976).

Conclusions

"Reference eye" test results indicated that some children varied between normal and immature correspondence but those with crossed correspondence remained crossed.

The number of children capable of voluntary convergence increased steadily over the three years. So did the numbers of children with good visual acuity (6/6 or 6/5 in both eyes) and those with good stereo-acuity (40 seconds of arc). There was however little change in the numbers having visual acuity below 6/9 in one or both eyes, or stereo-acuity below 100 seconds. The distribution pattern on synoptophore stereopsis tests remained the same throughout.

Acknowledgements

This study was supported by a National Health and Medical Research Council of Australia grant to Dr. D.B. Dunlop and Professor B. Fenelon (principals) and Mr. S. Allen and Mrs. P. Dunlop (associates).

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A SURVEY OF THE INCIDENCE OF DEFECTIVE VISION AND STRABISMUS IN KINDERGARTEN AGE CHILDREN – SYDNEY, 1976

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Introduction

In recent years much attention has been given to the early detection of visual defects in young children. It is recognised that early diagnosis of strabismus and associated visual defects improves the chance of restoring maximum visual acuity and of preventing deep amblyopia (Lyle[9], Burian & von Noorden[4]).

A study of 5,000 children of kindergarten age in the Sydney metropolitan area was made, with a view to determining the visual norm of kindergarten age children, the proportion of children with reduced vision, the proportion with latent or manifest strabismus, and the degree of convergence ability and level of stereo-acuity to be expected in the normally sighted child.

Personnel

All tests were performed by orthoptists from Sydney Eye and Prince of Wales Hospitals, and from the Western Metropolitan area. Each orthoptist used similar apparatus and steps were taken to ensure that the methods of examination and recording were as uniform as possible.

As the results of this survey were to be used for the updating of the standards for referral by the School Medical Service, it was decided that all tests should be conducted in the school clinic or similar area. While conditions are not always ideal they are conditions that would realistically be encountered by any screening programme in the schools.

Sample

5430 children of kindergarten age from 51 specifically selected public schools were examined. The schools selected had an infant enrolment of 200 upwards to ensure that a statistical and therefore truly representative sample of children from the Sydney Metropolitan area was maintained. Socio-economic and ethnic grouping was considered in the selection of this sample. Special schools (for the intellectually and physically handicapped and non-government schools) were excluded. Written parental permission was required of all children. Date of birth of the child and place of birth of the child and the parents were also requested.

Tests Performed

1. Visual acuity was tested at 6m with the Snellen's test type, using the Sheridan Gardiner board of magnetic letters. Vision was recorded as the lowest line in which more than half the letters were read correctly.

2. Near visual acuity was tested at 1/3m with the Sheridan Gardiner near test type.

3. The cover test for near (1/3m) with an accommodative target and distance (6m) was chosen simply to detect the presence or absence of a manifest or latent strabismus. The deviation, when detected,was not measured.

4. The convergence near point was measured and annotated according to the R.A.F. rule. Convergence ability was classed as normal (0-5 cms), reduced (6-10 cms) and defective (11 cms+).

5. Stereo acuity was measured with the Titmus Test.

Results and Discussion

5430 children were tested of whom 52% were boys and 48% were girls. Of the 5396, who gave a date of birth, the majority (86%) were aged between 5 and 6 years. (See Appendix Table 1).

Visual Acuity

The survey was initiated to determine the visual norm of kindergarten age children in the

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Sydney Metropolitan Area and to determine what proportion of the children had vision which fell below the norm, and therefore needed further investigation. It is important to note that all children were able to manage the Sheridan Gardiner magnetic board (Macfarlane 10)with ease to indicate the matching letter, even though they might not be able to name it. Illiteracy, as such, was not a problem.

80% of the children without glasses were found to have 6/6 or better vision in both eyes. (See Appendix Table II). It would be reasonable, therefore, to regard 6/6 as the visual norm for children of kindergarten age in the Sydney Metropolitan Area.

20% of the children without glasses were found to have less than 6/6 in at least one eye. (See Appendix Table III). This survey was not designed to identify the reasons for vision which fell below the norm, but one may hypothesise about the possible causes.

There was no provision made for the recording of congenital defects e.g. nystagmus or congenital cataract, and some of the children with reduced vision may fall into this group.

11% of those with reduced vision had strabismus, so in these cases strabismic amblyopia may be part of the cause for the reduced vision.

It is interesting to note that,of the 20% with reduced vision, 13.7% had only slightly reduced vision, i.e. either 6/9 in both eyes, or 6/9 in one and 6/6 or better in the other eye. (See Appendix Table III).

Comparison of visual acuity levels at different ages (see Appendix Table IV) shows a progressive increase with age of the proportion of children reading 6/5 and a decreasing proportion reading 6/9 or less. This agrees with Dunlop's finding (Page 20 of this journal).

It is likely that failure of some children to read 6/5 may be due simply to inattention, lack of familiarity with the test, or lack of confidence in the test situation. 113 children are recorded (Appendix Table II) as reading right eye 6/6, left eye 6/5, and only 66 as reading right eye 6/5, left eye 6/6. It was routine practice to test the right eye first. McKenzie (Page 29 of this journal) observed that an immediate retest on such occasions often revealed improved vision in the eye first tested.

A comparison was made of the visual acuity distributions in children grouped according to birthplace of parents, omitting all but three major groups - Australia, Northern Europe, and Southern Europe (see Appendix Table V). A chi square test of homogeneity indicates significant differences between the groups; it appears that a lower proportion (73%) of Southern European children in the Sydney Metropolitan Area may be expected to read 6/6 or better with each eye, as compared with the Australian and Northern European groups (82% & 80%) as here defined. It is not unlikely that difficulties in accepting the test situation, as suggested above, may play a part here.

Glasses and Visual Acuity

64 (1.2%) of the children wore glasses (See Appendix Table VI). The great majority of these (81%) had vision of less than 6/6 in one or both eyes, that is, they were below the norm quoted above. There is no doubt that glasses are not the only form of treatment needed to give maximum vision.

Near Visual Acuity

94.8% of the children without glasses had a near vision equivalent of 6/6 or better in both eyes, and 5.2% had vision of less than 6/6 in both eyes. Of the children wearing glasses 79% had the near vision equivalent of 6/6.

Testing near visual acuity with the Sheridan Gardiner single letter test type on this group, proved that no additional defects were found by incorporating this test.

Cover Test

The cover test showed that 3.5% of the children had strabismus; (See Appendix Table VII).

Of the 192 children with strabismus, 39% had constant strabismus and 61% had intermittent strabismus.

Of the 192 children with strabismus, 39% had 6/6 or better vision in both eyes, and 61% had less than 6/6 vision in at least one eye.

It is interesting to note that intermittent divergent strabismus was the most common type of strabismus detected.

All those cover tested can be summarised as follows:-

Strabismus	=	192 (3.5%)
Heterophoria	=	3026 (55.8%)
Orthophoria	=	2208 (40.7%)
Total	=	5426 (100%)

A vision survey conducted in Cardiff (Graham 8) detected 5.7% with manifest strabismus. This higher figure may be explained by the inclusion of the mentally and physically handicapped in the Cardiff survey. A further reason for the lower percentage of strabismus detected in Sydney is that some children with previously diagnosed defects were withdrawn from the survey by their parents.

56% of the children had a heterophoria. The most common type of heterophoria detected was exophoria for near. (see Appendix Table VIII).

It is not possible to compare these results with those in the Cardiff study because the Sydney survey was designed to detect the presence of a heterophoria, but no measurement was made. In the Cardiff survey only heterophorias of more than 8 Δ were included.

Convergence Near Point

The majority of kindergarten age children were found to have good convergence. 86% had convergence ability of better than 6cms, and a further 10% had convergence of better than 11cms. (see Appendix Table IX).

Comparison of the convergence figures with those of exophoria for near show that many of the latter cases must have had good convergence.

The Titmus Stereo Test

31% of the children demonstrated full stereo-acuity on the Titmus stereo test, the proportion of good stereo-acuity being higher for each successive age group. This finding is in agreement with those of Romano et al[11] and Dunlop (6) (see Appendix Table X).

Conclusion

6/6 was determined to be the visual norm of kindergarten age children in the Sydney Metropolitan Area by this survey. 20% of the children recorded vision which fell below this norm. The survey was not designed to find the reasons for the reduced vision, but to determine the proportion of children who require either a retest and/or further investigation. The survey also showed that the majority of the children tested had good convergence, that 31% demonstrated full stereo-acuity, and that the proportion of good stereo-acuity increases with each successive age group.

Acknowledgements

We would like to express our appreciation to all the orthoptists who took part in the survey; to Dr. W. Hemphill, principal advisor on Maternal and Child Health for the Health Commission of N.S.W. and to Dr. S. Gillis, Medical Superintendent, Sydney Eye Hospital, for their permission to conduct, and for their contributions to, this survey; and, to the Professorial Dept., University of Sydney, Sydney Eye Hospital for helpful advice and encouragement with the writing of this paper.

APPENDIX

TABLE I. AGE DISTRIBUTION IN SAMPLE

Age last birthday	Number	Percent
4	200	3.7%
5	4661	86.4%
6	524	9.7%
7	11	0.2%

TABLE II. VISUAL ACUITY

	Left eye				
Right eye	Less than 6/9	6/9	6/6	6/5	Total
Less than 6/9	163	53	32	6	254
6/9	53	439	140	10	642
6/6	25	139	3040	113	3317
6/5	7	13	66	1113	1199
Total	248	644	3278	1242	5412

TABLE III. SUMMARY OF FIGURES, TABLE II

6/6 or better both eyes	=	4332 (80%)
6/6 or better one eye; 6/9 other eye	=	302 (5.6%)
6/9 both eyes	=	439 (8.1%)
at least one eye less than 6/9	=	339 (6.3%)

TABLE IV. AGE AND VISUAL ACUITY

Acuity	Age 4 yrs	Age 5 yrs	Age 6 yrs.
6/9	34(17%)	465(10%)	35(6.8%)
6/6	140(70%)	2915(63%)	293(56.8%)
6/5	21(10.5%)	1112(24%)	117(34%)

TABLE V. VISUAL ACUITY AND BIRTHPLACE OF PARENTS

	BIRTHPLACE OF PARENTS			
Visual Acuity	Australia	Northern Europe	Southern Europe	Total
Less than 6/9	165 (5.5%)	42 (7.5%)	41 (9%)	248
6/9	358 (12%)	68 (12%)	87 (18.5%)	513
6/6	1770 (59%)	365 (63.5%)	286 (61%)	2421
6/5	694 (23.5%)	100 (17%)	54 (11.5%)	848
Total	2987	575	468	4030

TABLE VI. VISUAL ACUITY WITH GLASSES

64 (1.2%) children wore glasses. This 1.2% is made up as follows:

	6/6 or 6/5 in both eyes	=	12 (19% of 64)
Less than	6/6 in one or both eyes	=	52 (81% of 64)

TABLE VII.

The cover test revealed 192 (3.5%) of the children had constant or intermittent strabismus. This 3.5% is made up as follows:

	Constant Strabismus	Intermittent Strabismus	Total
Convergent	62 (32.3%)	35 (18.2%)	97 (50.5%)
Divergent	10 (5.2%)	79 (41.1%)	89 (46.3%)
Vertical Deviation only	3 (1.6%)	3 (1.6%)	6 (3.2%)
Total	75 (39.1%)	117 (60.9%)	192 (100%)

TABLE VIII.

3 026 (55.8%) had heterophoria which break down as follows:

	Near	Distance	Near & Distance	Total
Esophoria	285 (5.3%)	5 (.1%)	191 (3.5%)	481 (8.9%)
Exophoria	1964 (36.4%)	24 (.4%)	549 (10.1%)	2537 (46.8%)
Hyperphoria	2 (0%)	0	6 (.1%)	8 (.1%)
Total	2251 (41.5%)	29 (.5%)	746 (13.7%)	3026 (55.8%)

TABLE IX. CONVERGENCE NEAR POINT

Normal convergence	(0-5 cms)	=	4647 (86.4%)
Reduced convergence	(6-10 cms)	=	644 (10%)
Defective convergence	(11 cms+)	=	85 (1.6%)
			5376 (100%)

TABLE X. AGE & STEREO-ACUITY OF MORE THAN 100 SECONDS OF ARC.

83%	of	4 years	92%	of	6 years
87%	of	5 years	93%	of	7 years

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LINCOLN INSTITUTE KINDERGARTEN SCREENING

Linda McKenzie

During 1976, Lincoln Institute School of Orthoptics conducted a visual survey of the children attending Melbourne City Council Kindergartens; 638 children between the ages of 3 years 5 months and 5 years 6 months, average age 4 years 4 months, were tested.

Investigation

The following tests were performed –

1. Visual Acuity using a Sheridan Gardiner chart for distance and near.
2. Cover Test at 6 metres and 1/3 metre for manifest squint.
3. Ocular movements.
4. Convergence.
5. Fusion range using the prism bar. The synoptophore was found to be impractical for a screening program of this nature.
6. Stereopsis – Titmus stereo test.
7. Colour vision using the Guy's Colour Vision Test.
8. Confrontation fields were originally attempted but found to be unsuitable as a screening procedure for children of this age group due to lack of co-operation and comprehension.
9. Pupillary light reflexes were also observed.

Due to various circumstances it was not possible to perform every test on all occasions, this is one reason why the numbers quoted for the various tests are not equal. Another reason is that certain children at every age level refused to take part in some tests. Other children, whose date of birth was not recorded had to be excluded from Fig.1.

Results

Of the 638 children screened, 53 (8.3%) were found to have some ocular defect. 16 other children in the kindergartens, who were already under supervision for ocular defects, were not included in the screening. Their inclusion in the figures would bring the total rate to 10.5%.

We found:–

– defective V.A. (less than 6/9 in one or both eyes) in 35 children;

– manifest squint in 17 children (this included 5 having uniocular amblyopia);

– 6 children gave unequivocal evidence of colour defect.

The names of 55 children who refused to join in V.A. testing were noted for review at a later date.

Visual Acuity

The following table is of the Visual Acuity obtained in the 3½ – 5½ year age group, from children classed as having no ocular defect.

TABLE I

S – G Chart			S – G Singles	
6/9	6/6	6/5	6/9	6/6
211	250	25	17	27

When the V.A. varied by not more than one line, the vision in the lower eye is given. 44 children showed no understanding of the chart of letters, so results were obtained using S – G singles. It was routine to test the right eye first; not infrequently initial tests showed better vision in the left eye. With these children we retested the right eye and usually found an improvement from the initial result.

Of those 30 children with defective V.A. and no detectable manifest squint, 18 were found to have defective vision in one eye only, while 12 children had defective vision in both eyes. The maximum V.A. of the more defective eye was below 6/18 in 7 cases, 3 having 6/60 only.

Squint

Of the 17 children found to have a squint, 5 had amblyopia, the rest had equal vision.

Intermittent Squints			Constant Squints		
Convergent	...	6	Convergent	...	3
Divergent	...	5	Divergent	...	—
Vertical	...	2	Vertical	...	1

Colour Defects

Of the 6 males shown to be colour vision defective, 3 had a known family history of this.

We found that Guy's Colour Vision Test is not suitable for mass screening of young children. The instructions state that if 2 answers are incorrect the child is probably colour defective; but we found that the majority gave incorrect answers on at least 2 of the 6 test plates. To a person with normal colour vision, both the alternatives of any test plate are quite clearly discernible, some of the children called our attention to this. This being so we did not feel justified in recording a child as colour defective unless answers on all test plates were incorrect.

Fusion Amplitude

The fusion amplitude was measured using a prism bar on a fixation target at 33cm.

TABLE II

Divergence (Prism Dioptres) \ Convergence (Prism Dioptres)	20 – 25	30 – 35	40 +
6 – 8	1	10	13
10 – 12	3	10	33
14 – 16	2	18	97
18 – 20	3	1	9

This table shows that the major distribution is in the area of $14^{\Delta} - 16^{\Delta}$ divergence — $40+^{\Delta}$ convergence. The majority of the children (76%) are able to converge to 40 dioptres or more, with 65% able to diverge to 14 dioptres or more.

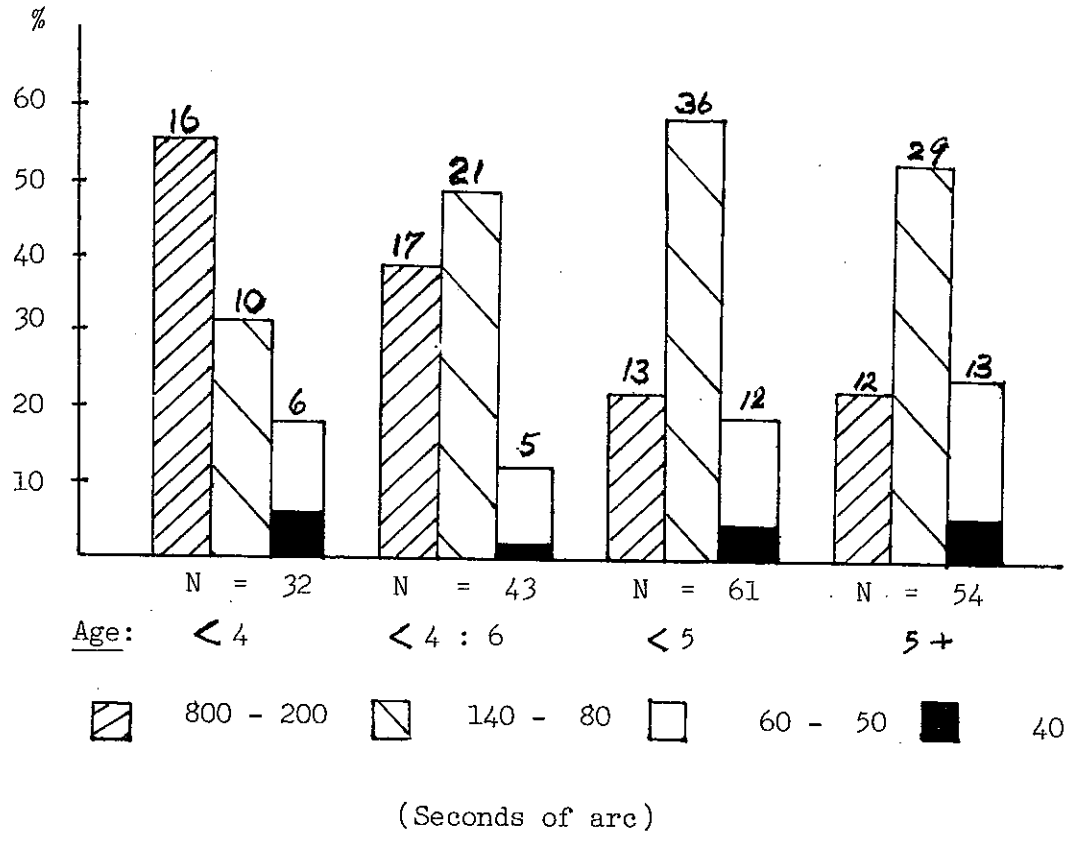
Though the prism bar fusion range is an easily administered test, it does not appear to be an appropriate test for mass screening as it has no differentiating value in the detection of amblyopia. The 'straight amblyopes' appear to have the same fusion range, using this test, as those children with good visual acuity.

Stereopsis

Results of 190 children of known age on the Wirt-Titmus stereo-test are shown graphically in Figure I.

FIGURE I

Proportions of poor, moderate and good stereo-acuity found at various ages.



It can be seen that there is an increase in the proportion of children having an acuity of 140 seconds of arc or better, for each successive age group. It is interesting to note that the percentage demonstrating acuity of 40 seconds (correct answers on all of the 9 circles) was not related to age.

Summary

We have found that the results of all tests depend a great deal on the confidence and maturity of the child, as well as on chronological age. Hopefully, these results may help in establishing standards to be expected for the various tests performed.

In this survey we found ocular defects, previously undetected, in 8.3% of the children. This indicates the importance to the community of continuing and even expanding the orthoptist's role in visual screening programmes within the field of preventative medical eye care.

Acknowledgements

The screening of these children was performed by staff from the School of Orthoptics — Miss R. Wilkinson and Mrs. G. Heinze and myself, with the aid of our first and second year students.

We thank Dr. I.B. Broderick and her staff of Infant Welfare Sisters and Kindergarten Teachers for their co-operation in this program.

SOME ASPECTS OF SWISS ORTHOPTICS

Ulrike Messerli

From 1966 to 1968 I trained as an orthoptist in St. Gallen, Switzerland, at the Orthoptic and Pleoptic School of Professor Bangerter. I worked from 1968 to 1973 in the Orthoptic Department of the University Eye Hospital in Bern.

During my training, the treatment of amblyopia was very important. So was the treatment of ARC, which I have never carried out again since then.

When I started work in Bern, we used Professor Cüpper's euthyscope treatment of amblyopia, which was much less time consuming than the Bangerter method. Two to four children could be treated together in one session. The treatment took about 2 months, following a preliminary two months of inverse occlusion. The child had two sessions, each of half an hour, daily. When fixation improved, he also had two sessions of 20 minutes each with the Haidinger brushes; then we changed to direct occlusion and gave the child some monocular exercises. Most of the children were hospitalised, or came for the whole of each day. After this intensive treatment the child was sent home with direct occlusion, and came back to our department for a weekly check up.

Children up to 4 years were given direct occlusion regardless of the state of fixation, with weekly visits. When necessary a child was hospitalised and had two sessions a day of monocular exercises like crossing out letters, for instance all "o's" in a magazine or telephone book. Between the ages of 4 and 5 years we tried direct occlusion. Although the prognosis was not so good we sometimes got positive results. If not, we gave inverse occlusion and euthyscope treatment. Another method of treating amblyopic eyes in older children (5 to 10 years) on whom we could not try direct occlusion, or where euthyscope treatment was impossible because of time or distance, was to give 2 months of inverse occlusion followed by direct occlusion for a quarter of an hour daily, gradually increasing to one hour. This treatment could take up to one year (maximum).

Over the years, euthyscope treatment became less and less necessary, and occlusion gained more importance, as the children came to us much younger.

Another form of treatment which gained importance was penalisation. Penalisation is based on exact correction of both eyes and an added correction of +3.OD. for the amblyopic eye, together with daily atropine 1% in the good eye. In general it was better accepted than occlusion. This penalisation for near, as it is called, was effective for younger children as they are concerned only with things close to them. For school children the method was better, as they used the amblyopic eye for near and the good eye for distance.

Another treatment was given to nystagmus patients, children and adults, using an after-image based on the principle of the euthyscope. The after-image was given by a photo-flash with an area sparing the macula and with a central fixation mark. The patient sat very close to the flash, and covered one eye for a moment. Just when he felt he was fixing the central fixation mark he set off the flash himself. Then he sat (like a euthyscope patient) in a room with a light going on and off. He now had a steady entoptic fixation stimulus which blocked the nystagmus and led to better vision. When the after image was gone, the nystagmus increased in intensity and the patient gave himself a new after-image.

After 4 sessions (or fewer) a day for about 4 weeks, vision improved subjectively, because in time the feeling of blocking or reducing the intensity of the nystagmus persisted even when the after image was gone. Objectively, improvement was less apparent. Some patients came back for further treatment when they felt their vision had deteriorated.

In treating heterophoria we did, on the whole, the same exercises as are used here in Australia. One additional thing was to practice room fusion for near and distance. For half of each half-hour session, twice weekly, patients practiced convergence and divergence with the prism bar, using Worth lights and Worth glasses for distance, or a fixation light at 30cm and Bagolini lenses.

On the whole, there are not so many differences in the field of orthoptic work. Something to think about are distances and population. Australia is 224 times larger than Switzerland and has 3 times as many inhabitants. There are about 138 registered orthoptists in the Swiss Orthoptic Association, 14 of them living abroad. Australia has 300 registered orthoptists, approximately 140 of them now working.

DISTANCE ESO-DEVIATION OR VERGENCE INSUFFICIENCY

W.E. Gillies, D.O., FRCS, FRACS, Melbourne

Training and experience make us think of eso-deviations as either partly or completely refractive in origin due to hypermetropia or an abnormal AC/A ratio. This is particularly so in children where nearly all eso-deviations are larger for near. An eso-deviation which is greater for distance or only present for distance seems a contradiction, so if we find one we at first think we have made a mistake.

However, it is now usually conceded that distance eso-deviations do exist and they are included in the classifications of squint. So we find divergence insufficiency along with divergence excess, convergence excess and convergence insufficiency. This makes for a tidy classification even if there seems a lack of conviction in most of the texts. Furthermore, these distance eso-deviations are not simply divergence insufficiencies.

Clinical Features

The typical picture is of a latent or manifest eso-deviation which is present for distance viewing. As the eyes converge to follow an object which is brought closer to the patient, a point is reached where there is no deviation at all, and this may be called the neutral point or crossing distance. At distances closer than this, there is an exo-deviation and in some patients this is accompanied by an obvious convergence weakness. A crossing distance may be found by moving a light towards the patient with a Maddox Rod in front of one eye.

The crossing distance is influenced by accommodation and in young patients, it is closer to the patient when an effort of accommodation is made, but in elderly patients, accommodation had little effect probably because of presbyopia. Also, in young patients, the crossing distance is much closer than in elderly - in the 0-10 age group it is about 20cm., in 31-40, about 30cm. and in 61-70, it is about 55cm.

The distance deviation also changes if the patient focuses distance optotypes when wearing full spectacle correction. In a few patients, the eso-deviation increases but in more, there is a small decrease in the eso-deviation, an 'exo-movement' which suggests a visually determined focusing mechanism.

In some patients, a small vertical deviation is present as well as the horizontal deviation.

The condition is not associated with any particular refractive error; most patients are emmetropic, but both hypermetropia and myopia may occur. Patients with some degree of anisometropic amblyopia often have a distance eso-deviation.

Incidence

The condition occurs in patients of all ages and both sexes from infancy to old age. Phorias are commoner than tropias.

Many infants present with an esotropia which seems to be due to hypermetropia and is controlled by glasses without operation. Later in life, some of these children show a typical distance eso-deviation, suggesting that this is the basic deviation which is masked in early life by an overlying accommodative element which disappears as the child grows older. Elderly patients commonly present with diplopia of sudden onset due to distance eso-deviation. Presumably the diplopia is caused by breakdown of a compensatory mechanism.

Symptoms

At all ages, distance eso-deviation is a basic oculomotor imbalance, probably due to a lag of the vergence mechanism. The patient has a long-standing adjustment to this disorder and symptoms are subtle unless this adjustment breaks down. Even so, small deviations can cause quite worrying symptoms.

Diplopia itself is not always present. Typically, it is not present for near and usually occurs only for a fairly long distance. It is often present only intermittently, is more common in elderly than in young patients and may be precipitated by illness, injury or emotional upset.

In younger patients, there is discomfort for distance vision with blurring or a difficulty in focusing, especially on moving objects. Activity involving continuous re-focusing of the eyes is especially difficult e.g. driving a car or working from a blackboard. Ball games are a problem to these children, especially if a change in direction is involved and the ball is small.

Parental despair is made worse because these children, when reading, hold the book at their neutral point for comfort. As this is often very close, they are thought to be myopic, which is seldom the case.

At all ages photophobia is almost universal in these patients; perhaps glare increases the difficulty in focusing.

Management

If a distance eso-deviation needs surgery, resection of the lateral rectus seems the surgical procedure of choice. If a recession of the medial rectus is also performed, it should be small.

In children with esotropia, if convergence cannot be maintained right up to the nose, then bilateral recession of the medial recti may cause gross weakness of convergence post-operatively.

If diplopia is present, then base-out prisms may give relief, correcting half to two-thirds of the deviation. They are not as effective in young patients because these patients continually change focus from distance to near, but after the onset of presbyopia, there is less of a problem. Correction of any small vertical deviation with a prism also helps.

Correction of any refractive error is usually helpful and in children, successful treatment of any amblyopia usually lessens the eso-deviation.

Convergence exercises will improve the convergence weakness common in the condition and usually improve the whole condition as well. Orthoptists should be able to devise some good convergence/divergence exercises.

Comment

Distance eso-deviation is the cause of many cases of diplopia which cannot otherwise be explained. In particular, the onset of horizontal diplopia for distance in an elderly patient is not necessarily due to a palsy of the divergence centre, if such a centre exists, nor is it always due to bilateral palsy of the lateral recti muscles. It is more likely due to the breakdown of an old distance eso-deviation.

The existence of distance eso-deviation strongly suggests that divergence is an active and not a passive function. It further suggests that convergence and divergence are complex, closely related functions, or rather, part of one vergence function mediated at mid-brain level, but under cortical control. A visual input drives this vergence mechanism and if one eye is amblyopic, or if binocular function is weak, a lag in the vergence mechanism is likely. A vergence insufficiency may also develop because of dis-function at another level.

Summary

The condition of distance eso-deviation is described. This is characterised by an eso-deviation which is present only for distance or is greater for distance than for near viewing. There is also a crossing distance or neutral point close to the patient where the deviation disappears and closer than this there is an exo-deviation. In many patients, there is also a convergence weakness. The condition occurs at all ages, phorias being more common than tropias. Management may need correction of refractive error, base-out prisms or surgery.

The condition seems due to a vergence insufficiency, not just a weakness of divergence.

THE OCULAR MYOPATHIES

*Hector Maclean,** MB,Ch.B,F.R.C.S. (Ed.),DO.

There is a group of diseases which affect the workings of the muscles of the body. The muscles affected may be those in the limbs, for example, as in the disease known as muscular dystrophies; or they may be the extra-ocular muscles, when the disease is called an ocular myopathy. One or several extra-ocular muscles may be affected, and there may be other associated eye disorders. An ocular myopathy and a muscular dystrophy may occur together.

In these myopathies and muscular dystrophies there is some evidence that the fault may lie in the biochemical mechanism within the muscle fibres, at the junction between the nerve and the muscle it drives, or even in the nerve itself.

The ocular myopathies are probably more common than is realised. They are often diagnosed in retrospect, only when review of ocular motility findings reveals a pattern too bizarre to be otherwise explained.

Two case histories will serve to illustrate what happens:

1. James C. first presented at age seven, with increasing diplopia from a left lateral rectus paresis and a history of minor head injury. There were no other neurological signs and a year later, with no change in his Hess screen chart, surgery corrected his diplopia.

   At the age of ten, he presented again with a new diplopia, this time from a left superior rectus palsy. Again the neurologist pronounced him normal, and a subsequent resection of the affected muscle cured him.

   At the age of thirteen, he had further diplopia, this time from weaknesses of the right lateral rectus and left superior oblique muscles. He had a left ptosis. Inspection of family photographs suggested a minor degree of right ptosis had been present, unrecognised, from the age of five. His father was now attending the neurological clinic because of multiple sclerosis. The diagnosis of a classical case of ocular myopathy was now very clear.

2. Andrew M. was referred at age five, because at his school entry test he read only 6/60 in each eye. He had a fully concomitant alternating convergent squint. Visual acuity and binocularity were restored by +10.00 dioptre spheres for each eye.

   Two years later, vision in his right eye dropped, as he developed a +15^{0} RCS with some L/R. He was unenthusiastic about constant light-tight occlusion, but recovered 6/6 vision and had a right recession and resection for this squint.

   At the age of ten and a half, he had some vertical diplopia which increased, and his grandmother pointed out his left ptosis. His inconstant Hess screen charts caused great distress to his orthoptist. He mentioned he wasn't very good at football, although he seemed to be very sturdy. The diagnosis was now clear. He was carefully fasted and rested overnight, so that a blood test for muscular dystrophy could be taken. It confirmed the clinical suspicion of muscular dystrophy with ocular myopathy.

   Diagnosis is relatively easy in a classical case showing the following features, as in the first patient:

   Onset in childhood

   Slowly progressive

   Ptosis usually precedes ocular motility upset

   Males are involved more frequently than females

   There is commonly some neurological upset in closer relatives

   Pupil reactions are not changed from normal

   Gaze palsies do not occur.

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There may be a very long interval between the onset of ptosis and ocular motility problems. A familial incidence is sometimes found. The exasperation and depression of wildly discrepant synoptophore or Hess screen readings at successive orthoptic visits becomes replaced by something approaching elation when the reason is suddenly clear.

Some readers may have seen patients with ocular myopathy, but felt it was something else, because it was given a different name; for example, progressive external ophthalmoplegia, or abiotrophic ophthalmoplegia externa. Ocular myopathy is the term preferred, as it fits best with our current knowledge of the disease involving primarily the extra-ocular muscles. Some recent evidence, though, tends to confirm a suggestion made by Von Graefe over a hundred years ago that there may be some neural involvement also.

The obvious conditions which have to be differentiated are:

Myasthenia gravis

Endocrine myopathy

Myositis

Myotonic syndrome

Drug effects (for example, Atropine, Vincristine)

The most important one to distinguish is myasthenia gravis. Electro-myogram of the extra-ocular muscles, if available, can help clinch the diagnosis and can help distinguish ocular myasthenia. This test also offers the most satisfactory method of carrying out the Tensilon test for myasthenia. Alternative methods of doing a Tensilon test are worth knowing about. In a myasthenic, an injection of Tensilon intravenously, briefly raises the intra-ocular pressure by over 5mm. Hg. within a minute of the injection being given (usually 20-40 seconds). This can be recorded by continuous applanation tonometry, or better, by a brief tonography.

A new method of assessing extra-ocular muscle power has recently been described from Sheffield. It has considerable promise and is within the capabilities of the average orthoptist. A contact lens on the eye, is attached to a strain gauge which feeds into an oscillograph. The patient sits in front of a Hess screen and has merely to quickly look in the direction of the suspected affected muscle.

Some associated conditions are worth noting:

(a) Muscular dystrophy. This was present in one quarter of the patients in the original Kiloh and Nevin series. My second case is in this group. Biopsy of skeletal and extra-ocular muscle may help clarify a doubtful diagnosis in these patients, but only few centres can do the necessary elaborate work well. Serological tests can help. The two enzymes most checked are the serum creatine phosphokinase and serum aldolase.

(b) Atypical retinitis pigmentosa. This is commonest in females with ptosis early and ophthalmoplegia late. The fundus picture does not show the classical "bone spicules" of true retinitis pigmentosa, and electro-diagnostic tests of retinal function are normal. Night blindness is also not a feature.

(c) Hereditary ataxias such as Friedreich's ataxia and Marie's ataxia. Nystagmus is common in the first, and optic atrophy in the second.

(d) There is a group of patients with ocular myopathy, cardiac muscle myopathy and retinal degeneration. These patients are liable to sudden death. They are deaf, dwarfed, and have weak trunk and limb muscles.

(e) A miscellaneous group includes such conditions reported rarely as the Bassen-Kornzweig syndrome, Refsum's syndrome and choroideraemia.

Treatment

If the cause is myasthenia gravis, the standard therapies for this also relieve the diplopia. Competent surgery can help most of the patients, thought the good results sometimes last for a disappointingly short time. Fresnel prisms are an important advance, because of the ease with which they can be changed. For the underlying causes however, there is no known remedy. You may wish to read a little more widely. The following references should help.

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THE ROLE OF THE ORTHOPTIST IN THE MANAGEMENT OF DYSTHYROID EYE DISEASE

J. Mein *

Many terms have been used to describe the condition in which exophthalmos is linked with limited ocular movement and diplopia, the best known being exophthalmic ophthalmoplegia. In some cases of thyroid disturbance, however, there is exophthalmos with little or no ophthalmoplegia and in others there is ophthalmoplegia without the typical exophthalmos, now recognised through more sophisticated medical diagnosis. For these reasons the older terminology appears to gave been superseded by the more general term, dysthyroid eye disease.

I am fortunate in that I have worked for a long time in a hospital where there is excellent liaison between endocrine and ophthalmic departments, so that all patients with eye symptoms are seen in both clinics. The nature of this disease is such that patients are followed up over a long period of time, both because prolonged medication is required and because it is often impossible to state that a patient is cured and will never have a recurrence of symptoms or a change in his thyroid state. As a result we have had opportunity to watch the patients' progress for ten years or more in some cases.

We decided to present a follow-up of these patients at the Third International Orthoptic Congress in Boston in July, 1975, using an earlier study (Mein 1967) as a guide and for comparison. The paper was written jointly by Brian Greaves and myself and was presented by him in Boston. This paper concentrates on orthoptic rather than ophthalmic management but is based on the same material.

Material

We were able to review a total of 144 patients and these we divided into three groups based on the length of the follow-up period.

Group 1.	followed for up to 4 years	43 patients
Group 2.	followed from 4-10 years	55 patients
Group 3.	followed for over 10 years	46 patients

All these patients were seen in the orthoptic clinic because of diplopia, although it is our practice to see all patients with known or suspect dysthyroid eye disease, even if symptom free, in order to plot a Hess Chart for reference in case of change. All were under the care of the endocrinologist and the ophthalmologist, whether they presented first to the eye department or first in the endocrine department. In some cases diplopia was the presenting symptom but in others it developed much later in the course of the disease when the patient was still hyperthyroid, or when he was euthyroid or even hypothyroid. It has proved impossible to correlate the patient's thyroid state with the onset or progress of his dyplopia.

Because we were interested in long-term changes we concentrated most on Groups 2 and 3 with the longer follow-up time.

The functions of the orthoptic department are:

1. to provide an adequate record;
2. to relieve symptoms;
3. to keep the patient under observation and note any change in his eye condition.

I propose to refer first to some of the methods we use to fulfil these functions and then to present facts which emerged from our follow-up.

Diagnostic Methods

The patient's vision was routinely tested on every visit since this is at risk both from corneal exposure and pressure on the optic nerve. We recorded the cover test, ocular movements

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and measurement in the primary position, but relied mainly on serial Hess Charts, fields of binocular single vision, fields of uniocular fixation in a few cases, and on photographs to record the patient's appearance and ocular movements. In addition, the exophthalmos was measured in the eye department and the patient examined ophthalmologically.

Serial Hess Charts seem to us to be the best way of showing the patient's progress, always providing that the outer field is recorded. If this proves impossible because of bilateral limited movement then this must be stated. In cases when a meaningful Hess cannot be plotted we plot instead a field of uniocular fixation on the perimeter. This test is dependent on the patient appreciating when he loses foveal fixation, and therefore the best possible vision is necessary: for this reason glasses are worn. We plot fields of binocular fixation in all cases with an area of binocular single vision. Our reasons for using this test so much are:

1. that patients with this condition frequently develop an excellent fusion range and the field of binocular fixation is surprisingly large when compared with the Hess Chart;

2. that the patient's control of his deviation may vary, becoming less good or better whilst the Hess Charts remain unchanged.

Orthoptic Management

We use prisms extensively in the management of these cases, first as Fresnel or occasionally as clip-on prisms for a trial period of up to 6 months, later as a permanent or semi-permanent prescription in the patient's glasses.

Our reasons for their use are:

1. because the condition is notoriously unstable in that it can remain static for many months or even years and then change; surgery is avoided in our department where possible or certainly not performed inside a 2 year observation period. Prisms are a more acceptable alternative to surgery;

2. because the fusion range is so large many patients are comfortable using a prism strength far below their measured angle, for example a patient with 45^{Δ} of L. hypertropia who has been symptom free for 8 years with a 10^{Δ} vertical prism.

On reviewing the 101 patients in Groups 2 and 3 of our series we found that the majority had worn prisms at some stage; 48 out of 101 had a wearing time exceeding 3 years, analysis of this number showed that —

15 patients have retained the same prism;

4 have required an increase;

5 have had the strength reduced;

16 have discontinued wearing prisms because they are now comfortable without them, and

8 further cases have been able to discontinue wear post-operatively.

3 out of the 4 patients needing more prism had esophoric deviations and it is well recognised that this happens in such cases irrespective of etiology. There is little evidence that patients with this condition cannot be made comfortable with prisms or that they become dependent on them.

Results of Follow-up

1. **Ocular Movement:**

Typically these patients show limited elevation which simulates Superior Rectus weakness. There is chin elevation and a tilt to the lower eye which results in binocular single vision but also allows the patient to fix more easily and avoid the discomfort of looking up. Most authorities believe these signs can be related to the inferior rectus which is first involved in inflammatory changes and later becomes fibrotic, thus preventing full upward movement and causing pain on elevation.

However, the inferior rectus is not the only muscle involved and many cases in this series showed

generalised limitation of movement, limited abduction and limited depression far greater than their limited elevation. In some cases the greatest limitation of movement was in the least proptosed eye.

Many patients presented with unilateral limitation, or with very asymmetrical limitation. We reported a patient in 1967 who had gross unilateral limitation of elevation for some years before his other eye became involved. When this "eye caught up" with the first eye the diplopia resolved and binocular single vision was restored in the lower field. Similar findings occurred in 8 other patients in Groups 2 and 3.

However, to us the most important finding was that a significant number of patients improved spontaneously; 41 out of the 101 patients in Groups 2 and 3 showed significant improvement, our criteria for this being:

(a) objective improvement on Hess charts of a displacement toward normal of at least 1 square (subtending 5^{o});

(b) subjective improvement in symptoms and in appearance;

(c) the ability to discard prisms or accept a reduction in prism strength.

50% of the patients in Group 3 (observed more than 10 years) and 33% of those in Group 2 (observed 4 - 10 years) met these criteria.

It is difficult to explain how ocular movement can improve if there is fibrosis of muscles as it is generally believed such changes are irreversible.

2. Exophthalmos:

Another fact to emerge in the course of our survey is that there is variation in the degree of proptosis during elevation and depression of gaze. Exophthalmology readings using a Hertel exophthalmometer were taken by the same observer (B.P.G.) on 109 patients. pivoting the apparatus from the primary position to maximum elevation and depression. In 78 patients the proptosis increased by 2 - 4mm. on elevation and decreased by 3 - 5mm. on depression. The 15 normal subjects tested for comparison all showed a decreased measurement on elevation.

The results in dysthyroid subjects suggest that limited elevation is not explained entirely by fibrosis of the inferior rectus but that this muscle must in fact relax on attempted elevation so that the exophthalmus increases.

Conclusions

The findings of this survey encourage us to believe that the end result in most cases is satisfactory The patient's appearance improves, and he maintains a good field of symptom free binocular single vision. They also confirm our belief that conservative management is indicated in most cases, partly because of much later changes which can occur but also because of the satisfactory spontaneous improvement which is found in a significant number.

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TWO CASE REPORTS:

SUPERIOR OBLIQUE TENDON SHEATH SYNDROME IN SIBLINGS

Penelope Monteath (Newcastle)

Two cases of apparent superior oblique tendon sheath syndrome are reported here.

Sheree W., 5 years old, presented in July 1976 with a history of turning her left eye outward on looking up since the age of three years.

Cover test for near:	tiny exophoria with rapid recovery
Cover test, 6 metres:	no deviation
Ocular movements:	defective upward movement of left eye, most marked in adduction,

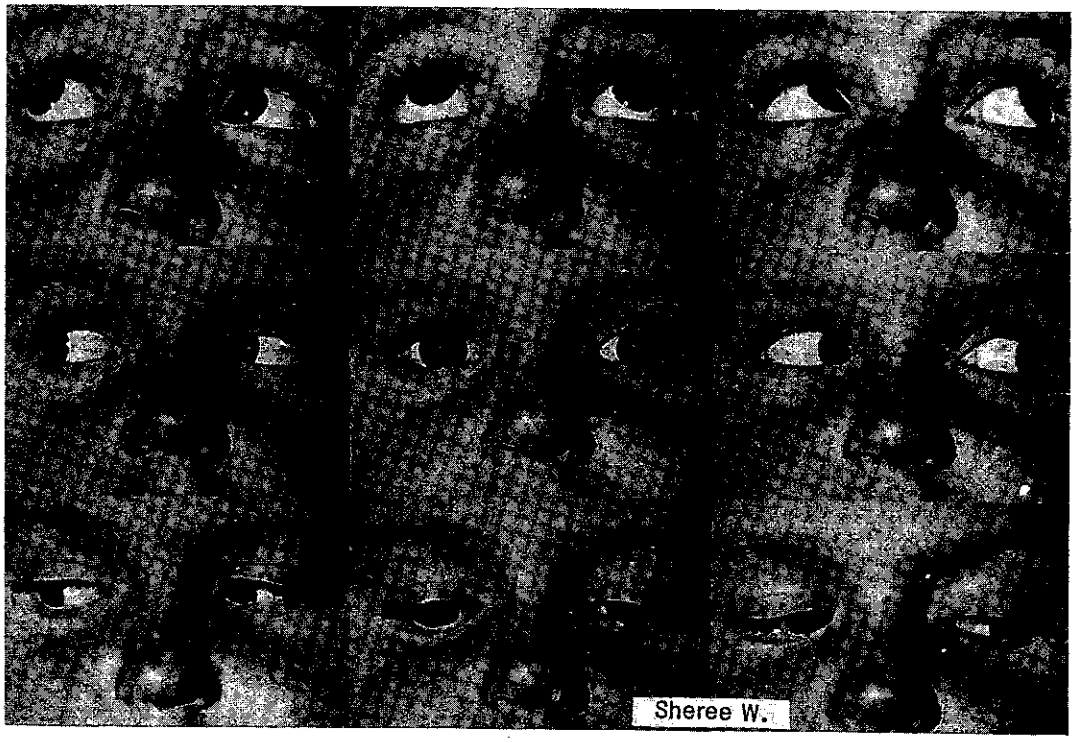
The Hess screen showed some restriction of left adduction in elevation, and orthophoria in depression, restriction of upward movement of the left eye particularly in adduction, and overaction of the right superior rectus, typical of left superior oblique tendon sheath syndrome. (Fig.1)

The interesting feature here is that on the same day her younger sister Karen, 3 years old, presented with a history of turning her left eye on looking up, noticed during the past 12 months. She showed no deviation in the primary position on cover test, but there was defective upward movement of the left eye particularly in adduction, with the same deviation, as reported by her mother. Her Hess chart gave a similar picture to that of her sister, except that the outward deviation was more marked. (Fig.2)

Both children have full binocular vision, equal visual acuity, and no abnormal head posture. Their mother knew of no eye muscle problems in other members of the family.

Have there been any other reports of congenital defects of this nature evident in siblings?

I would like to thank Dr. R.K. Pountney for his permission to present these cases, and the Royal Newcastle Hospital's Medical Illustration Department for the illustrations.



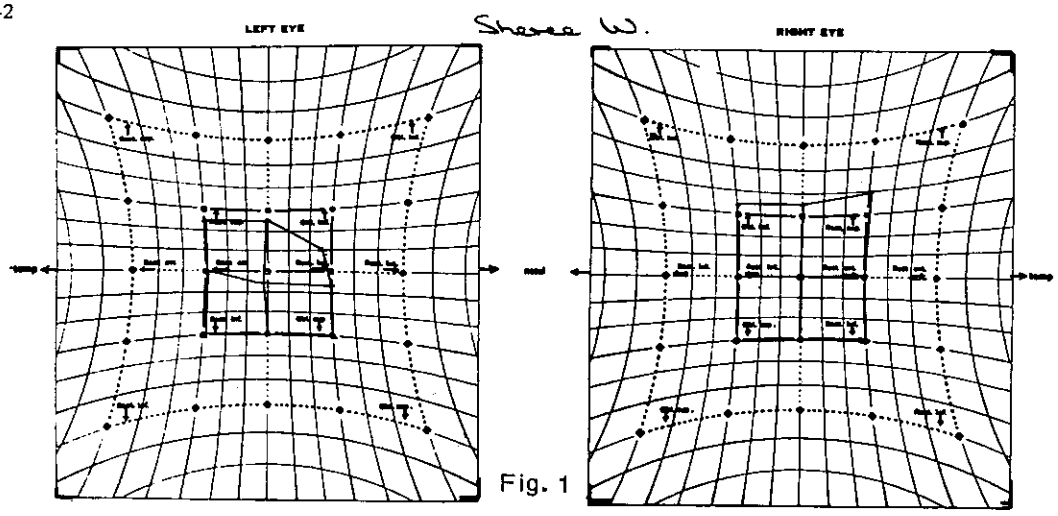
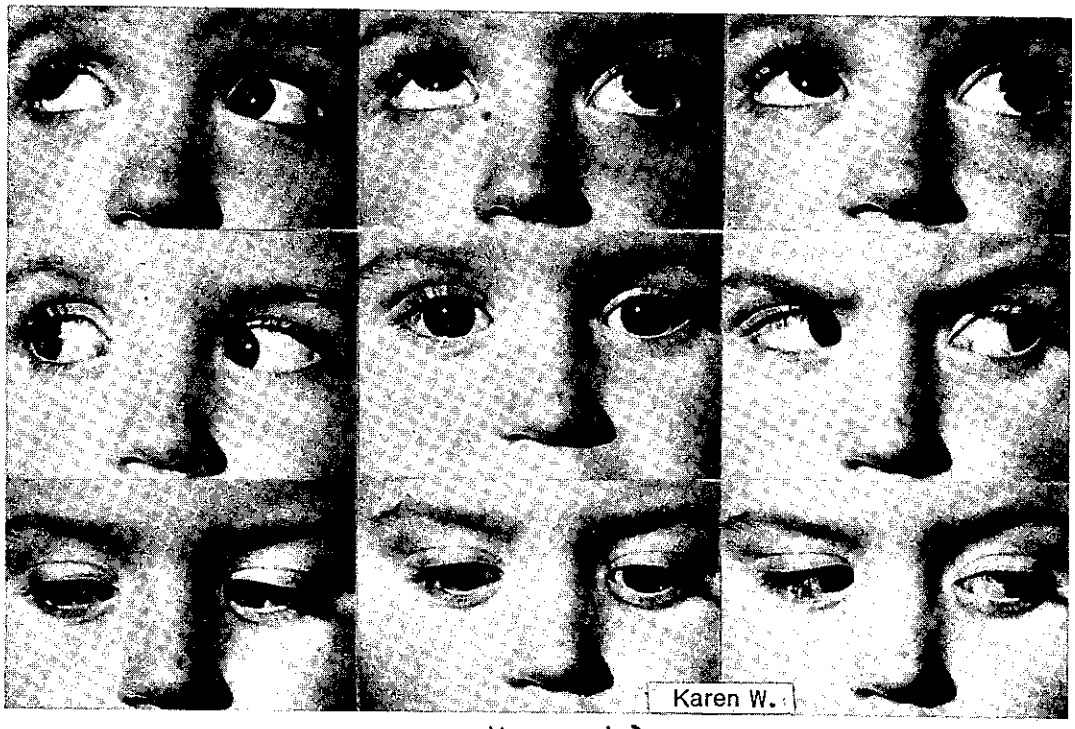


Fig. 1



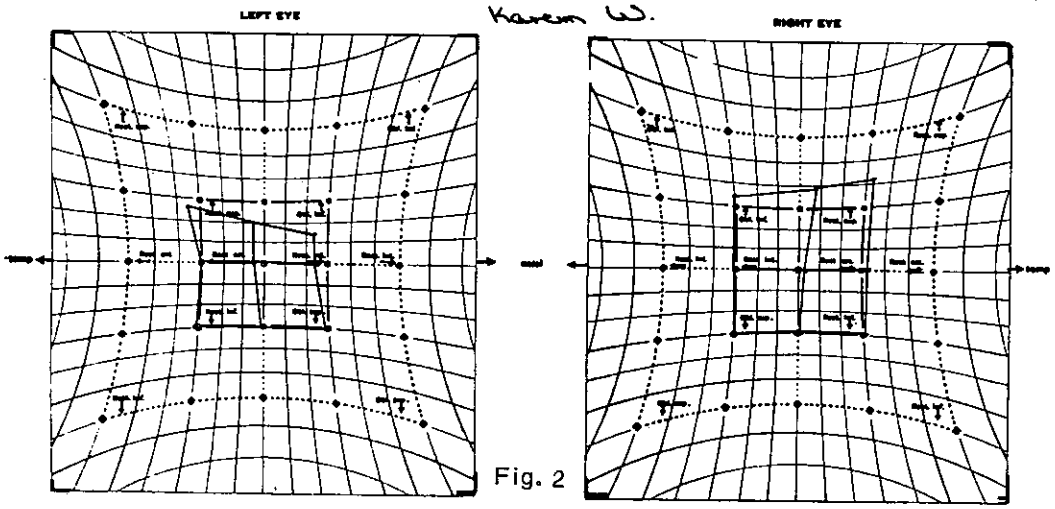


Fig. 2

HYPOACCOMMODATIVE SQUINT: TWO CASE HISTORIES

Helen Hawkeswood

The two cases here presented fall into Costenbader's second group of comitant esotropias. that of hypoaccommodatives. Broadly, Costenbader states that this type of squint appears between the ages of one and six years and is associated with a lower degree of hypermetropia than is found in the refractional type. He attributes the overconvergence, which is particularly apparent when reading, to excessive demands on a weakened accommodation mechanism.

Two patients, Mr. R.B. and Mrs. S.L., were each referred at 24 years, giving rather vague histories of an earlier turn in the right eye. Mr. R.B. believed he might have had one at eleven years of age. Mrs. S.L. remembered her mother saying:"You must be tired; your eye is turning." This occurred in her late teens. Both patients had been given convex spheres of less than one dioptre, which failed to help and were worn for about three months only. Both of them complained of focusing difficulties, frontal headaches, frequent diplopia when tired, and blurred vision for near.

Orthoptic findings were characteristic. There was a small esotropia, at most, for distance and a large right convergent squint for near. Accommodation on the near point rule was grossly defective for the patients' years, and the Maddox wing varied from esophoria 10^{Δ} to 35^{Δ}. Convergence was fair but showed no pupillary constriction. In each case there was normal visual acuity for distance while monocular vision was extremely poor for near (N48 to N36). Synoptophore examination showed binocular vision present.

It was found that +2.50 dioptre spheres for near allowed Mr. R.B. to bar read N8, and reduced his prism cover test from 60^{Δ} to 8^{Δ} of esophoria. Mrs. S.L., likewise with +2.50 spheres right and left, was able to bar read N5 with her Maddox wing reading reduced from esophoria 18^{Δ} to orthophoria. These corrections were accordingly ordered by the ophthalmologist for near work.

Mr. R.B. was seen in 1968. Contacted by telephone nine years later, he is still wearing the same prescription glasses, but as his job as a design draughtsman has changed,he thinks his glasses may need changing too. Mrs. S.L.,last seen nine months ago,is still symptom free and wearing the same glasses for close work.

REFERENCE:

Costenbader, F.D., (1950) *The Management of Convergent Strabismus* in Strabismus Ophthalmic Symposium (No. 1) Allen, J.H. Ed., Mosby, St. Louis. p.334.

CASE HISTORY: RECURRENCE OF ALTERNATE DAY SQUINT IN AN ADULT

Jan Wulff

This report concerns a patient, Mrs. A.O., first seen in 1972 (Magin 1974) at the age of 55. An inconspicuous right convergent squint, present from childhood, had during recent years increased to 30°, at first intermittently, then regularly on alternate days for eighteen months, to become finally a constant convergent squint of approximately 35°, which was disfiguring and most disorientating.

A right medial rectus recession in April 1973 reduced the deviation to 2°, giving good appearance and a dramatic improvement in the patient's personality and her ability to cope with the world. There was still deep right amblyopia, and no demonstrable binocular vision. Corrections and vision were:

$$\text{Right } \frac{-16.00}{+3.00} \times 100^{o} \quad \frac{1}{60} \qquad \text{Left } \frac{-2.00}{+0.50} \times 60^{o} \quad \frac{6}{6}$$

The right eye had been left uncorrected for many years.

The patient returned in November, 1975, complaining of a recurrence of the alternate day pattern with extremely sharp pains behind her right eye and loss of balance on her "squinting" days. On these days the convergent squint measured 25° by reflections and our patient was so disorientated that she would get up early and perform all her household duties before 8 a.m. when the right eye began to squint. (Figure1).

No binocular vision was demonstrable. Visual acuity and visuscope findings were the same on squinting and on non-squinting days. The visuscope revealed two eccentric fixation points for the right eye, one nasal in the paramacular region and the other very close to the optic disc. The patient changed easily from one to the other, showing no preference for either.

In September 1976, a right lateral rectus resection of 4mm. was carried out, resulting in a residual right convergent squint of 3°. To date there has been no recurrence of the large convergent squint. The patient is symptom-free again and very pleased with her appearance.

Not knowing the cause of the previous deteriorations, one wonders how long Mrs. A.O. will now remain comfortable and cosmetically acceptable. She maintains an extremely good standard of general health and is not on any form of medication at present.

This case appears interesting on several counts - that alternate day squint should appear in an adult, that it should appear in one with such gross anisometropia and amblyopia, and that it should provoke such severe symptoms when amblyopia is present. Another interesting feature is the correction of a 30° or 25° convergent squint, on two occasions, by surgery on a single muscle.

I would like to thank Dr. John Hart and the patient for allowing me to present this further development of her case history.

Straight day Squinting day After second operation

Alternate Day Squint

CASE HISTORY: INNERVATIONAL ANOMALY AND HEAD TURN

Patricia Wister, Melbourne.

Lorraine, a somewhat retarded 15 year old girl, presented with a head turn of 20° to the right, chin slightly up, and a right convergent squint with hypotropia.(Fig.1) Vision of the right eye was 6/60, left 6/6. There was no refractive error.

The patient was able to direct her eyes into most positions of gaze, but with bizarre results. In particular attempted gaze to the right resulted in abduction of the right eye with simultaneous abduction of the left eye which caused considerable pain. (Figure 2). This anomalous divergence followed an A pattern, being most marked in depression. The left eye could be brought into primary position, but efforts to do so, with the head held rigidly straight, caused great discomfort. All evidence suggested a complex innervational anomaly.

In view of the mental retardation and satisfactory appearance with the compensatory head posture, the first inclination was to leave such a complex squint alone. But considerable discomfort was felt in any position of gaze except the one requiring the head turn, and Lorraine's guardians were concerned that the head turn itself might be an obstacle to her future happiness. A left lateral rectus recession of 8-9mm. was suggested as likely to reduce both the primary exodeviation and the head turn.

This surgery was subsequently performed with good results as regards both the head position and comfort. (Figure 3).

My thanks go to Dr. Lindsay Jones for allowing me to present this case, and to the Photography Department, Royal Victorian Eye and Ear Hospital, for patience in preparing illustrations.

(1) Usual position (2) Attempts right gaze (3) Left eye fixing in primary position

Before surgery After surgery

BOOK REVIEW: ORTHOPTICS: PAST, PRESENT, FUTURE

Editors: S. Moore, J. Mein and L. Stockbridge

The transactions of the Third International Orthoptic Congress are published under the title of Orthoptics, Past, Present, Future, which was the theme of the Congress. The publication contains most of the papers presented at that meeting and for this reason alone it is a worthwhile addition to the library of any orthoptist or ophthalmologist interested in strabismus and related topics. It does not, any more than the Congress did, quite live up to its title. A few of the contributors may have briefly mentioned the historical background of their subject and a few postulated on the future of orthoptics but most, and rightly so, concentrated on the present.

A few subjects had special attention at this Congress, attracting several contributions from scientists, ophthalmologists and orthoptists. These subjects included stereopsis, amblyopia (especially its neurophysiology), penalisation, nystagmus, dysthyroid eye disease, prisms, intermittent exotropia, small angle esotropia and microtropia. Many of these papers are thought-provoking, especially those on stereopsis and amblyopia.

This Congress also demonstrated many of the newer areas of interest to orthoptists. Papers by orthoptists include areas of pure research and others show interest in ocular motility problems in dysthyroid eye disease, cerebral palsy, hydrocephalus, mentally handicapped children, cranio-facial dysostosis and specific learning difficulties. These should be of interest to orthoptists hoping to widen the scope of their work.

The book is a credit to the editors, Sally Moore and Lynn Stockbridge from U.S.A. and Joyce Mein from the U.K. and is well produced (Symposia Specialists - Miami). It is also reasonably priced at $19.95 (U.S. dollars) from Stratton Intercontinental Book Corp., 381 Park Avenue, New York, N.Y. 10016.

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