

ON THE RELATIONSHIP OF ESO TO EXO-TROPIA IN NEWCASTLE. 1980

PATRICIA DUNLOP DBO(D)
Newcastle, N.S.W.

Abstract

All cases of manifest horizontal deviation presenting during 1980 in a solo Australian private orthoptic practice were analysed in relation to type of deviation, type of onset, age, race, sex, refractive error, amblyopia, concomitance, constancy and delay in presentation. The 1980 incidence of eso and exo deviation was compared with the figures from the same solo practice over the previous 25 years.

Key words: Survey, manifest horizontal deviation, related factors, incidence.

INTRODUCTION

The International Orthoptic Association has planned a world wide study of the relative incidence of esotropia and exotropia, with as many countries participating as possible. In particular the association wishes to assess whether the prevalence of one or the other condition can be related to one or more of the following factors: latitude, hours of sunshine and race.

Additional factors to be studied include: concomitance or incomitance; congenital or acquired; constant or intermittent (when first presenting); presence of refractive error and amblyopia.

SURVEY

A survey of all new cases of eso and exo-tropia presenting in one Newcastle practice during 1980 has been undertaken as part of the International project.

All the patients in this study have lived at about 33°S for all or most of their lives, with an average exposure of 8 hours of sunshine daily and are of mainly Northern European

race. In 1980 there were 159 new cases of esotropia and 31 new cases of exotropia.

In order to put the figures of the year 1980 into perspective, the ratio of eso to exo-tropia has been calculated for the previous 25 years (see Figure 1). The ratio varies from year to year but shows a general rise which has reached a peak of 4.6:1 in 1980. Taking the mean of these ratios in 5 year spans (see broken lines), there is a gradual increase from 1.9:1 in '55-'59 up to 3.2:1 in '75-'79.

Age at Presentation

Figures 2 and 3 show the number of males and females presenting in 1980 at various ages with esotropia and exotropia.

Tables 1 and 2 shows the actual number of cases in each group with percentages (approx.) in brackets.

Over half (57%) the esotropic cases presented in the birth to 3 years old age group, but only 30% of exotropes were in this age group. Esotropia was more common in males than it was in females in this series but females presented slightly more frequently with

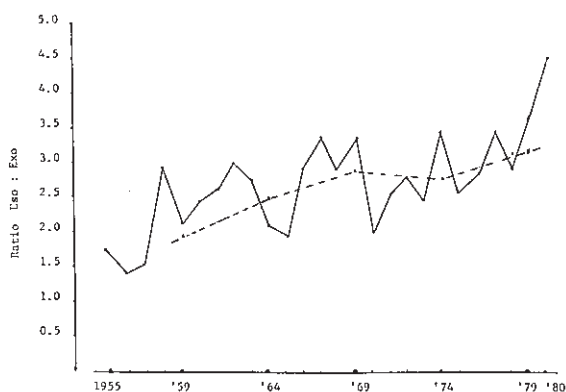


Figure 1: Graph showing the ratio of eso to exo deviation (continuous line) 1955-1980. Broken line represents the mean ratio of eso to exo deviation in 5 yearly spans (1955-1979).

exotropia. It is interesting to note that all the males with exotropia presented under age 7 years.

Type of Deviation

Figure 4 and Tables 3 and 4 show the number and percentages of cases of congenital and acquired eso and esotropia in 1980. The International Orthoptic Association (I.O.A.) guidelines define "congenital" as dating from birth or with onset within the first 9 months of

life. "Acquired" means onset after the age of 9 months. Constant and intermittent status was noted at the time of presentation.

Most cases (76%) were intermittent in both esotropia and exotropia. There was no incidence of incomitance in the 31 cases of exotropia.

Refractive Error and Amblyopia

Refractive error is defined (I.O.A.) as 1D or more error in any meridian and amblyopia is said to be present where there is one or more lines difference in visual acuity between the eyes before treatment. Tables 5 and 6 and Figure

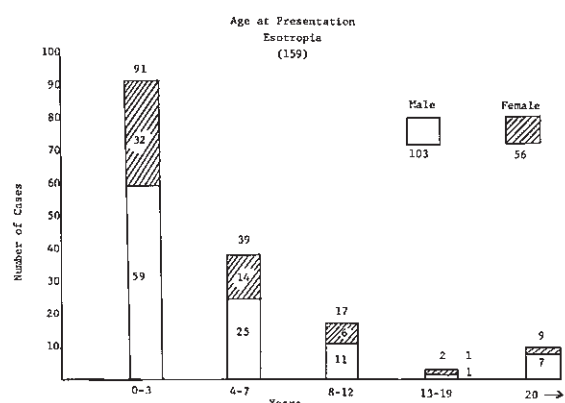


Figure 2.

TABLE 1
Age at Presentation of Esotropia

Age in years	0-3	4-7	8-12	13-19	20→	
Males	103 (65)	59 (37)	25 (16)	11 (7)	1 (0.5)	7 (5)
Females	56 (35)	32 (20)	14 (9)	6 (4)	1 (0.5)	2 (1)
Total	159 (100)	91 (57)	39 (25)	17 (11)	2 (1)	9 (6)

Percentages in brackets.

TABLE 2
Age at Presentation of Exotropia

Age in years	0-3	4-7	8-12	13-19	20→	
Males	13 (42)	6 (20)	7 (22)	0 (0)	0 (0)	0 (0)
Females	18 (58)	3 (10)	4 (13)	5 (16)	1 (3)	5 (16)
Total	31 (100)	9 (30)	11 (35)	5 (16)	1 (3)	5 (16)

Percentages in brackets.

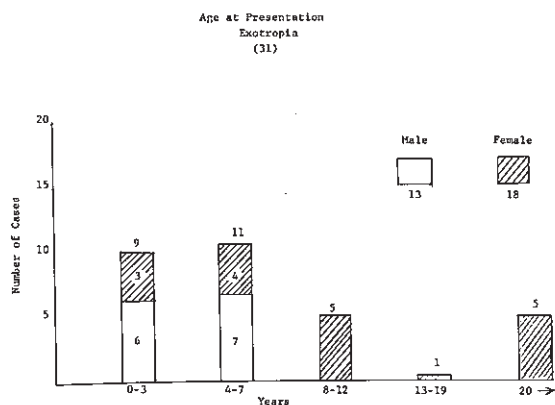


Figure 3.

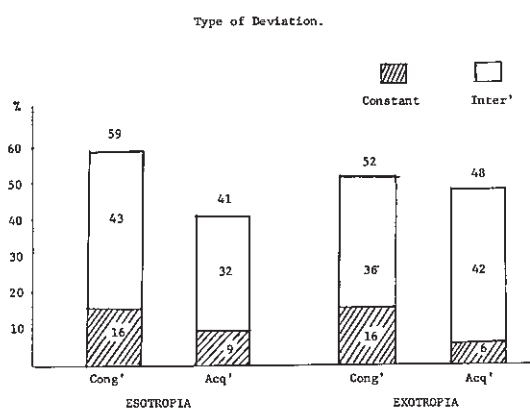


Figure 4.

TABLE 3
Esotropia—Type of Deviation

		Constant	Inter	Total
Congenital 94 (59)	Concomitant	16 (10)	59 (37)	75 (47)
	Incomitant	10 (6)	9 (6)	19 (12)
Acquired 65 (41)	Concomitant	9 (6)	47 (29)	56 (35)
	Incomitant	4 (3)	5 (3)	9 (6)
Total 159 (100)		39 (25)	120 (75)	159 (100)

Percentages in brackets.

5 show the number of cases of congenital and acquired eso and exo-tropia affected by refractive error and amblyopia, including those affected by both or neither condition.

DISCUSSION

Surprisingly, similarities between eso and exo-deviation are more apparent in this series than dissimilarities.

Information on latitude, hours of sunshine and race from this study will only be useful when it is considered in relation to the world-wide figures and will not be discussed here.

Figure 1 shows a relative increase in the proportion of eso-tropia to exo-tropia, rising

TABLE 4
Exotropia—Type of Deviation

		Constant	Inter	Total
Congenital 16 (52)		5 (16)	11 (36)	16 (52)
Acquired 15 (48)		2 (6)	13 (42)	15 (48)
Total		7 (23)	24 (77)	31 (100)

Percentages in brackets.

1.7:1 in 1955 to 4.6:1 in 1980. Similar variations may be occurring in other areas. The National Trachoma and Eye Health Program figures show a ratio of eso to exo deviation of 3:1 among aborigines, whereas non-aborigines in the same survey had a ratio of almost 1:1 (37:40) in an area where the incidence of strabismus appears much lower—0.05% for

aborigines and 0.1% for non-aborigines.¹ The rate for urban Western type society varies between 1% and 3% depending on the age group involved.²

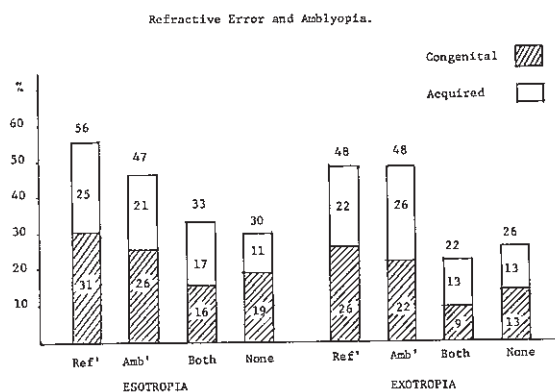


Figure 5.

Divergent squint is more common in aborigines than in non-aborigines. Hollows (1980) states that "Aboriginal children have less amount of convergence per unit of focussing

with only 30% of exotropes in the same age groups is interesting. Does Western style culture predispose humans to "too much, too close too soon?" Has the human race not really adapted to the demands of the highly sophisticated living we accept as normal in 1980?

The proportion of "congenital" to "acquired" was about the same in both types of deviation. This may be a reflection of the arbitrary time chosen by the I.O.A. to divide congenital and acquired (nine months).

Most patients sought treatment within a few months of the deviation becoming apparent. Only a very small number of patients presented after a prolonged period of neglect of the deviation. Only 4 (13%) of the exotropes and 21 (13%) of the 159 esotropes could be termed "neglected".

TABLE 5
Amblyopia and Refractive Error in Esotropia

	Ref Error	Amb'	Both	Neither
Congenital 94 (59)	49 (31)	41 (26)	26 (16)	30 (19)
Acquired 65 (41)	40 (25)	34 (21)	27 (17)	18 (11)
Total 159 (100)	89 (56)	75 (47)	53 (33)	48 (30)

Percentages in brackets.

TABLE 6
Amblyopia and Refractive Error in Exotropia

	Ref Error	Amb'	Both	Neither
Congenital 16 (52)	8 (26)	7 (22)	3 (9)	4 (13)
Acquired 15 (48)	7 (22)	8 (26)	4 (13)	4 (13)
Total 31 (100)	15 (48)	15 (48)	7 (22)	8 (26)

Percentages in brackets.

power than do Caucasian children. Although this phenomenon is probably genetic it may include some adaption to high-light environments. Squint in aborigines also tends to occur later in childhood and it is not unusual for the poorer sighted eye to diverge at this stage".

The high percentage (57%) of esotropes presenting under the age of 3 years, compared

The early presentation for both conditions is very satisfactory, as early treatment of ocular muscle imbalance should produce the best possible chance of fully functional results. This reflects gradually increasing local parent and practitioner awareness of the desirability and practicability of early diagnosis and treatment.³

Refractive error appears to be a predominant factor in both eso and exo cases. This may be because of the parameters set for this study and the fact that so many of the patients were very young, where an "error" of 1D is common and natural. Nevertheless, early correction of refractive error in ocular muscle imbalance seems highly desirable: form deprivation, meridional and strabismic amblyopia may thus be avoided.^{4,5,6,7} In the exotropic group 8 (26%) had no other defect other than their divergence.

CONCLUSION

The unexpected features of these results may be mainly local deviations from the norm; and the full significance of these figures will not be evident until the world wide figures are available for comparison.

I would like to urge all orthoptists to complete their surveys as adequately as possible and to add retrospective studies of other years for

comparison, in order to enhance the value of the Australia-wide picture in the world scene.

ACKNOWLEDGEMENTS

My grateful thanks go to Mr R. Bryant of the Medical Communication Department of the University of Newcastle for the photographic work and Mrs J. Power for her typing assistance.

References

1. Hollows F. National trachoma and eye health program report. Royal Australian College of Ophthalmologists. Sydney, 1980.
2. Duke Elder S, Wybar K. System of ophthalmology. London: Kimpton, 1973; 6: 584.
3. Dunlop P, Dunlop DB. Progress in infant strabismus therapy, analysis of long term results. Aust J Ophthal 1979; 7: 57-64.
4. Hubel DH, Wiesel TW. Binocular interaction in the striate cortex of kittens reared with artificial squint. J Neurophysiol 1965; 28: 1041.
5. Von Noorden GK. Current concepts of amblyopia. In: Orthoptics, past, present and future. Eds Moore, Mein and Stockbridge. New York: Stratten, 1976: 37-44.
6. Ikeda H. Visual acuity, its development and amblyopia. J Roy Soc Med 1980; 73: 546-555.
7. Ikeda H, Tremain K. Amblyopia and cortical binocularity. Trans Ophthal Soc. U.K. 1980; 100: 450-452.