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COMMUNICATIONS

ON THE VALUE OF ORTHOPTIC TRAINING

BY

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LONDON

OF recent years very considerable attention has been paid to the question of improving the results of the treatment of squint by supplementing the simple clinical methods with organised training on special instruments. The general enthusiasm, the organisation, and the publicity is new; the underlying principles are, for the most part, far from new. It is in the writer's opinion—and from conversation he has gathered that this opinion is shared by many—high time that an impartial investigation were conducted in order to discover whether the immense amount of time and trouble now being devoted to orthoptics is bearing the fruits of success which one is entitled to expect from so highly organised and extensively practised a branch of ophthalmology.

There are special reasons why orthoptics should be so scrutinised as to results. The recent interest in this branch of ophthalmology has resulted in large numbers of medically unqualified persons undergoing a course of study, subsequently to undertake the training of squinting children, which training is usually of a very protracted nature. Aided by the somewhat apathetic acquiescence of the majority of ophthalmic surgeons, the practice of orthoptics,

from some points of view, has reached the position of a vested interest, and its uncritical acceptance is all that is needed to ensure its persistence, quite apart from its excellence. It cannot, I think, be said that the same holds true for, say, massage, or physiotherapy—two ancillary services which bear, to their parent sciences, relationships similar to that borne by orthoptics to ophthalmology.

Opinions are obviously divided upon the value of orthoptic training. From enthusiasts the impression is gained that light has at last dawned upon the treatment of squint; on the other hand the opinion has lately been expressed that most of the time spent in training is useless and some positively harmful. There seems little doubt that this discrepancy arises from the fact that there is no general agreement as to what is aimed at in the treatment of squint. A cosmetically straight eye is justifiably considered essential before one can speak of a cure in any sense—this is fundamental and agreed; it is upon the painful and prolonged striving after stereoscopic vision that disagreement arises. It is in the writer's opinion quite unnecessary to set such a high standard as the possession of full stereoscopic vision; very few people need it and fewer still are aware of the possession of it. Let it be assumed as a postulate in the present instance that the aim of the treatment of squint is to give two straight seeing eyes—a considerable assumption in view of the present orthoptic activities but one with which it is my experience that most ophthalmic surgeons will agree. It is the common experience that, for this end to be achieved, some degree of fusion is essential in order to endeavour to ensure that deviation shall not occur again; this point will be mentioned later.

This standard will be assumed in the argument of this article and the conclusions arrived at will be drawn with that as a basis. It has to be admitted at once that only one—though the largest—branch of orthoptics will here be considered, *viz.*, that concerned with the treatment of squint in young children. The treatment of adults, both for squint and heterophoria, will not be touched upon in detail, though it may be mentioned in passing that the results in such cases seem to be very disappointing.

For an attempt to assess the value of orthoptic training, and to estimate any improvement in results consequent upon the introduction of an orthoptic department into an ophthalmic out-patient department, the opportunity presented at Paddington Green Children's Hospital seemed too good to be allowed to pass. There the writer has been in charge of the ophthalmic department, devoted of course exclusively to children, since 1929; before him Mr. Maurice Whiting held the post, and many cases referred to here were in his charge first. The treatment of the squinting

children as applied by myself and my predecessor differed in no important particular, and may be described as consisting of :

- (a) Full correction of any refractive error (with rare exceptions).
- (b) Occlusion for suppression, or amblyopia.
- (c) Operation where deemed necessary.

There were thus present a large number of cases of squint available, treated by such methods only, for comparison.

In 1935 an orthoptic department was instituted, presided over by a medically unqualified certified orthoptist. Ever since then every single case of deviation has been referred to the department for examination and comment; moreover all old cases of recognised squint, whether apparently cured or not, were also referred to the Department, and a record kept. It is thus seen that the results of treatment with and without the help of an orthoptic department can be accurately compared. The age limit for attendance at the Hospital is twelve in the case of boys and fourteen in the case of girls; this rule is somewhat elastic in such departments as the ophthalmic, where no inconvenience is caused by the attendance of children a little older.

It is with apology that tables are introduced into these notes. At their best somewhat boring to peruse, and at their worst triumphantly indecipherable or meaningless, they usually mark the point where the reader gives up the effort and turns to the next article. It did seem, however, essential that some data should be presented in tabular form, so that the source of the deductions might be checked.

The first table simply gives an analysis of those cases which were available for consideration when it was decided to begin the investigation (Table I). The second, Table II, gives a detailed analysis of the cases appearing under heading AI in Table I; the third gives a similar analysis of cases which appear under heading AIII in Table I; and the fourth, Table IV, appears under the title "Results of Orthoptic Department" as the Orthoptic Assistant's estimate of the results achieved with the material available in the agreed time.

TABLE I

No. of cases seen, 124.

(a) Old cases with glasses ...	...	...	86
(b) New cases with glasses ..	...	...	33
(c) Cases with no glasses ...	...	...	5

TABLE I—*continued**A.I. Old cases, straight with glasses and needing no Orthoptic Treatment, 27.*

(a) Good stereopsis ...	...	...	...	7
(b) Partial stereopsis ...	...	...	...	14
(c) Good fusion ...	...	...	...	6

A.II. Old cases, straight with glasses but needing some Orthoptic Treatment, 8.

Amblyopia ...	...	...	...	4
No fusion ...	...	...	...	2
Weak fusion (headache) ...	...	...	...	1
No binocular vision ...	...	...	...	1

A.III. Old cases, not straight with glasses, having worn glasses at least six months, 51.

Amblyopia (all convergent) ...	...	...	...	18
Occasional (convergent 3, alternating convergent 1) ...	...	...	...	4

Constant.

- (a) *Normal retinal correspondence*, 15.
(convergent 10, alternating convergent 3,
divergent 1, alternating divergent 1)
- (b) *Abnormal retinal correspondence*, 14.
(convergent 9, alternating convergent 3,
divergent 2)

B. New cases with glasses which have never been worn before or have been worn less than six months, 33.

Amblyopia ...	...	...	...	...	10
Too young ...	...	...	...	...	4
Observation ...	...	...	...	...	19

C. Cases with no refractive error, 5.

Occasional squints ...	...	...	...	...	3
Exophoria ...	...	...	...	...	1
Divergent squint ...	...	...	...	...	1

VALUE OF ORTHOPTIC TRAINING

TABLE II
Cases cured with glasses

Serial No.	Age at first visit	Age at Onset	Nature of Squint	Worn	Angle on Synop.		Worth Lights		Binoc. Vision
					c. gls.	s. gls.	c. gls.	s. gls.	
12/35	7	Birth	RCCS	3 yrs.	0°	0°	4	4	S.V.
18/35	6	5 yrs.	RCCS	1 yr.	0°	+5°	4	5	Partial S.V.
21/35	15	? 5 yrs.	LCCS	11½ yrs.	0°	+5°	4	5	S.V.
22/35	10	?	LCCS	—	0°	0°	4	4	Partial S.V.
26/35	4½	3 yrs.	LCCS	1½ yrs.	0°	+3°	4	4	S.V.
27/35	7	6 yrs.	LCCS	6 mths.	0°	+5°	4	4	S.V.
32/35	8	?	ACCS	7 yrs.	0°	—	4	4-5	Partial S.V.
37/35	4	Birth	RDCS	3 yrs.	0°	0°	—	—	Good fusion
40/35	11	5-6 yrs.	RCCS	6 yrs.	0°	0°	4	4	Partial S.V.
43/35	5	4 yrs.	LCCS	1 yr.	0°	+7°	4	5	Partial S.V.
49/35	12	12 yrs.	RCCS	4 mths.	6°	—	4	5	Partial S.V.
53/35	6	9 mths.	LCCS	5 yrs. 3 mths.	0°	0°	4	4	Good fusion
56/35	12	2 yrs.	LCCS	8 yrs.	0°	+5°	4	4-5	Partial S.V.
57/35	6	9 mths.	LCCS	9 mths.	0°	+4°	?	?	Partial S.V.
64/36	8	9 mths.	LDCS	2½ yrs.	0°	0°	?	?	Partial S.V.
65/36	9¼	3 yrs.	RCCS	—	0°	0°	?	?	Good fusion
68/36	2	Birth	LCCS	6 mths.	+2°	—	?	?	Too young
73/36	8	? 2 yrs.	LCCS	1 yr.	0°	+6°	?	?	S.V.
89/36	7	7 yrs.	LCCS	5 mths.	0°	0°	?	?	S.V.
99/36	4½	12 mths.	RCCS	3 yrs.	0°	+5°	?	?	Good fusion
92/36	10	Birth	RCCS	7½ yrs.	0°	+4°	?	?	S.V.
103/36	8	5½ yrs.	RCCS	2 yrs.	0°	+6°	?	?	Good fusion
105/36	7	1½ yrs.	RCCS	6½ yrs.	0°	0°	?	?	Partial S.V.
121/36	5	3 yrs.	ACCS	2 yrs.	0°	0°	?	?	Partial S.V.
87/36	7	2 yrs.	RCCS	2 yrs.	0°	+6°	?	?	Partial S.V.
94/36	5	4 yrs.	RCCS	14 mths.	0°	—	?	?	Partial S.V.
123/36	8	3 yrs.	LCCS	5 yrs.	0°	0°	?	?	Partial S.V.

TABLE III
Cases not straight with glasses, when first seen
Amblyopias

Serial No.	Age at first Visit	Nature of Squint	Degree of Amblyopia	Age at Onset	Worn	Binocular Vision
19/35	4	LCCS	6/18	16 mths.	2½ yrs.	Suppression
9/35	12	RCCS	6/36	3 yrs. ?	9 yrs.	Suppression
66/36	3½	RCCS	6/36	3 yrs.	9 mths.	Suppression
116/36	6	RCCS	6/18	3 yrs.	2½ yrs.	Suppression
36/35	11	LCCS	6/60	14 mths.	7 yrs.	Suppression
39/35	4	RCCS	6/18	2½ yrs.	18 mths.	Suppression
62/35	5½	RCCS	6/60	3 yrs.	2 yrs.	Suppression
63/35	9	RCCS	6/36	5 yrs.	4 yrs.	Suppression
67/36	4½	LCCS	6/18	2 yrs.	4 yrs.	Suppression
48/35	10	LCCS	6/60	3 yrs.	6 yrs.	Suppression
69/36	7½	RCCS	6/24	2 yrs.	4½ yrs.	Suppression
10/35	3	LCCS	6/18	2 yrs.	1 yr.	Suppression
106/36	15	RCCS	6/18	2½ yrs.	12½ yrs.	Suppression
118/36	8	RCCS	6/60	4 yrs.	1 yr.	Suppression
38/36	8	RCCS	6/36	2½ yrs.	4½ yrs.	Suppression
4/35	9	LCCS	6/36	2½ yrs.	6½ yrs.	Suppression
34/35	9	RCCS	6/36 Nystagmus	2 yrs.	7 yrs.	Suppression
71/36	2½	LCCS	6/18	2 yrs.	10 mths.	Suppression

TABLE III—*continued*
Normal retinal correspondence

Serial No.	Age at first Visit	Nature of Squint	Degree of Amblyopia	Age at Onset	Worn	Binocular Vision
5/35	5	ADCS	—	3 yrs.	2 yrs.	Fusion - 5° *
1/35	6	LDCS	—	2-3 yrs.	18 mths.	Fusion - 8°
17/35	8	LCCS	—	4 yrs.	4 yrs.	Fusion + 10°
84/36	11	ACCS	—	Birth?	9 yrs.	No fusion + 10°
20/35	13	ACCS	—	7 yrs.	6 yrs.	No fusion + 20°
88/36	6	RCCS	—	3½ yrs.	3 yrs.	Fusion + 10° L/R
16/35	9½	RCCS	—	4 yrs.	4½ yrs.	Fusion + 10°
61/35	10½	LCCS	—	2½ yrs.	8 yrs.	No fusion + 15°
31/35	4½	LCCS	—	Birth	4 yrs.	No fusion + 5°
74/36	9	RCCS	—	10 mths.	8 yrs.	Fusion + 12°
11/35	3	LCCS	—	2 yrs.	1 yr.	Fusion + 10°
60/35	8½	RCCS	—	2 yrs.	6½ yrs.	No fusion + 15°
6/35	7	LCCS	—	6 mths.	6 yrs.	No fusion + 15°
72/36	3	LCCS	—	2 yrs.	1 yr.	No fusion + 10°
70/36	3	ACCS	—	18 mths.	14 mths.	No fusion + 20° L/R 8°

* Measured, with glasses, at first visit. Where fusion is present, the angle at which fusion occurs is given. Where no fusion is present, the angle of squint is given.

Abnormal retinal correspondence

Serial No	Age at first Visit	Nature of Squint	Degree of Amblyopia	Age at Onset	Worn	Angle of Squint with glasses
13/35	7	ACCS	—	2½ yrs.	4½ yrs.	+ 20°
15/35	4	LCCS	—	1 yr.	4 yrs.	+ 30°... + 40°
45/35	5	RCCS	—	9 mths.	3 yrs.	+ 15°
114/36	10	RCCS	6/36	3 yrs.	7 yrs.	Suppression + 10°
91/36	9	LCCS	—	4 yrs.	6 yrs.	+ 25°
119/36	6	ACCS	—	9 mths.	4 yrs.	+ 30°... + 40°
3/35	9½	LCCS	—	2½ yrs.	5 yrs.	+ 40°
120/36	4½	LDCS	—	Birth?	2½ yrs.	- 15°
28/35	6	ACCS	6/12	Birth?	18 mths.	+ 12°
59/35	2	ADCS	—	17 mths.	6 mths.	- 15°
125/36	14	RCCS	—	Birth	9 yrs.	+ 10°
7/35	5	RCCS	6/12	Birth	3 yrs.	+ 15°
90/36	11½	LCCS	—	2 yrs.	10 yrs.	+ 5°
33/35	6	LCCS	6/12	3 yrs.	3 yrs.	+ 7°

TABLE IV

Results of Orthoptic Department, March, 1937.

A.I. All these cases that it has been possible to keep under observation have remained steady or improved.

A.II. *Amblyopias.*

6/36, now discharged with good stereopsis.
6/36, now 6/9, partial stereopsis.
6/18, now 6/12, still having treatment.
6/24, has not since attended.

No fusion.

Discharged with stereopsis	...	1
Fusion	... ..	1
Refused as unsuitable	... ..	1
Will not attend	... ..	1

A.III. *Amblyopias.*

Discharged with stereopsis	...	6	(1 operation case)
Good fusion. partial stereopsis, synoptophore angle with glasses +5° or less	... ..	5	
Fusion, still having treatment	...	2	
Simultaneous perception, still having treatment	... ..	3	
Failure. 6/36 after five months	...	1	
Unsuitable. Nystagmus		1	

Occasional.

Discharged with stereopsis	...	4
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Constant (a) Normal retinal correspondence.

Discharged with stereopsis	...	9
(0° on Synoptophore $\bar{c}$ glasses, and 4 Worth lights)		
Fusion, less than +10° with glasses	...	2
Too young at present	... ..	2
Unable to attend	... ..	2

A.III. (b) *Abnormal retinal correspondence.*

Discharged with stereopsis	...	3	(2 operation cases)
Partial stereopsis, angle less than +3° with glasses	... ..	3	(1 operation case)
Treatment just started	... ..	3	+1 on fusion
Failure	... ..	1	
Too young	... ..	1	
Unable to attend	... ..	2	

TABLE IV—continued

B. *Amblyopias.*

Discharged with stereopsis	...	2
Less than +5°, good fusion, partial stereopsis	... ..	3
Fusion, still on treatment	... ..	1
Vision improving	... ..	3
Unable to attend	... ..	1
Too young	... ..	4
<i>Observation.</i>		
Improved on each visit, no treatment at present	... ..	7
Given treatment after observation	...	7
		Discharged S.V. 1
		Good fusion, less than +5° c gl. 6
Will not attend	... ..	5

C. *Cases with no glasses.*

Exophoria, needed no treatment	...	1
Occasional squints, needing no treatment	... ..	2
Divergent squint, too young	...	1
Occasional squint, discharged, with stereopsis	... ..	1

In assessing the results, thirty-three cases were at once eliminated as having been under observation for too short a time to justify their inclusion. Of the five cases for which no glasses were ordered, three appeared to have undergone spontaneous cure, one was cured by treatment and one was too young to be included. There remained eighty-six cases; the interesting fact emerges that of these twenty-seven were straight and possessed at least some degree of fusion, which together with the three mentioned above gives a total of thirty cases cured without orthoptic aid—just a third of the whole.

Fifty-nine cases are left, and of these eight were found to be straight but still in need of some treatment, while fifty-one were not straight. Three of the eight responded to orthoptic treatment and are classified as cures; the fifty-one are divided into amblyopias, occasional squinters, and constant squinters, in the proportion of 18:4:29. Six of the first category were cured by orthoptic treatment, one of these needing operation as well; all the four in the next class are described as being "discharged with stereoscopic vision," but whether they are to be classed as orthoptic cures is another matter. Unfortunately I cannot trace the individual records in order to see to how much treatment each

was submitted, but it would seem reasonable to doubt, considering that their squinting was only occasional, whether any treatment at all was needed, in which event they would fall into the category of "cured by glasses." It seemed fairer to omit them altogether in assessing the final results.

Twenty-nine cases remain, still constantly squinting. Fifteen of these had normal retinal correspondence and nine of this subclass responded to orthoptic treatment; fourteen had abnormal retinal correspondence and only three of these showed a successful response to treatment, two of them requiring operation as well.

The difficulty of appreciating the meaning of such a mass of information and figures provides the excuse for representing the results graphically; this has been done in Table V, where the information set out in the last three paragraphs may be reviewed at a glance. If some of the categories appear to be labelled in a rather cryptic manner, explanation will at once be found by referring to Tables I and II.

The term "cure" obviously demands some explanation. In the opinion of its parents a child is usually considered cured when the eyes are straight, more particularly if the glasses are also discarded; and while in a large number of cases such a state of affairs is certainly all the "cure" which is likely to be required, a somewhat higher standard must be set in a critical analysis such as this. All ophthalmic surgeons are familiar with the case which shows no deviation, even upon the instrument, and yet possesses no useful degree of fusion; all are equally familiar with the case which possesses stereoscopic vision when discharged from the department, only to show that such a faculty has been lost at a later date, with or without a return of deviation. It is therefore manifestly impossible to use the term "cure" in a strict sense; the term has been quoted from the records of the Orthoptic Department, and presumably means that the patient on discharge (or examination if no treatment were found necessary) showed no deviation and possessed a high degree of fusion at least. Since it is seen that cases even with good stereopsis may relapse, it is suggested that to aim at such a condition is to aim too high, and that in the majority of cases straight eyes with some degree of fusion may be regarded as no longer in need of treatment.

It remains to consider the actual results. The most important fact—though it may not be new—which emerges from a consideration of the figures is that one-third of ninety-one totally unselected cases of squint in young children achieved what is deemed a cure by orthoptic standards without the assistance of any measures except glasses and occlusion where necessary. Further orthoptic training succeeded in curing less than a half of cases, which, though straightened by these measures, were considered to be in need of training in the orthoptic department.

TABLE V

As for those cases which ordinary clinical methods had, up to the time under consideration, failed to straighten, one must remember that it is justifiable to assume that some of these would have come straight as time went on, and also on the other hand, that some of those whom orthoptic training had so far failed to cure would have done likewise under this more intense treatment. None the less, viewing the figures as they stand, one-third of the amblyopic patients were cured, one with the help of operation, while more than half of those with normal retinal correspondence responded to treatment, though from the nature of their disability it may be said that the majority of them would have achieved similar success if given a longer period without training. It is in the group with abnormal retinal correspondence that the greatest disappointment is encountered, for only three of fourteen such cases were cured by orthoptic training.

These conclusions are broad, and, in so far as some do not take into account such a fact, for instance, as that a certain number of the cases had had very little treatment, or that some were too young, are to a certain degree manifestly unfair. Further, it might be said that one was comparing the results of some years of general ophthalmic measures with those of a much shorter time of orthoptic treatment. But it is in the belief that many children are asked to spend far too much time in the orthoptic department and in travelling to and from it—that, in fact, a serious social and economic question is involved—that the conclusions as set forth are considered justifiable. Furthermore, the time periods are by no means compatible, for one has to consider to what extent in a given period calls are made on the patient's time. Periodical refraction, supervision and occlusion demands a visit to Hospital for a few minutes, every two months or so at most; when a patient is accepted in an orthoptic department it is often a matter of attending twice or three times a week, and of spending a much longer time at each visit.

It is suggested that a consideration of the foregoing facts justifies the following conclusions :—

1. A far greater proportion of squints than is generally supposed can be cured by glasses, and occlusion where necessary.
2. Only those cases in which such measures have failed should be submitted to orthoptic training.
3. Cases should be considered and selected for training not only on their clinical merits but also with due consideration for the end it is desired to achieve and for the justification for the means necessary to attain it.
4. The results of orthoptic training are far less dramatic and far less certain than they are held to be in some quarters, and

the descriptions of the value of such training, which have appeared in the medical press, have all erred on the side of optimism.

I tender my grateful thanks to Miss Margaret Weight who was in charge of the Department at Paddington Green Children's Hospital in its first years, and kindly prepared the data for this article.

THE USE OF SODIUM AND MERCURY VAPOUR LAMPS IN OPHTHALMOSCOPY

BY

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THE writer has been employing sodium and mercury vapour lamps in clinical work during the past two years, and the advantages of these have been referred to in two communications (Ballantyne, 1937).

The inducement to experiment with these selected lights was provided by the demonstration of various forms of discharge lamps during the visit of Members of the Ophthalmological Society to the Research Department of the G.E.C. at Wembley in the Spring of 1936, and the first lamps used were the laboratory pattern sodium and mercury lamps. These were somewhat expensive, and, in the case of the mercury lamp at least, the luminosity was somewhat low for purposes of ophthalmoscopy.

Subsequently, the "Osira" mercury vapour lamp and the "Philco" sodium vapour lamp, as used for street lighting, were obtained, and these were found to give more than ample illumination.

For convenience in consulting room use, Messrs. Curry and Paxton have, at the writer's suggestion, fitted these two tubes on a single standard, but it would be equally easy to fit either or both of them to an adjustable wall bracket.

The electrical current is taken from the mains supply through a choke coil, and in the standard pattern referred to, the two coils are enclosed in a cabinet on the base. A small shelf or table-top is provided at a convenient height and the switches are attached below this on the upright standard. The lamps are attached to the ends of two jointed arms, adjustable for height, and as the luminous area of the discharge tubes is unnecessarily large for ophthalmoscopy, each is enclosed in a light asbestos-lined metal chimney with a suitable aperture, provided with a gallery in which