A SURVEY OF ESOPHORIA AND CILIARY SPASM*

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It is with diffidence that I venture to write about ciliary spasm. Irregularities of the accommodative state seem to be on the increase and in some way connected with the post-war period, and patients are being referred in quite considerable numbers for orthoptic treatment.

I thought, therefore, that it might be interesting to illustrate several cases which have responded well to treatment.

Before discussing ciliary spasm in detail, there are one or two straightforward cases of esophoria and old accommodative squint that have received great relief as a result of treatment, and show rather clearly the different categories into which these particular forms of ocular muscle imbalance seem to be divided.

In the four groups shown in Table I we get quite a wide variation of the initial defect *i.e.*, esophoria.

TABLE I
ESOPHORIA

With normal divergence	Pseudo-esophoria	With divergence weakness
Esophoria associated with old accommodative squint		

1. *Esophoria with normal divergence*.—As is well known, this type of case is found to respond quickly to treatment and the amount of imbalance, though sometimes quite large, entirely disappears.

2. *Esophoria with divergence weakness*.—On the contrary, those in this group obtain relief from symptoms and are able to carry on their occupations successfully but owing to a divergence weakness a considerable amount of imbalance remains. Operation follows in these cases if the symptoms recur.

3. *Pseudo-esophoria*.—This is a state which is associated with

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ciliary spasm and will therefore be referred to in the second part of this paper. It is interesting to note, however, that the imbalance is very difficult to determine owing to the overaction of the ciliary muscle and the readings vary from day to day according to whether the accommodation is relaxed or working to excess. The variation can be as much as 10^{Δ} of esophoria or exophoria, and an examination on one or two consecutive days may be necessary before a decision can be made.

4. *Esophoria associated with old accommodative squint.*—In adults very severe symptoms can be experienced over a period of many years, and these can only be relieved by orthoptic treatment. The age factor is no great barrier providing binocular single vision is present, and the general health good. Dramatic changes in the

ESOPHORIA WITH NORMAL DIVERGENCE

Case 1. Age 62 years

Correction. R. + 1'25 D.sph., L. + 0'75 D.sph., Distance
R. + 3'75 D.sph., L. + 3'25 D.sph., Reading

	Before Treatment	After Treatment
Visual Acuity	R. 6/18, L. 6/18	R. 6/6, L. 6/6
B.V.A.	6/18, pt.	6/5
Worth's Lights	5	4
Maddox Rod	9^{Δ} esophoria	Orthophoric
Maddox Wing	3° esophoria	Orthophoric
Livingston Binocular Gauge	Convergence 12 cms. Accommodation 15 cms.	6 cms. 12 cms.
Synoptophore Angle ...	$+ 8^{\circ}$	$0/ + 4^{\circ}$
Fusion	$+ 4^{\circ}$	0°
Adduction	8°	35°
Abduction	3°	5°
Stereoscopic Vision ...	Poor	Good

Number of Treatments 6. All tests taken with distance glasses

well-being of these patients can be noted and they state that their lives have been completely changed as a result of restored muscle balance.

In illustration of these points the following cases which fall into the several categories previously outlined have been chosen. All have been re-examined after treatment at different periods up to 2½ years and only one has had to receive a further course.

CASE NO. 1. Aged 62 years.—This patient complained of having suffered from severe headaches and giddy attacks for the past ten years, and was found to have a considerable amount of esophoria which caused her to get diplopia occasionally when tired. Being a case with normal divergence the imbalance was completely eliminated by treatment, with relief of all symptoms.

CASE NO. 2. Aged 15 years.—This child was said "to squint at meal times" and complained of headaches and diplopia when

ESOPHORIA WITH DIVERGENCE WEAKNESS

Case 2. Age 15 years

Correction. Nil

	<i>Before Treatment</i>	<i>After Treatment</i>
Visual Acuity	R. 6/4, L. 6/4	R. 6/4, L. 6/4
B.V.A.	6/4	6/4
Worth's Lights	5	4
Maddox Rod	12 Δ esophoria	6 Δ esophoria
Maddox Wing	I-11	01-3
Livingston Binocular Gauge	Convergence 14 cms. Accommodation normal	6 cms. normal
Synoptophore Angle ...	+ 6°	+ 1°
Fusion	+ 4°	0°
Adduction	Nil	20°
Abduction	4°	6°
Stereoscopic Vision ...	Too much suppression	Good

Number of Treatments 20

tired. The esophoria lessened somewhat and the symptoms disappeared, but there was evidence of divergence weakness. She has since commenced to study medicine and there is every likelihood of further treatment being needed, and possibly an operation.

CASE NO. 3. Aged 51 years.—A history of squint from early childhood was given here, and severe symptoms such as blurred vision, occasional diplopia, and acute headaches, had been experienced for the past 15 years. The prisms were removed after the first twelve treatments and at the conclusion of the second course complete relief from symptoms had been established. It will be seen, however, that the amount of esophoria remained at 12 degrees. An examination after a lapse of $2\frac{1}{2}$ years found the patient quite comfortable and the measurements the same as at the last visit.

ESOPHORIA ASSOCIATED WITH OLD ACCOMMODATIVE SQUINT

Case 3. Age 51 years

Correction. R. $\frac{+1.0 \text{ D. sph.}}{+0.5 \text{ D. cyl.}}$ L. $\frac{+0.5 \text{ D. sph.}}{+0.25 \text{ D. cyl.}}$ 3 prism, B.O., E.E.
+ 2'0, added for reading

	Before Treatment	After Treatment
Visual Acuity	R. 6/5, L. 6/6	R. 6/5, L. 6/5
B.V.A.	6/5	6/5
Worth's Lights	5	4
Maddox Rod	20 Δ esophoria	12 Δ esophoria
Maddox Wing	3 $^{\circ}$ -11 esophoria	Orthophoric
Livingston Binocular Gauge	Convergence 12 cms. Accommodation 23 cms.	6 cms. 18 cms.
Synoptophore Angle	+ 15 $^{\circ}$	+ 4/8 $^{\circ}$
Fusion	+ 10 $^{\circ}$	0 $^{\circ}$
Adduction	15 $^{\circ}$	30 $^{\circ}$
Abduction	5 $^{\circ}$	10 $^{\circ}$
Stereoscopic Vision	Slow	Good

Number of Treatments 24. All tests taken with distance glasses

CASE No. 4. Aged 42 years.—Here again a history of squint from four years of age with similar symptoms over a period of many years culminating finally in inability to read for more than five minutes at a time. A marked convergence insufficiency was shown at first, but later, after the removal of the prisms and a reduction of the correction, the true esophoria was revealed and treatment as for accommodative squint reduced the angle of convergence from 15° to 3° without glasses with relief of symptoms. When communicating some months later with this patient he said he had been away on holiday and had read a detective book per day.

ESOPHORIA ASSOCIATED WITH ACCOMMODATIVE SQUINT

Case 4. Age 42 years

Correction. Was wearing R. $\begin{matrix} +3.75 \text{ D sph.} \\ +1.50 \text{ D cyl. } \nearrow 115^{\circ} \end{matrix}$ L. $\begin{matrix} +3.50 \text{ D sph.} \\ +1.75 \text{ D cyl. } \nearrow 65^{\circ} \\ 2 \text{ prism BOEE} \end{matrix}$
Was ordered R. $\begin{matrix} +2.0 \text{ D sph.} \\ +2.0 \text{ D cyl. } \nearrow 115^{\circ} \end{matrix}$ L. $\begin{matrix} +3.0 \text{ D sph.} \\ +1.50 \text{ D cyl. } \nearrow 65^{\circ} \end{matrix}$

	Before Treatment	After Treatment
Visual Acuity	R. 6/6, L. 6/4	R. 6/6, L. 6/5
B.V.A.	6/24	6/6
Worth's Lights	5	4
Maddox Rod	12^{Δ} esophoria	4^{Δ} esophoria
Maddox Wing	4° - 6° exophoria	01° - 3° esophoria
Livingston Binocular Gauge	Convergence 12 cms. Accommodation 18 cms.	6 cms. 13 cms.
Synoptophore Angle	$+15^{\circ}$	$+3^{\circ}$
Fusion	$+12^{\circ}$	$+1^{\circ}$
Adduction	5°	40°
Abduction	5°	5°
Stereoscopic Vision	Good	Good

Number of Treatments 24. All tests taken with distance glasses.

Ciliary spasm

This condition, which can be monocular or binocular, is referred to by Air Commodore Livingston in his paper in 1934 entitled "Heterophoria in Aviation" in which he tells us of "these complicated cases showing added spasm."

These under discussion have acquired a spasm for one reason or another, each one in a slightly different way and they fit into the various categories outlined in Table II.

TABLE II
CILIARY SPASM

Spasm with heterophoria, esophoria or exophoria	Spasm without muscle imbalance	Pseudo-esophoria
Monocular or Binocular		

It is surprising to find how many variations there are, and encouraging to realise what an immensely interesting and wide field they offer to orthoptists for treatment. That these patients in some instances suffer intensely there can be absolutely no doubt. On the other hand a young person in his teens can be suffering from a marked ciliary spasm of long standing and apart from noticing the blurring, of objects in the distance, can be otherwise completely ignorant of the fact.

The symptoms vary considerably, but amongst those complained of are :—

1. Blurred vision in the distance.
2. Rapid lowering of visual acuity.
3. Pain in the centre of the eyes.
4. Frontal headaches.
5. Sickness.
6. Tensing of ocular muscles generally.

At first it was thought best to rest the ciliary muscle by application of atropine before commencing orthoptic treatment, but latterly it has proved far more satisfactory to carry out both forms of treatment simultaneously. The reason for this is that if the spasm is of long standing and therefore a very strong habit an unconscious effort will be made by the patient to overcome the

atropine, and relaxing of the muscles generally by orthoptic treatment helps to counteract this. For the same reason it has been found more helpful to give $\frac{1}{2}$ per cent. atropine b.d. rather than 1 per cent. as patients themselves in the latter case have complained of the effects of the atropine wearing off towards the end of the day with the consequent return of symptoms and renewed blurring of vision.

Unless any discomfort or irritation is experienced, with the approval of the ophthalmic surgeon, atropine is continued for as long as four to five weeks according to the severity of the case and orthoptic treatment is given twice or three times a week.

Where patients hold appointments, naturally this method of treatment necessitates sick leave, but the attempt to relax the abnormal fluctuations which occur in a ciliary spasm cannot be carried out economically by orthoptic treatment alone.

The following results will, I hope, help to illustrate the various forms of spasm treated and I will return later to the methods of treatment we have used to restore the normal accommodative state.

Two cases have been chosen to show spasm with esophoria, one being a myope and the other a hypermetrope with a very small correction. Both were young women who had had ocular symptoms for many years and finally both were compelled to give up good appointments on account of their general health being affected.

CASE NO. 5. Aged 26 years.—This patient had suffered for six years from severe headaches and a gradual onset of blurred vision accompanied by attacks of vomiting lasting for several days.

Her visual acuity deteriorated starting in July, 1939, as R. 6/9 L. 6/5. December, 1941, R. 6/9 L. 6/12. January, 1944, R. 6/36 L. 6/36.

Maddox Rod 8 Δ esophoria and Maddox Wing 11—13 esophoria in glasses.

The binocular visual acuity at the commencement of orthoptic treatment in August, 1944, was 6/24 with glasses. This was restored to 6/9pt. after 24 treatments with complete relief of symptoms there being no further attacks of vomiting after the spasm had started to relax.

However, after a period of 2 $\frac{1}{2}$ years the patient felt a slight tendency to return to the old habit of ocular tension and on examination it was found that the B.V.A. was 6/12. However, after a further course of treatment this was rectified. The cause of this relapse was thought to be due to a serious shock with the expected temporary setback to general health.

CILIARY SPASM WITH ESOPHORIA

Case 5. Age 24 years

Correction. R. $\frac{-5.00 \text{ D sph.}}{-1.00 \text{ D cyl. } \searrow 90^\circ}$ L. $\frac{-4.50 \text{ D sph.}}{-1.00 \text{ D cyl. } \swarrow 90^\circ}$

	Before Treatment	After Treatment
Visual Acuity	R. 6/24, L. 6/24	R. 6/12, L. 6/12
B.V.A.	6/24	6/9 pt.
Worth's Lights	5	4
Maddox Rod	8 Δ esophoria	6 Δ esophoria
Maddox Wing	11°-13 esophoria	3°-5 esophoria
Livingston Binocular Gauge	Convergence 10 cms. Accommodation 16 cms.	6 cms. 13 cms.
Synoptophore	+ 5°	0/+2°
Fusion	0°	0°
Adduction	30°	30°
Abduction	5°	7°
Stereoscopic Vision ...	Good	Good

Number of Treatments 36. All tests taken with glasses.

CASE NO. 6. Aged 26 years.—The history here revealed a tendency towards headaches for several years and the patient said she was often told at school that "her eyes were looking queer." Because she never felt very comfortable when reading, on volunteering for national service at 18 years she joined the Women's Land Army to avoid close work.

After several years' service she unfortunately met with an accident and fractured the base of her skull, and this precipitated acute ocular symptoms with occasional diplopia at the end of the day.

She was subsequently referred to an orthoptic clinic and found to have full ocular movements but 17° of esophoria.

She received 12 orthoptic treatments without relief and no reduction in the imbalance, although every effort was made to help her and her co-operation was excellent.

The surgeon decided that operation was not indicated at that stage but if no improvement occurred during the next 18 months he would reconsider the case.

In the meantime the patient was referred to me for investigation. I discussed the condition very fully with my colleague and we both agreed that there was some further problem yet to be discovered. This finally proved to be a ciliary spasm and by the time I saw the patient the vision had started to deteriorate to 6/18, either eye and binocularly.

Atropine was given together with treatment and the vision improved and the symptoms almost disappeared, the convergence angle being reduced from 20 degrees to 0 degrees as the result of the relaxing of the spasm.

Atropine was discontinued after a period of four weeks and very great care was taken to ensure that the patient completely understood how to relax her eyes and the importance of guarding against the possible return of the spasm.

CILIARY SPASM WITH ESOPHORIA

Case 6. Age 26 years

Correction Nil

	<i>Before Treatment</i>	<i>After Treatment</i>
Visual Acuity	R. 6/18, L. 6/18	R. 6/5, L. 6/5
B.V.A.	6/18	6/5
Worth's Lights	5	4
Maddox Rod	22 Δ esophoria	9 Δ esophoria
Maddox Wing	5 $^{\circ}$ -11 esophoria	3 $^{\circ}$ -9 esophoria
Livingston Binocular Gauge	Convergence 6 cms. Accommodation 6 cms.	6 cms. 12 cms.
Synoptophore	+10/20 after atropine 0	0/ + 4
Fusion	+10 $^{\circ}$ after atropine 0 $^{\circ}$	0 $^{\circ}$
Adduction	20 $^{\circ}$	35 $^{\circ}$
Abduction	3 $^{\circ}$	5 $^{\circ}$
Stereoscopic Vision ...	Poor	Good

Number of Treatments 36.

She suffered acutely when learning to adduct and converge and frequently had attacks of vomiting after treatment.

The importance of helping the patient to persevere through these difficult phases of the treatment cannot be too strongly stressed and providing the health is normal in every other respect, orthoptic treatment should not be discontinued until they are overcome. In almost every case the same difficulties occur when trying to develop convergence without the return of the overaction of the ciliary muscle.

The effort to converge causes a very real disturbance which results either in nausea or in actual vomiting and one learns the necessity to watch the colour of one's patient and limit the time and method of treatment accordingly.

CILIARY SPASM WITH EXOPHORIA

Case 7. Age 17 years

Correction. R. $-8^{\circ}0$ D. Sph. L. $-8^{\circ}0$ D. Sph.
 $-0^{\circ}50$ D. Cyl. $\angle 60^{\circ}$

	Before Treatment	After Treatment
Visual Acuity with glasses	R. 6/18, L. 6/18	R. 6/9, L. 6/9
Without glasses ...	R. 6/36, L. 6/36	R. 6/18, L. 6/18
B.V.A. with glasses ...	6/9 pt.	6/6 pt.
Without glasses ...	6/36	6/18 pt.
Worth's Lights ...	5 crossed	4
Maddox Rod ...	4 Δ exophoria	1 Δ exophoria
Maddox Wing ...	18 Δ exophoria	6 $^{\circ}$ - 8 exophoria
Livingston ...	Convergence 14 cms.	6 cms.
Binocular Gauge ...	Accommodation 6 cms.	12 cms.
Synoptophore ...	-5° later -10°	0/ - 2°
Fusion ...	-4°	2° -
Adduction ...	5°	40°
Abduction ...	8°	10°
Stereoscopic Vision ...	Good	Good

Number of Treatments 30.

All tests taken with glasses.

CASE NO. 7. Aged 17 years.—Here the spasm was slight, in fact only just commencing, and no symptoms at all were complained of in spite of a quite considerable amount of exophoria.

However, no attempt was made at first to reduce the exophoria but rather to relax the muscles, thereby revealing a further amount of imbalance, but at the same time restoring the visual acuity to normal. After reaching this stage the treatment proceeded as in the usual way for exophoria, observing closely for any return of the spasm on adduction and convergence. No atropine was used in this instance.

CASE NO. 8. Age 51 years.—We now come to a most interesting type of spasm, *i.e.*, that without any muscle imbalance of which only two cases have been referred for treatment, one having a binocular spasm and one a monocular. The first patient had been ill for some months and had suffered recently from alopecia areata.

CILIARY SPASM WITHOUT MUSCLE IMBALANCE

Case 8. Age 51 years

Correction. R. +1.75 D. Sph. L. +1.75 D. Sph.

	<i>Before Treatment</i>	<i>After Treatment</i>
Visual Acuity	R. 6/60, L. 6/60	R. 6/6, L. 6/6
B.V.A.	6/60	6/5
Worth's Lights	4	4
Maddox Rod	2 ^Δ esophoria	orthophoric
Maddox Wing	orthophoric	orthophoric
Livingston Binocular Gauge	Convergence 16 cms. Accommodation 10 cms.	6 cms. 19 cms.
Synoptophore Angle ...	0°	0°
Fusion	0°	0°
Adduction	20°	30°
Abduction	4°	6°
Stereoscopic Vision ...	Poor	Good

Number of Treatments 15. All tests taken without glasses.

She had had a long period of convalescence and came complaining of "going blind" saying that her vision had failed during the last four days. She also said that she had been compelled to hold her book nearer and nearer to her eyes.

As will be seen she could only see 6/60 E.E. and binocularly and, as was to be expected, was in a highly emotional state. She had rather poor stereoscopic vision, considerable suppression on the synoptophore, but otherwise showed no imbalance. The real trouble was detected when testing the accommodation on the Livingston Binocular Gauge which with and without glasses was 10 cms. instead of 19-20 cms. at the age of 51.

Atropine was prescribed and on account of the age of the patient, this was carried out under the personal supervision of the ophthalmic surgeon. It was discontinued after 12 days as the visual acuity had recovered to 6/9 and orthoptic treatment was given to strengthen the stereoscopic vision and relax the remaining spasm and thus restore visual acuity to 6/5 and the accommodation to 19 cms.

The patient made a rapid recovery to good health and has not had any return of the trouble.

CASE No. 9. Age 14½ years.—The second case in this group which shows a monocular spasm, was quite different in that there were no symptoms complained of, merely the fact that the vision was "poor" in one eye.

Here we find the spasm tending to lessen over a period of time, rather than increase, as in most instances.

From the orthoptic point of view there was little to account for the condition except that the stereoscopic vision was very poorly developed indeed and there was marked suppression of the right eye with poor convergence.

The variation in the refraction, however, is of great interest as in 1944, the R.E. vision was corrected from 6/18 to 6/5 with R.E. -2.0 D. Sph. L. plane; 1945, the correction was reduced to -1.0 D. Sph.; 1946, the correction appeared to be the same, the vision being improved from 6/36 to 6/6 in glasses.

In all these previous instances, atropine had been given for three days prior to refraction.

In August, 1946, it was decided to continue atropine for fourteen days and the correction then accepted was R. + 0.5 D. Sph., L. + 0.5 D. Sph.

Atropine was continued for a further fourteen days, glasses were discarded and the right eye vision improved from 6/36 to 6/6 after twelve treatments.

This patient has now returned to school and will be seen at half

term to check the vision as we do not know as yet how well she will be able to stand up to close work.

It would seem that some patients suffering from ciliary spasm accept a myopic correction and to a certain extent are comfortable and, for a time, able to see better.

Sooner or later, however, the spasm increases, the symptoms become more acute and finally the glasses are no help.

CILIARY SPASM WITHOUT MUSCLE IMBALANCE

Case 9, Age 14½ years

Correction. April 1944, R. -2'0 D. Sph. Left Plane.

August 1946, R. +0'50 D. Sph., L. +0'50. D. Sph. After atropine for 14 days.

	<i>Before Treatment</i>	<i>After Treatment</i>
Visual Acuity with glasses	R. 6/5, L. 6/5	—
Without glasses ...	R. 6/36. L. 6/5	R. 6/6, L. 6/5
B.V.A. without glasses ...	—	6/5
Worth's Lights ...	4	4
Maddox Rod ...	orthophoric	orthophoric
Maddox Wing ...	orthophoric	orthophoric
Livingston Binocular Gauge	Convergence 6 cms. Accommodation 8 cms.	6 cms. 13 cms.
Synoptophore ...	0°	0°
Fusion ...	0°	0°
Adduction...	4°	20°
Abduction ...	2°	6°
Stereoscopic Vision ...	Very poor	Improved

Number of Treatments 12. To continue. All tests taken without glasses.

CASE No. 10. Age 15½ years.—This condition often calls for atropine, as usually there is exophoria present although esophoric readings on the Maddox Rod and Wing may be recorded.

In this particular case it will be seen that the reading on the

Maddox Rod was orthophoric, the Wing 5-9 esophoric and Worth's Lights 5 homonymous.

After atropine the Maddox Rod showed 7^{Δ} exophoria, the Wing orthophoria, and the synoptophore varied from $+5$ degrees to -12 .

Another case not illustrated here showed 10^{Δ} of exophoria and -5° on the synoptophore on one day and on the following day 8^{Δ} of esophoria and $+10/15$ on the synoptophore. These abnormal fluctuations lasted until atropine was given and the exophoria revealed was 10^{Δ} .

PSEUDO-ESOPHORIA

Case 10. Age $15\frac{1}{2}$ years

Correction. R. $+4.25$ D. Sph. L. $+5.5$ D. Sph.
 -1.25 D. Cyl. -1.75 D. Cyl.

	Before Treatment	After Treatment
Visual Acuity with glasses	R. 6/6 pt. L. 6/6 pt.	R. 6/5, L. 6/5
Without glasses ...	R. 6/12 L. 6/12	R. 6/9, L. 6/9
B.V.A. with glasses ...	6/5	6/4
Without glasses ...	6/9 pt.	6/6
Worth's Lights ...	5 homonymous	4
Maddox Rod ...	Orthophoric. After atropine 7^{Δ} exophoria	7^{Δ} exophoria
Maddox Wing ...	5° - esophoria. After atropine orthophoric	orthophoric
Livingston Binocular Gauge	Convergence 6 cms. Accommodation 10 cms.	6 cms. 12 cms.
Synoptophore ...	$+2^{\circ}$ - 10 after atropine	0°
Fusion ...	0°	0°
Adduction ...	10°	28°
Abduction ...	4°	10°
Stereoscopic Vision ...	Good	Good

Number of Treatments 18. Still continuing. All tests taken with glasses.

Diagnosis

The history reveals repeated efforts to clear the print when reading finally resulting in the necessity to hold the book nearer and nearer to the eyes.

Sickness and giddiness accompany these extreme efforts causing an acute emotional state on account of the loss of vision.

General muscle tension, not only of the ocular muscles, adds to the aggravation.

In spasm the ciliary muscle is contracted causing excess accommodation. This state gives rise to the following indications.

1. Variable visual acuity with and without glasses.
2. Blurred vision in the distance.
3. Distant vision sometimes cleared by concave lenses.
4. Near point focus.
5. All usual signs of myopia.
6. Evidence on the synoptophore, *i.e.*, blurring, suppression, variable angle.
7. Readings on all tests vary from day to day.
8. The reading on the Livingston Binocular Gauge when testing accommodation are usually far in excess of the normal.
9. The resolving of all these states after the application of atropine.

Treatment

There are very few new ideas, if any, in the treatment of these cases, but, as previously mentioned, there is a considerable emotional element present and marked muscle tension generally, and the whole basis of the treatment is relaxation.

It might be argued that atropine does this for the patient but in many cases the brain is so accustomed to the bad habit that it makes every effort to overcome the effect of the atropine, and it is here that the orthoptist can be of greatest assistance in helping the patient to know what his eyes are doing, and by learning to relax, gradually place them in a position of rest.

In the final stages of treatment a very high standard is aimed at in the effort to restore the accommodative mechanism to normal and in doing so the smallest slides are used, and finally when teaching adduction the smallest Maddox fusion slide has to be mastered to at least 25-30 degrees.

Comparison between these figures and those required for a cure in convergence insufficiency would be unfavourable, and it must be remembered that the tendency for the ciliary muscle to overact again requires long and patient handling before a cure is obtained.

Summary

In conclusion, I think it is wise to assume that we are, as yet, only on the threshold of this extremely interesting application of orthoptic treatment and much will be revealed as time goes on.

The most important factor to stress is the necessity of testing the accommodation both binocularly and monocularly in patients of all ages and types excluding those actually suffering from strabismus.

CONTACT LENSES IN EXCELSIS*

BY

ALLAN H. BRIGGS

LINCOLN

IN 1938 I was consulted by a young man aged 22 years, who was anxious to join the Civil Air Guard. He had been rejected on several occasions at various centres owing to the fact that he was rather highly myopic. He was extremely interested in flying, and very keen to learn, but his myopia had proved an insuperable obstacle. He was anxious to know of any form of treatment, operative or otherwise, which might overcome his difficulty; and the only possible course I had to suggest was contact lenses. He was very willing to bear the expense and to try the experiment and I accordingly placed him in touch with the contact lens centre. His visual acuity was: R.V. c—8.0 D.sph. and—1.0 D.cyl. axis $170^{\circ} = 6/6$. L.V. c—4.0 D.sph. and—2.0 D.cyl. axis $170^{\circ} = 6/5$.

I heard later that he had been successfully fitted with contact lenses and had presented himself for medical examination again, without divulging that he was wearing contact lenses, and had been passed without their presence being suspected.

I lost touch with him during the war period, but was able to establish contact with him again recently after he had been demobilised. I was anxious to learn what had transpired, and I do not think I can do better than quote his letter to me: "... Briefly I enlisted in the R.A.F. in a ground trade in February, 1940, but transferred to flying duties during the following year. I had the usual medical examination, and was posted to Canada and America for training as a pilot. My lenses were not detected either at this medical Board, or at two subsequent Boards I had in America and upon my return to England. The American Board carried out

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