USE OF MIOTICS IN SQUINT SURGERY*

BY

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AFTER operations for convergent squint, a comparatively frequent result is that the eyes are straight for distance, but on attempting near vision, the squint reappears. It happens even after a full recession of both medial recti and after the fullest possible spectacle correction. This residual accommodational squint proves a great handicap to the full restoration of binocular single vision and any treatment to obviate it would be welcome.

The use of atropine in such cases is widespread, with the hope that paralysis of accommodation will reduce convergence. Unfortunately, atropine does not paralyse the will to accommodate. With the eyes atropinized the effort involved in attempting to obtain a clear image (frontal accommodation reflex) can cause a vicious overconvergence. We have often witnessed this unfortunate result when the child is playing with a toy or attempting to read a "get-well-quick" card. Atropine is also unsuitable in such cases because so much of the post-operative orthoptic training, especially bar reading, requires clarity of near vision.

It would seem therefore that the opposite effect upon accommodation would be of more use. Would pilocarpine, setting the accommodation for near without any voluntary effort, control this accommodational squint residue? Its use is not new, for Javal (1896) advised a young lady with a squint to use it when attending a wedding. More recently, Abraham (1949, 1952) has described the use of miotics in squints and some of the ill effects of the prolonged use of di-isopropyl fluorophosphonate, including the formation of intra-epithelial cysts of the iris.

In our recent investigations, pilocarpine was used as an aid to the post-operative orthoptic training of cases that still showed a convergence for near, although for distance the eyes were straight or almost so. It was found necessary to instil the 1 per cent. drops into both eyes three times a day, and the treatment was started on the second or third day after operation as at no time were the eyes padded. Usually this was done for 4 weeks, followed by drops twice daily for 2 weeks and then once daily for a further 2 weeks. This routine was varied according to the progress of the case.

In successful cases, the beneficial effects were quick and dramatic. Cases that showed binocular single vision for near but with a marked tendency to break down to a convergent squint were immediately controlled as were several that were frankly convergent squints for near.

The Figure (opposite) shows this effect of pilocarpine, which assists post-operative orthoptic training.

The Table (overleaf) reports the progress of the first nine cases so treated. These results show that success depends on two factors. First, good binocular

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(A) Looking at near object 7 days after bilateral guarded tenotomy of medial recti.

(B) Looking at near object 48 hours later, after instillation of pilocarpine.

**Figure.**—Male, aged 7 years, Case 4 in Table, had had bilateral recession medial recti (5 mm.) one year before.

Vision with fusion and fairly good stereopsis are essential for a successful result and pilocarpine will produce no miracles when these are lacking; only a temporary reduction in the angle of squint while the drops are being used can be expected. Secondly, the residual angle of squint must not be too large, but rather as expected, there is no definite limiting angle. The failure of pilocarpine to control the residual angle can be used as a yardstick in deciding on further surgery. Even a small reduction in the Maddox wing reading may allow the squint to be controlled.

**Case 9, a girl aged 7 years,** had a left convergent squint, first noticed at 4 years old.

**Visual acuity.**—Right eye: 6/9 with 3 D sph., 0·5 D cyl. 90°; Left eye: 6/7·5 with 2·5 D sph.

**Pre-operative Instrument Readings.**—
- Maddox Rod: with glasses Eso 6; without glasses Eso 30.
- Maddox Wing: with glasses Eso 23; without glasses Eso 36.
- Bilateral Visual Acuity: with glasses 6/9; without glasses alternating convergent strabismus.
- Bar Reading: with and without glasses—convergent squint.
- Synoptophore: with glasses +10°; without glasses +20°, with full stereopsis.

**Operation.**—Bilateral recession of both medial recti (5 mm.)

**Post-operative Instrument Readings.**—
- Maddox Rod: with glasses Eso 6; without glasses Eso 21.
- Maddox Wing: with glasses Eso 11; without glasses Eso 21.
- Bar Reading: with and without glasses—convergent squint.
- Bilateral Visual Acuity: with glasses 6/9; without glasses convergent squint.

**Treatment.**—Pilocarpine 1 per cent. drops three times daily for one month, then twice
JOHN WHITWELL AND AUDREY PRESTON

### TABLE

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Sex</th>
<th>Age (yrs)</th>
<th>State of Binocular Vision</th>
<th>Cover Test (post-operative)</th>
<th>Angle of Deviation (post-operative)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>With glasses</td>
<td>Without glasses</td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>12</td>
<td>Full stereopsis</td>
<td>Alternating convergent strabismus, Binocular single vision with effort</td>
<td>Rod Eso 2</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>7</td>
<td>Full stereopsis</td>
<td>Alternating convergent strabismus, Binocular single vision with effort</td>
<td>Rod Eso 5</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>8</td>
<td>Full stereopsis</td>
<td>Right convergent strabismus, Binocular single vision with effort</td>
<td>Rod Eso 2</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>7</td>
<td>Fusion, some stereopsis</td>
<td>Left convergent strabismus near and distance</td>
<td>Rod Eso 6</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>8</td>
<td>Good stereopsis</td>
<td>Dist: latent convergence, moderate recovery, Near: latent convergence with slow recovery</td>
<td>Rod Eso 10</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>4</td>
<td>Weak fusion</td>
<td>Left convergent strabismus near and distance</td>
<td>Rod Eso 10</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>7</td>
<td>Weak stereopsis</td>
<td>Left convergent strabismus near and distance</td>
<td>Rod Eso 10</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>6</td>
<td>Weak stereopsis</td>
<td>Same</td>
<td>Rod Eso 6</td>
</tr>
<tr>
<td>9</td>
<td>F</td>
<td>7</td>
<td>Full stereopsis</td>
<td>Alternating convergent strabismus</td>
<td>Rod Eso 6</td>
</tr>
</tbody>
</table>

Daily for 2 weeks, then daily for 2 weeks. During this time, the patient was encouraged to leave off glasses for distance and was given bar reading exercises, without glasses where possible. This was continued for one month after the miotic was stopped.

**Final Instrument Readings.**

* Maddox Rod: with glasses Eso 3; without glasses Eso 9.
* Maddox Wing: with glasses Eso 3; without glasses Eso 9.
* Bilateral Visual Acuity: with glasses 6/7·5; without glasses 6/7·5
* Bar Reading: N.6.
* Synoptophore Angle: with glasses 0°; without glasses +5°.

The cover test showed a slight latent convergence for near and distance without glasses. She was instructed to use her glasses for reading only.

As yet, no control series has been investigated, and it could well be argued that orthoptic training would eventually give these cases full binocular single vision at all distances. It is submitted, however, that a result as shown in
**MIOTICS IN SQUINT SURGERY**

—PROGRESS IN NINE CASES

<table>
<thead>
<tr>
<th>Cover Test (under pilocarpine)</th>
<th>Angle of Deviation (under pilocarpine)</th>
<th>Final Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>With glasses</td>
<td>Without glasses</td>
<td>With glasses</td>
</tr>
<tr>
<td>Nothing abnormal detected</td>
<td>Latent convergence with slow recovery</td>
<td>+3</td>
</tr>
<tr>
<td>Nothing abnormal detected near and distance</td>
<td>Left convergent strabismus in extreme convergence only</td>
<td>+3</td>
</tr>
<tr>
<td>Dist: Nothing abnormal detected. Near: latent convergence with good recovery</td>
<td>Right convergent strabismus extreme convergence only</td>
<td>-1</td>
</tr>
<tr>
<td>Dist: nothing abnormal detected. Near: left convergent strabismus. Binocular single vision with effort</td>
<td>Left convergent strabismus. Binocular single vision</td>
<td>+5</td>
</tr>
<tr>
<td>Dist: nothing abnormal detected. Near: latent convergence. Good recovery</td>
<td>Latent convergence, moderate recovery</td>
<td>+4</td>
</tr>
<tr>
<td>Dist: nothing abnormal detected. Near: left convergent strabismus. Binocular single vision.</td>
<td>Left convergent strabismus near and distance</td>
<td>+3</td>
</tr>
<tr>
<td>Dist: latent convergence. Near: left convergent strabismus</td>
<td>Left convergent strabismus</td>
<td>-7</td>
</tr>
<tr>
<td>Dist: mostly Binocular single vision. Near: right convergent strabismus</td>
<td>Alternating convergent strabismus near and distance</td>
<td>+5</td>
</tr>
<tr>
<td>Dist: nothing abnormal detected. Near: latent convergence, good recovery</td>
<td>Alternating convergent strabismus, latent convergence with effort</td>
<td>+3</td>
</tr>
</tbody>
</table>

the photograph will be of great assistance to the orthoptist, and will probably shorten the training period. It might help some cases to escape further surgery.

**Summary**

The use of pilocarpine drops in the post-operative treatment of squints with a residual convergence for near is described. Success can be expected only when good stereoscopic vision is present.

This investigation was carried out at the Highgate Annexe of the Moorfields, Westminster and Central Eye Hospital. We wish to thank the consultant surgeons of that hospital for their co-operation.

**REFERENCES**


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