8 mm Bimedial rectus recession in infantile esotropia of 80–90 prism dioptres

Alexandros G Damanakis, Panagos G Arvanitis, Ioannis D Ladas, George P Theodossiadis

Abstract
Sixteen patients with large angle infantile esotropia with deviations of 80–90 prism dioptres were operated at the age of about 2 years. All patients underwent 8 mm bilateral medial rectus recessions. At the last follow up examination, 6 to 48 months postoperatively (average 16·3 months), successful horizontal alignment was achieved in 12 patients (75%). Four patients (25%) were undercorrected. Clinically significant limitation of adduction or convergence was not observed postoperatively in any of the patients. Consecutive exotropia was not encountered in this series but a longer follow up is probably needed in order to assess its delayed appearance. These results suggest that 8 mm recession of the medial recti is an effective procedure for the correction of large angle infantile esotropia of 80–90 prism dioptres and can be considered as an acceptable alternative to operations on three or four muscles.

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Unilateral recession of the medial rectus combined with resection of the lateral rectus or bilateral recession of the medial recti have been traditionally used in the surgical treatment of infantile esotropia. In deviations exceeding 50 prism dioptres, operations on three or four muscles have been used. In recent years there has been a tendency towards the bilateral recession of the medial recti. In large angle infantile esotropia, a number of authors propose augmented recessions of the medial recti instead of operating on three or four muscles. In the past, large recessions of the medial rectus of more than 6 mm were avoided for fear of producing adduction deficits. The safety and efficacy of the 7 mm recession has already been proved, and some have proposed even larger recessions.

The purpose of this paper is to report the results we obtained after performing 8 mm recessions of the medial recti in patients with large angle infantile esotropia with deviations of 80 to 90 prism dioptres.

Results
All patients included in this study had preoperative deviations 80 to 90 prism dioptres and underwent 8 mm recessions of the medial recti. At the last postoperative follow up visit 12 patients (75%) had ocular alignment between orthotropia and prism dioptres of esotropia (Table 1). By comparing the first and the last postoperative examination, we did not observe any tendency towards exodeviation or convergence, of clinically significant amount, was not observed in any of the patients. The ability of the eyes to adduct was estimated by observing the relative position of the corneal light reflexes in primary position and lateroversions.

Four patients classified as failures were undercorrected. Two of them underwent additional surgery consisting of bilateral resection of the lateral recti at the sixth and eighth postoperative month respectively and were successfully aligned.

Discussion
The traditional maximum 5 mm recession of the medial recti is insufficient in correcting infantile esotropias with deviations greater than 50 prism dioptres. The success rate increases if resection...
Table 1 Results of 8 mm bilateral medial rectus recession

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age at surgery (months)</th>
<th>Preoperative deviation (prism dioptres)</th>
<th>Refractive error (D)</th>
<th>Last postoperative examination</th>
<th>Follow-up (months)</th>
<th>Associated preoperative findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32</td>
<td>80</td>
<td>+2.0</td>
<td>ortho</td>
<td>22</td>
<td>DVD</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>90</td>
<td>+4.0</td>
<td>ortho</td>
<td>6</td>
<td>Inferior oblique overaction</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
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<td>+3.0</td>
<td>ortho</td>
<td>4</td>
<td>Inferior oblique overaction</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>80</td>
<td>plano</td>
<td>ortho</td>
<td>6</td>
<td>DVD</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>80</td>
<td>plano</td>
<td>10 ET</td>
<td>6</td>
<td>Inferior oblique overaction</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>80</td>
<td>+2.25</td>
<td>8 ET</td>
<td>22</td>
<td>DVD</td>
</tr>
<tr>
<td>7</td>
<td>18</td>
<td>90</td>
<td>+2.0</td>
<td>30 ET</td>
<td>9</td>
<td>DVD</td>
</tr>
<tr>
<td>8</td>
<td>36</td>
<td>80</td>
<td>plano</td>
<td>ortho</td>
<td>6</td>
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</tr>
<tr>
<td>9</td>
<td>24</td>
<td>80</td>
<td>plano</td>
<td>25 ET</td>
<td>18</td>
<td>Inferior oblique overaction</td>
</tr>
<tr>
<td>10</td>
<td>38</td>
<td>85</td>
<td>+0.25</td>
<td>10 ET</td>
<td>6</td>
<td>Inferior oblique overaction</td>
</tr>
<tr>
<td>11</td>
<td>38</td>
<td>90</td>
<td>-3.50</td>
<td>50 ET</td>
<td>48*</td>
<td>Severe limitation of abduction, head turn with fixation in extreme adduction</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>80</td>
<td>+2.0</td>
<td>ortho</td>
<td>6</td>
<td>DVD</td>
</tr>
<tr>
<td>13</td>
<td>24</td>
<td>80</td>
<td>+2.0</td>
<td>25 ET</td>
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<tr>
<td>14</td>
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<td>10 ET</td>
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<tr>
<td>16</td>
<td>30</td>
<td>85</td>
<td>+0.5</td>
<td>ortho</td>
<td>18</td>
<td>Inferior oblique overaction</td>
</tr>
</tbody>
</table>

ET = Esotropia.  
DVD = Dissociated vertical deviation.  
*Successful alignment (10 prism dioptres ET) after second operation (8 mm bilateral lateral rectus resection) performed 6 months after initial operation.  
†Successful alignment (orthotropia) after second operation (5 mm bilateral lateral rectus resection) performed 8 months after initial operation.

of one or both lateral recti is added. Scott et al.\(^9\) reported a success rate of 64-5% in 48 esotropes with preoperative deviations of 50 or more, operating on three or four muscles. Lee and Dyer\(^11\) obtained a 61% success rate by performing bilateral medial rectus resections and bilateral lateral rectus recessions in congenital esotropes with deviations in excess of 50 prism dioptres.  

In recent years several authors have advocated that bimedial rectus recessions in excess of the traditional 5 mm can be used for the correction of large angle infantile esotropia. Mittelman and Folk,\(^12\) and more recently Biedner et al.\(^13\) have presented favourable results following recession of the medial rectus 13-5 mm from the limbus for undercorrected esotropia. Hess and Calhoun\(^1\) were early proponents of bimedial rectus recessions in excess of the traditional 5 mm in patients with large angle esotropia. They reported 30 patients ranging in age from 5 months to 12 years, with an average age of 4 years, who underwent graded bimedial rectus recessions of 6 to 8 mm. Eighty four per cent of the patients in the 6 mm group (average preoperative deviation 57 prism dioptres) and 60% in the 7 mm group (average preoperative deviation 78 prism dioptres) were within 10 prism dioptres of orthophoria following the initial procedure. The one patient who had 8 mm recessions for an esotropia of 90 prism dioptres was undercorrected. Prieto-Diaz\(^4\) reported an 80% success rate in early esotropia with bilateral limitation of abduction, performing bimedial rectus recessions from 6 to 8 mm. In this study the amount of recession was determined by the angle of deviation and the amount of the torticollis caused by the fixation in addiction. However, the preoperative deviation in this series is not mentioned. Szmyd et al.\(^4\) reported a 91% success rate using 6 to 7 mm recessions in 45 patients with infantile esotropia and deviations exceeding 50 prism dioptres. Judgment of final alignment was made 6 weeks postoperatively, with an average follow up of 13 months. Nelson et al.\(^6\) reported an 83.5% success rate in 97 congenital esotropes with deviations greater than 50 prism dioptres, performing bimedial recessions of 6 and 7 mm. Judgement of final alignment was made at the last follow up examination, 6 to 61 months (average 23-4 months) postoperatively. Finally, Weakley et al.\(^6\) performed 7 mm bilateral medial rectus recessions in 36 patients with large angle infantile esotropia averaging 74 prism dioptrees. Successful horizontal alignment with the initial procedure, when measured at the most recent follow up examination (average 18-2 months postoperatively), was achieved in 75% of the patients. An observation made by all the above authors advocating large bimedial recessions, was that exceeding the traditional maximum recession of the medial rectus does not produce clinically significant limitation of adduction or convergence.  

We have been using bimedial recessions in the surgical management of infantile esotropia for the last 12 years, being satisfied with the results concerning the horizontal alignment and the absence of late overcorrections, or significant limitation of adduction postoperatively. Initially, we did not exceed 7 mm, but because our failures were predominantly undercorrection – especially in the very large angles – in the last 4 years we have increased our maximum numbers to 8 mm for deviations of 80 prism dioptres or greater. Reviewing our records we found 16 patients who underwent 8 mm recessions for deviations of 80-90 prism dioptres. Successful horizontal alignment at the most recent follow up examination (6 to 48 months postoperatively) was achieved in 12 patients (75%). The four patients (25%) who were not successfully aligned were undercorrected. The fear of producing adduction or convergence deficits when such extra large recessions are used is not justified. Our results and the results of others showed that such a problem does not exist when very large recessions are performed for the correction of infantile esotropia. Beisner\(^1\) has shown by mathematical analysis that an 8 mm recession will result in only a 10%
loss in torque when the eye is adducted 15
degrees. Coupling this mathematical analysis
with length tension diagrams, Beisner hypothe-
sised that gross underactions of muscles exces-
sively recessed are due primarily to a marked
decrease in the force of contraction rather than a
marked loss in mechanical advantage. Clinical
signs commonly found in infantile esotropia,
especially when the deviation is very large
(limitation of abduction, excessive adduction,
fixation in adduction) indicate an existing tight-
ness (primary or secondary) of the medial recti.
Such taut muscles probably can sustain greater
recessions without losing their ability to contract
normally. We feel that the medial recti in infant-
tile esotropia behave in a way quite similar to the
superior recti in dissociated vertical deviation,
where extremely large recessions of these
muscles do not produce any significant limitation
of elevation.\(^5\)

Many surgeons do not perform extra large
recessions of the medial recti because of the fear
of consecutive exotropia. Recently, Stager and
Weakley\(^6\) reported a 20% incidence of delayed
consecutive exotropia in their patients who have
undergone 7 mm bilateral medial rectus reces-
sions. Consecutive exotropia developed after a
average of 23 months after the initial surgery.
Of special interest is the fact that the incidence of
consecutive exotropia differed according to the
age at which the initial operation was performed.
Those operated on at 4–6 months of age had a
larger incidence (33%), while those operated on
at or after 9 months of age had a lower incidence
(14%).

Consecutive exotropia did not develop in any
of our patients. By comparing the first and the
last postoperative examination we did not observe
any tendency towards exodeviation. A high
incidence of delayed consecutive exotropia
does not seem very possible and this view is
further supported by the results reported by
Stager and Weakley, who found a low incidence
(14%) of consecutive exotropia in the patients
operated on at the older age group (9 months).
In our series the patients were much older at the
time of surgery, ranging from 18 to 38 months
(average 26.6 months). Nevertheless, a longer
follow up is probably needed in order to assess
the incidence of delayed consecutive exotropia.
Our results suggest that performing 8 mm
bilateral medial rectus recessions in infantile
esotropia is an effective procedure for the correc-
tion of the horizontal deviation when it measures
80 to 90 prism dioptries. The facts that, in this
series, we did not encounter adduction deficits
and that the failures were undercorrections, gives
some evidence that the 8 mm bimedial recession
may not be the maximum number that can be
used for the correction of extra large deviations in
infantile esotropia.

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