

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

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### 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<sup>1-6</sup> 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,<sup>2-7</sup> and some have proposed even larger recessions.<sup>3,4,8</sup>

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.

### Patients and methods

The records of 165 patients who underwent surgery for infantile esotropia by one of the authors (AGD) were reviewed. Sixteen patients met the criteria for inclusion in this study, which were as follows: (1) esotropia documented by an ophthalmologist before the sixth month of age; (2) alternation of fixation; (3) preoperative deviation of 80 to 90 prism dioptres treated with 8 mm bilateral medial rectus recession; and (4) more than 6 months' postoperative follow up. Age at

surgery ranged from 18 to 38 months, with a mean of 26.6 months (in 10 of the 16 patients age at operation was less than 2 years).

Since the measurement of the deviation at distance is usually not possible in the first years of life, we measured the preoperative and postoperative angle at near using alternate cover test and accommodative targets. In a few patients in whom the cover test could not be used accurately, the angle was estimated by the Krimsky method. The accommodative component was excluded preoperatively with cycloplegic refraction with the use of cyclopentolate 1% and full correction of any hypermetropic error greater than +2.0D.

All patients underwent a bilateral 8 mm medial rectus recession using a limbal incision. The recession was measured from the muscle insertion and the muscle was sutured directly on the sclera. The intermuscular membrane and the check ligaments were lysed in the course of the procedure. The conjunctiva was not recessed. In patients on whom inferior oblique overaction was noted preoperatively, myectomy of these muscles was performed during the same operation.

The mean postoperative follow up interval was 16.3 months, ranging from 6 to 48 months.

### 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 that could be possibly considered as a warning for late overcorrection. Postoperative limitation of adduction 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.

The 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.<sup>9,10</sup> The success rate increases if resection

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Table 1 Results of 8 mm bilateral medial rectus recession

Patient	Age at surgery (months)	Preoperative deviation (prism dioptres)	Refractive error (D)	Last postoperative examination	Follow up (months)	Associated preoperative findings
1	32	80	+2.0	ortho	22	DVD Inferior oblique overaction
2	19	90	+4.0	ortho	8	
3	23	80	+1.0	10 ET	8	Inferior oblique overaction
4	24	80	plano	ortho	6	Inferior oblique overaction
5	19	80	plano	10 ET	6	DVD
6	19	80	+2.25	8 ET	22	
7	18	90	+2.0	30 ET	9	DVD
8	36	80	plano	ortho	6	Inferior oblique overaction
9	24	80	plano	25 ET	18	
10	38	85	+0.25 +1.25	10 ET	6	Inferior oblique overaction
11	38	90	-3.50 -7.0	50 ET	48*	Severe limitation of abduction, head turn with fixation in extreme adduction DVD
12	24	80	+2.0	ortho	24	
13	24	80	+2.0	25 ET	17†	
14	23	80	plano	ortho	6	Inferior oblique overaction
15	36	80	+2.5, +3.5	10 ET	25	
16	30	85	+0.5	ortho	30	DVD Inferior oblique overaction

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*<sup>10</sup> 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<sup>11</sup> obtained a 61% success rate by performing bilateral medial rectus recessions and bilateral lateral rectus resections 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. Mittleman and Folk,<sup>12</sup> and more recently Biedner *et al*<sup>13</sup> have presented favourable results following re-recession of the medial rectus 13.5 mm from the limbus for undercorrected esotropia. Hess and Calhoun<sup>3</sup> 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<sup>4</sup> 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 adduction. However, the preoperative deviation in this series is not mentioned. Szymd *et al*<sup>2</sup> 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*<sup>5</sup> 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. Judgment of final alignment was made at the last follow up examination, 6 to 61 months (average 23.4 months) postoperatively. Finally, Weakley *et al*<sup>6</sup> performed 7 mm bilateral medial rectus recessions in 36 patients with large angle infantile esotropia averaging 74 prism dioptres. 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<sup>14</sup> 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 hypothesised that gross underactions of muscles excessively 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 tightness (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 infantile 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.<sup>15</sup>

Many surgeons do not perform extra large recessions of the medial recti because of the fear of consecutive exotropia. Recently, Stager and Weakley<sup>16</sup> reported a 20% incidence of delayed consecutive exotropia in their patients who have undergone 7 mm bilateral medial rectus recessions. Consecutive exotropia developed after an 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 correction of the horizontal deviation when it measures 80 to 90 prism dioptres. 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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