

# Large bimedial rectus recessions in congenital esotropia

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**SUMMARY** The success rate of large (6 and 7 mm) bimedial rectus recessions in 45 congenital esotropes with deviations of 50 prism dioptres or greater was found to be 91%. Judgment of final alignment was made six weeks postoperatively, with an average follow-up of 13 months. Large bimedial rectus recessions are an effective surgical treatment for congenital esotropia. This procedure does not significantly alter adduction, and leaves other muscles available should further surgery be necessary. These findings show that initial surgery on three or more muscles is unnecessary in congenital esotropia.

The management of congenital esotropia has long been a topic of controversy, not only concerning when to operate but also as to the best surgical approach. Success rates ranging from 40 to 80% have been described with a variety of surgical techniques.<sup>1-8</sup> This paper shows that bimedial rectus recessions in excess of the traditional 5 mm have a high success rate in the management of the congenital esotropie with a deviation of 50 prism dioptres or greater.

## Materials and methods

The records of 218 patients with congenital esotropia who underwent surgery at the Wills Eye Hospital between 1979 and 1983 were reviewed. Forty-five patients met the criteria for inclusion in this study, which were as follows: (1) esotropia documented by one of the authors before 6 months of age, (2) pre-operative deviation of 50 prism dioptres or greater, (3) alternation of fixation, (4) correction of hyperopic refractive errors greater than 2 dioptres with spectacles, (5) age at operation less than 2 years, (6) no overt evidence of central nervous system abnormalities or organic eye disease, and (7) follow-up of six weeks or more. Deviations were evaluated by the Hirschberg or Krimsky methods, or by the prism and cover test at distance when possible. Cycloplegic refraction with 1% cyclopentolate and in some cases 1% atropine was performed in all cases.

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All patients underwent bimedial rectus recessions of 6 or 7 mm by the Parks cul-de-sac approach. For this study an alignment within 10 prism dioptres of orthophoria at six weeks postoperatively was considered a success.

## Results

Thirty-seven patients had deviations in the 50 to 65 prism dioptre range and underwent bimedial rectus recessions of 6 mm. The remaining eight patients had deviations in excess of 70 prism dioptres and had bimedial rectus recessions of 7 mm. The average deviation in the 6 mm group was 59.7 prism dioptres of esotropia, and the average for the 7 mm group was 76.9 prism dioptres. Refractive errors ranged from -1.50 to +4.50 dioptres (average +1.26 dioptres) for the 6 mm group, and plano to +2.50 dioptres (average +1.38 dioptres) for the 7 mm group (Tables 1-3).

Of the 37 patients who underwent 6 mm recessions 33 (89%) were considered successful at six weeks, whereas all eight patients (100%) in the 7 mm group were successful. Overall 91% of both groups combined were successful. In addition no clinically significant limitation of convergence or adduction was noted in any of the patients.

For this report the final surgical result was judged at six weeks, with follow-up ranging from two months to four and a half years and averaging 13 months. Two children (4.4%), one in the 6 mm and one in the 7 mm group, required second operations for esotropia at 10 and 28 months after the first surgery

Table 1 Results of 6 mm bimedral rectus recessions

Patient	Age at surgery (mos).	Preop. deviation ( $\Delta$ )	Refractive error (D)	6-Wk. postop. alignment	Follow-up (mos).	Comments
1	8	65	+2.50	S*	42	Developed accommodative ET
2	9	60	+1.75	S	7	
3	18	55	+1.50	S	3	
4	19	55	+2.50	S	10	
5	24	55	plano	S	24	
6	7	60	plano	S	10	
7	12	55	+1.50	S	24	
8	7	55	+3.00	S	12	
9	5	65	+2.00	S	3	
10	9	55	+2.25	S	6	
11	17	65	+1.50	S	48	Redeveloped ET 10 mos. postop. → Reoperation
12	18	55	-1.50	S	6	
13	14	65	+0.75	S	8	
14	7	65	+0.50	S	12	Developed accommodative ET
15	24	65	+1.00	S	9	
16	7	55	+1.75	S	12	
17	16	60	+0.50	S	10	
18	12	55	+4.50	S	2	
19	6	55	+1.50	S	4	
20	15	65	+1.00	S	6	
21	22	55	+1.50	S	12	Developed accommodative ET
22	5	60	-0.25	S	17	
23	24	65	+1.50	S	2	
24	23	55	plano	S	36	
25	9	55	+0.50	S	3	
26	18	60	+0.25	S	6	
27	8	55	+2.75	S	12	
28	20	75	+2.50	S	7	Developed accommodative ET
29	11	65	+0.50	S	26	
30	5	55	+3.00	ET=30	18	LR resections 8 mos. later MR recessed 20 mos. later LR resections 12 mos. later
31	11	65	-1.25	ET=20	12	
32	8	55	+2.50	S	3	
33	5	65	plano	ET=35	12	MR recessed 4 mos. later
34	7	65	+1.50	ET=25	12	LR resections 3 mos. later
35	11	65	plano	S	3	
36	16	55	+1.25	S	3	
37	6	55	+2.00	S	2	

\*Successful alignment (ET $\leq$ 10 $\Delta$ ).

respectively. Five children (11%) redeveloped esotropia that was corrected with hyperopic spectacles. The esotropia redeveloped from three to 36 months after surgery, with an average of 13 months. Refractive errors ranged from +0.50 to +2.50 dioptres in this group, with an average of 1.9 dioptres of hyperopia. None of the patients in this study developed a consecutive exotropia.

### Discussion

A variety of surgical techniques for the correction of congenital esotropia have been described. Two basic 'schools' have emerged as to the type of surgical procedure, those advocating uniform surgery and those who prefer a selective approach. Proponents of uniform surgery advocate step-wise surgery, the first operation being symmetrical bimedral rectus

recessions or a medial rectus recession combined with a lateral rectus resection on the non-fixating eye. Further surgery, either bilateral rectus resections or a medial rectus recession and lateral rectus resection on the fellow eye, is performed as necessary. A successful operation is generally accepted as one which results with an alignment within 10 prism dioptres of orthophoria.<sup>1-5,7,9</sup> The success rate for the uniform approach after one operation was 50% in the series of Ing and co-workers<sup>1</sup> and 42% in von Noorden's series.<sup>2</sup> Helveston and colleagues<sup>3</sup> initially reported a 72% success rate by his augmented recession technique, consisting of a graded bimedral rectus recession (maximum recession of 5.5 mm) with the measurement carried out from the limbus. This was combined with recession of the conjunctiva and Tenon's capsule. More recently they described an approximately 80% success rate using this technique.<sup>4</sup>

Table 2 Results of 7 mm bimedral rectus recessions

Patient	Age at surgery (mos).	Preop. deviation ( $\Delta$ )	Refractive error (D)	6-Wk. postop. alignment	Follow-up (mos).	Comments
1	6	75	+2.00	S*	2	
2	8	80	+1.50	S	3	
3	7	75	+0.50	S	54	
4	9	75	+2.50	S	30	Developed accommodative ET
5	8	75	plano	S	48	Developed ET 28 mos. postop. → Reoperation
6	8	75	+2.50	S	7	
7	6	75	+1.00	S	3	
8	6	85	+1.00	S	4	

\*Successful alignment (ET $\leq$ 10 $\Delta$ ).

Table 3 Summary of clinical data

	Bimedral rectus recessions	
	6 mm group	7 mm group
Average deviation	59.7 $\Delta$	76.9 $\Delta$
Average refraction	+1.26D	+1.38D
Success rate	33/37 (89%)	8/8 (100%)
Average follow-up	12 mos.	19 mos.
Reoperation rate	1/37 (2.7%)	1/8 (12.5%)

A selective approach has also been suggested, with surgery on two to four of the horizontal rectus muscles, depending on the size of the deviation. Foster and co-workers<sup>5</sup> described a 79% success rate with one operation using this approach. Lee and Dyer<sup>6</sup> recently recommended that bimedral rectus recessions and bilateral rectus resections be performed in congenital esotropes with a deviation in excess of 50 dioptres. The eyes of 61% of their patients were straight after one operation.

Other authors have suggested bimedral rectus recessions in excess of the traditional 5 mm in patients with large angle esotropia. Hess and Calhoun<sup>9</sup> reported on 30 patients ranging in age from 5 months to 12 years (with an average age of 4 years) with large angle esotropia who underwent graded bimedral rectus recessions of 6 to 8 mm. 84% of the patients in the 6 mm group and 60% in the 7 mm group were within 10 prism dioptres of orthophoria with the initial procedure, whereas the one patient who had 8 mm recessions was undercorrected.

The results of the present study corroborate the experience of Prieto-Diaz,<sup>7</sup> who was an early advocate of large bimedral rectus recessions for congenital esotropia. Slightly over 80% of his 85 patients had successful realignment which remained stable over a three-year follow-up period. These results are similar to those of Rodriguez-Vazquez,<sup>8</sup> who also reported a success rate of approximately 80%. In spite of the large recessions performed, both adduction and convergence were not affected significantly in either of these studies.

We considered the alignment at six weeks postoperatively to represent the final surgical result in this study. Helveston *et al.*<sup>3</sup> used the six-week postoperative alignment as the final surgical result for statistical purposes in analysing his augmented recession technique. Parks<sup>10</sup> reoperates on patients who have residual esotropia angles of 15 prism dioptres or more at six weeks postoperatively.

Recently Bateman and co-workers<sup>11</sup> utilised computer based discriminant analysis to study the results of congenital esotropia surgery. They discovered that the preoperative deviation, amount of medial rectus recession, and the interval between the onset of the esotropia and surgery were all statistically significant predictive variables for the surgical outcome six weeks postoperatively. In addition they found that only the postoperative deviation at six weeks was predictive of the long-term deviation, with a minimum follow-up of six months in their series.

Freeley and co-workers<sup>12</sup> recently reported on a group of patients with congenital esotropia who were surgically aligned prior to 18 months of age. They found that 28% of these patients later redeveloped esotropia, with an average time of onset at 14 months postoperatively. 78% of this group were corrected with hyperopic spectacles. Five patients (11%) in the current study fell into this category, and the eyes of all were straightened with glasses. Therefore a significant number of patients with congenital esotropia who are surgically corrected may redevelop a convergent deviation which can be successfully treated with even a mild hyperopic correction.

The bimedral recession approach is preferred by those who favour symmetrical surgery. Recessions are technically easier than resections, thus requiring less anaesthesia time.<sup>9</sup> Because the tendon rather than muscle is severed in recessions, there is less tendency toward bleeding. Bimedral rectus recessions also leave the lateral rectus muscles untouched should further surgery be necessary.

Contrary to the selective approach for large angle congenital esotropia and from a study of our findings,

we consider that initial surgery on three or more muscles is not indicated.

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