

Convergence excess esotropia treated surgically with fadenoperation and medial rectus muscle recessions

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Abstract

Convergence excess esotropia has been treated with bifocals, miotics, medial rectus recession(s), fadenoperation, or a combination of these. However, comparatively few studies on the sensory status of these patients exist. We present the sensory findings in 31 children treated surgically. Twenty-one had fadenoperations combined with bimedial rectus recessions, one had a fadenoperation alone, and nine had augmented bimedial rectus recessions. Five children (16%) achieved bifoveal fusion, 22 (71%) had varying degrees of peripheral fusion, and four (13%) had no detectable binocularity after a mean post-operative follow-up of 2.4 years.

Convergence excess esotropia is characterised by normal binocular single vision for distance (with glasses if required) but esotropia on accommodation for near fixation. Its traditional treatment has been with bifocals¹ and occasionally miotics. However, doubts have been raised about the appropriateness of long term treatment by either of these methods.²

The results with conventional surgery, namely unilateral or bilateral medial rectus recessions, have been mixed, while the use of the posterior fixation suture alone or in conjunction with conventional surgical techniques is accepted as an alternative. We review the sensory findings in 31 consecutive cases of convergence excess esotropia after primary surgical treatment.

Patients and methods

Thirty-one cases of convergence excess esotropia were treated surgically over a five-year period. None had been previously treated with miotics or bifocals. Twenty-one children had bilateral medial rectus recessions combined with posterior fixation sutures placed as far posteriorly as the intraconal fat pad would allow (12-14 mm from the original insertion). 1 mm of medial rectus recession was performed for each 3 prism dioptres of distance angle measured. Two

posterior fixation sutures (PFS) were placed in each medial rectus muscle (the superior and inferior sutures incorporating approximately the superior and inferior one-fourths of the muscle respectively) with 5:0 Dacron. One patient was treated with posterior fixation sutures (fadenoperation) alone. Nine cases had bilateral symmetrical augmented medial rectus recessions where 1 mm of recession was performed for each 3 prism dioptres of near angle up to a maximum of 6.5 mm of recession per eye. Our aim was to reduce the near deviation to less than 10 prism dioptres (PD) so that suppression might be reduced or eliminated and the potential for fusion facilitated. Tables 1 and 2 compare the sizes of the near angles preoperatively with the most recently measured deviations and outline the most recent sensory status of all 31 patients.

Results

Thirty-one cases of convergence excess esotropia were assessed (17 males, 14 females). Their mean age when first seen was 3.7 years (range 1.5 to 6.8 years). Their mean age at surgery was 5.7 years (range 2.5 to 9.0 years), while their mean age at most recent assessment was 8.1 years (range 5.0 years to 15.0 years). The child who had posterior fixation sutures alone had a near angle of 30 prism dioptres. Five of 22 children who had posterior fixation sutures required further surgery, with resultant satisfactory realignment. Two had been initially overcorrected, while three were initially undercorrected.

There was a significant overall reduction in the size of the near deviation postoperatively, most cases being phoric or with a residual small angle manifest squint (Table I). In many cases a microtropia was noted for near with the 4-dioptre prism test. There was a significant improvement in binocularity and in stereoacuity postoperatively in 21 children (68%) (Table I). In eight cases (26%) (Table II) cosmesis was improved without a noticeable improvement in binocularity. Binocularity was lost in two children, though cosmesis was satisfactory. There were no cases of convergence weakness and no intraocular complications post-operatively. Lateral incomitance, while common, was not marked or symptomatic in any of our patients following fadenoperation.

Discussion

Despite having binocular single vision for distance fixation, children with convergence excess esotropia are not infrequently difficult to treat and results are often disappointing. Miotics were reported to be ineffective.² Moreover, they have numerous side effects, some of which may

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TABLE I Preoperative near deviation (prism dioptres), postoperative alignment, and stereoacuity in 21 patients with improved binocular status after surgery

	Fadenoperation plus recession group (21 cases)	Bilateral recession group (5 cases)
Age at surgery (years)	5.7 (range 2.5 to 9.0)	6.8 (range 5.5 to 7.8)
Age at end of follow-up	8.1 (range 5.0 to 12.0)	9.6 (range 8.0 to 15.0)
Preop. near deviation (PD)	35.6 (range 25 to >45)	32.0 (range 25 to >45)
Postop. near stereoacuity (arc ^o)	≤60° 4 cases >60°-≤140° 7 cases >140°-≤800° 5 cases	≤60° 1 case >60° ≤140° 3 cases >140° ≤800° 1 case
Present near alignment of each patient	12 E; 1X** 3 microtropia	5 E

*E=esophoria. **X=exophoria.

TABLE II Preoperative near deviation (prism dioptres) and postoperative alignment in 10 patients, with little change (8 cases) or apparent deterioration (2 cases) in postoperative binocular status

	Fadenoperation plus recession group (5 cases)	Bilateral recession group (4 cases)	Fadenoperation (1 case)
Age at surgery (years)	5.1 (range 4.5 to 6.5)	5.8 (range 3.1 to 9.0)	4.0
Age at end of follow-up	7.2 (range 6.0 to 9.1)	8.1 (range 3.1 to 9.8)	6.0
Preop. near deviation (PD)	40 (range 30 to 45)	31 (range 20 to 40)	30
Postop. near stereoacuity (arc°)	2 small PFR [*] 3 no BSV [†]	2 small PFR 200°, 400°	Small PFR
Present near alignment	3 E‡, 2 ET [§]	1 E, 1 X, 2 ET	1 E

*PFR=Prism fusion range. †BSV=binocular single vision. ‡E=esophoria. §ET=esotropia. ||X=exophoria.

be severe.³ The traditional treatment, more especially in the United States of America, has been with bifocals,¹⁴ but little information is available on the sensory findings in such patients and the efficacy of this therapy in comparison with other methods.^{2,4,5} Indeed, correct fitting of bifocal and compliance with their wear is often less satisfactory in active children than in adults.

Von Noorden *et al* evaluated bifocals in 84 children.⁴ Twelve (14%) patients were able to fuse without bifocals at the end of therapy; in 19 (22%) the bifocal power could be reduced. Thirty-nine (46%) remained dependent on bifocals, and in 14 (17%) fusion had deteriorated in spite of therapy. Tillson and Pratt-Johnson² suggested that bifocals were ineffective even in compliant patients in preventing the eye from turning in at all near distances. In their series of 120 children surgery (bimedial rectus recessions) was performed only if children had a distance esotropia greater than 10 prism dioptres. They noted that the sensory results in those prescribed bifocals were comparable with those treated surgically. Only 9% of those treated with bifocals or surgery achieved bifoveal binocular single vision for near (<60° arc) and distance, while 76% achieved peripheral fusion. The children in our study differed in that none had a documented distance esotropia, and a different surgical procedure was employed. Only five cases (16%) achieved bifoveal binocular single vision for near and distance (four of 21 cases of posterior fixation sutures with medial rectus muscle recessions; one of nine cases of bilateral medial rectus muscle recessions), while 22 (71%) cases achieved variable stereopsis. In two cases (6%) binocular potential was lost despite cosmetically satisfactory alignment.

Conventional muscle surgery techniques have been used to treat convergence excess esotropia with mixed success.⁶⁻⁸ Kushner *et al*,⁹ believing that conventional recessions were associated with frequent undercorrections, conducted a prospective study of 46 patients with partially accommodative esotropia with a high AC/A ratio. One group had bilateral medial rectus recessions with posterior fixation sutures, while the other group had augmented bilateral medial rectus recessions. Their data suggested that better postoperative alignment was achieved by the latter procedure. Reynolds and Hiles¹⁰ used a variety of procedures in conjunction with the posterior fixation suture. Most of their bifocal wearers could discard their glasses, but further details on sensory findings were not published.

There are a number of conflicting reports on the variability in the postoperative deviation following either posterior fixation suture alone or

in combination with medial rectus muscle recessions.¹¹⁻¹³ Kushner *et al*⁹ noted that three of 21 patients with combined bilateral medial rectus muscle recessions and posterior fixation sutures were overcorrected, while some were significantly undercorrected. In our series five of 21 cases required reoperation, with satisfactory realignment. None of our patients suffered vision threatening intraocular complications after a mean postoperative follow-up of 2.4 years. Lyons *et al*¹⁴ have recently retrospectively reviewed 100 fadenoperations and affirmed the relative safety of the procedure.

The traditional treatment of convergence excess esotropia (high AC/A ratio) in children has been with bifocals. We used the posterior fixation suture, bilateral medial rectus recessions, or a combination of these as a primary therapy. The results of postoperative alignment and stereoacuity compare favourably with those previously published. We believe that the posterior fixation suture is an effective primary treatment of convergence excess esotropia when compared with the known advantages and disadvantages of existing therapeutic methods.^{14,15}

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