European Journal of Ophthalmology / Vol. 13 no. 5, 2003 / pp. 415-423

Visual performance after congenital nystagmus surgery using extended hang back recession of the four horizontal rectus muscles

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PURPOSE. To evaluate the results of surgical correction of congenital nystagmus based on the use of extensive recessions of the four horizontal rectus muscles. The outcome of this procedure in terms of visual performance of the patients has been analyzed in follow-ups of at least 1 year.

METHODS. Surgery was performed on 42 patients. An extended retroequatorial recession of the four horizontal rectus muscles was performed between 13 and 15 mm from the muscle insertion with hang back sutures in every case. Preoperatively, all cases showed either a horizontal pendular (4 cases) or jerk nystagmus (38 cases).

RESULTS. After surgery, all cases showed full preservation of ductions in all gaze positions. Torticollis decreased in all cases. Binocular best-corrected vision improved in 19 (45.2%) patients and in the remaining 23 (54.8%) it remained unchanged. Consecutive exotropia was observed postoperatively in 7 patients. A second surgical procedure was performed in 9 cases (21.4%) and a botulinum injection in 3 cases (7%). All cases of diplopia resolved. Patient satisfaction was high in 38 cases (96%).

CONCLUSIONS. Extended recession of horizontal rectus muscles using hang back sutures offers a good option for the surgical correction of sensorial and neuromuscular nystagmus, providing improvement in binocular best-corrected vision in 45% of the patients (21.4% more than 0.2 logMar units), a high satisfaction rate, and few associated complications. In patients with low vision this can be considered a success that may improve quality of life. (Eur J Ophthalmol 2003; 13: 415-23)

KEY WORDS. Nystagmus surgery, Hang back sutures

Accepted: February 5, 2003

INTRODUCTION

Nystagmus, defined as rhythmic and oscillatory involuntary and usually bilateral movements of the eyes, is a challenge for clinicians and researchers of ocular motility. The clinical study of nystagmus allows us to recognize by electrooculography up to 45 different types of nystagmus (1). Its pathophysiology is unclear and alternatives to its correction have included multiple options of limited results.

The goal of surgical correction of nystagmus is to decrease the eye movements. This leads to an improvement of binocular best-corrected visual acuity (BCVA) and to a decrease in complications associat-

 1120-6721/415-09$04.50/0

ed with nystagmus, such as torticollis, in some cases. Other alternatives to surgery, such as orthoptic and pleoptic treatments, that would lead the patient to a voluntary control of nystagmus have also been proposed (2) but are of limited value. Treatment of nystagmus with prisms has failed as patients developed strabismus, in some cases, due to the constant convergence stress and lack of any significant permanent effect on nystagmus (3). Contact lenses seem to improve the visual acuity of these patients and to decrease the amplitude of the movements, owing to an improvement of eye fixation (4).

Reduced best-corrected vision is almost constant in nystagmus and one of the aims of correction is to improve best-corrected vision. In many cases it is difficult to ascertain to what extent amblyopia is due to nystagmic movements or whether nystagmus is caused by poor vision. Sensorial factors such as albinism and the frequent association of nystagmus with high ametropia or with complex neurologic syndromes are other issues related to the low vision of these patients.

Traditionally, surgical alternatives to the correction of nystagmus have addressed the detection of a blockade position of gaze in which the frequency or intensity of the movements decreases. This gaze position is frequently associated with a compensatory torticollis and improvement in binocular vision. Those cases in which surgical approaches have been used to bring the blockade position to primary position of sight or to widen it, to decrease nystagmus and improve visual acuity, or those associated with improving cosmetic results are to be considered a step forward in this surgery. Anderson (5) and Kestembaum (6) were the pioneers in the proposal of a systematic surgical approach to correct the anomalous positions of the head with the goal of moving the blockade position to the primary position, decreasing the severity of nystagmus (7).

The classical limits established by Parks (8) for strabismus surgery were initially suggested for nystagmus surgery. Short recessions of medial recti (under 5 mm) and resections of lateral recti (under 8 mm) of each eye were combined to move the null zone to the primary position associated with a high degree of hypocorrection (9). Extended resection/recession techniques from 30% to 40% over classic guidelines for severe torticollis were associated with ductional deficits in the field of action of the recessed muscles (10).The technique based on extensive recessions of horizontal rectus for surgical correction of jerk nystagmus was originally invented by Bietti and Bagolini in 1960 (11) and revisited by Limon (Surgical treatment of nystagmus. Presented at the First Congress on Practical Management of Nystagmus and Strabismus; General Hospital Manuel Gea Gonzalez; México City; November 5-7, 1986) and Limon and Bernardelli in 1989 (12). It was popularized by Von Noorden and Sprunger (13) in 1991 and in the same year another article by Helveston et al (14) appeared on the same subject. This approach demonstrated how to diminish the intensity of the nystagmus, how to widen the blockade area, and how to increase the foveation time sparing ductions (13, 14).

The influence of nystagmus surgery on visual acuity has always been a controversial issue. In cases where torticollis or heterotropia is present, a surgical approach may be established for functional reasons. If torticollis or heterotropia is not present, improvements in visual acuity could justify some surgical approaches to obtain a functional benefit (associated with cosmetic improvements). On the other hand, if visual acuity remains stable after surgery, the only reason for performing this surgery would be for cosmetic improvement. If an unjustified number of complications is associated with the technique, this should be avoided.

We present a prospective study on a series of 42 consecutive patients with different types of nystagmus operated on using a surgical technique based on extended recessions of the four horizontal rectus muscles between 13 and 15 mm from the muscle insertion using hang back sutures. We examine the complications and visual performance results in follow-ups of at least 1 year. The importance of this article is based not only on the technique used (retroequatorial recession of the four rectus muscles and the first series reported in which hang back muscle surgery has been used), but also on the number of patients included in the correction of nystagmus.

PATIENTS AND METHODS

A total of 42 patients (84 eyes) from 7 to 49 years of age (mean 24.2 ± 7.3 years) were operated on with extended retroequatorial recessions of the four hor-

izontal rectus muscles between 13 mm and 15 mm from the insertion with hang back sutures. Surgery was performed by the same surgeon (JLA). The preoperative and postoperative follow-ups were performed alternatively by two observers. A surgical plan was established in all cases as a recession of the four horizontal rectus muscles 14 x 14 mm from the insertion as standard technique in cases with no associated strabismus. If strabismus was present, a recession of 13 mm or 15 mm was performed, with a larger recession in the medial recti if esotropia was present or in the lateral recti in cases of exotropia. Follow-up in all cases ranged from 1 to 4 years with a mean of 2.5 years. Postoperative clinical examination of the patients was performed the day after surgery; the third week, the third month, the sixth month, and 1 year after surgery; and then every year. The follow-up time for every patient is presented in Table I.

Data concerning the clinical features of the patients are shown in Table II. All cases had horizontal nystagmus, either sensorial (4 cases) or neuromuscular congenital nystagmus (38 cases). Three cases showed associated exotropia, five cases showed a nonaccommodative esotropia, and seven cases showed a torticollis greater than 25 prism diopters (Tab. II).

Clinically significant torticollis was measured by progressive prismation, with a double prism bar, base directed toward the side of the torticollis while the maximum line of visual acuity was fixated at the distance.

BCVA was measured at 6 meters with a Snellen decimal visual acuity chart and expressed in logMar units for adequate statistical analysis. In all cases BCVA was evaluated with the best correction with spectacles and the occlusion of the fellow eye with a Spielman occluder. If torticollis was present, monocular and binocular BCVA were tested in the most comfortable position for the patient. The recorded line of vision was determined if at least 80% of the characters were seen. Near vision was tested with the best-corrected spectacles and at the subjective best distance for each patient. The Jaeger scale was used for that purpose.

Motor assessment of the nystagmus was recorded using diagrammatic methods in which the type, direction, and intensity were noted by the same observers following a previously described chart diagram (15). A chart for every patient was completed for every visit by two independent observers who described the subjective direction of nystagmus, its amplitude, and its frequency. Clinical data obtained from this subjective methodology are not analyzed in this report.

Patient satisfaction was screened using a scale to classify the responses into four categories (0 = unsatisfied; 1 = moderately satisfied; 2 = satisfied; 3 = very satisfied), depending on the subjective improvement in visual performance in distance vision and near vision and aesthetic improvement after the nystagmus surgery. The patients were asked to fill in a questionnaire that allowed us to note the subjective improvement from 0 to 3 in these three parameters, and the mean value was recorded as the mean satisfaction degree. The subjective improvement scale used by us has not been validated in previous studies and is not intended to record improvements in real-life activities (such as watching television or reading). This scale records the overall subjective impression of the patient after surgery.

Surgical technique

In all cases wide recessions of the four horizontal rectus muscles between 13 mm and 15 mm from the insertion were performed, following an individualized surgical plan for each case. Muscle recession was performed using a hang back recession technique. Bilateral peribulbar anesthesia with 5 cc lidocaine 2% plus bupivacaine 0.75% combined with mild sedation was used in all adult cases. In four children, surgery was performed under sedation with midazolam 0.2 mg/10 kg weight. A conjunctival incision was performed after cauterization with bipolar diathermy. A conjunctival incision was performed with Westcott scissors at the level of the corneoscleral limbus. Horizontal rectus muscles were captured with a muscle hook (Jameson muscle hook, Katena Instruments, NJ) and a blunt dissection was carried out to eliminate all Tenon capsule and cheek ligaments throughout the muscular body. At the anterior insertion a double armed 6/0 Vicryl suture (Ethicon Vicryl, Johnson and Johnson, Brussels, Belgium) was passed through. Then the tendon was excised and a hang back technique was performed, sutured at the original insertion as previously described by our group

TABLE I - IMPROVEMENT IN VISUAL ACUITY (VA) AND FURTHER SURGICAL PROCEDURES (difference in logMar units)

N	Improvement in logMar VA, right eye	Improvement in logMar VA, left Eye	Improvement in binocular VA	Improvement in near VA (Jaeger)	Further surgical procedures	Satisfaction	Follow-up, years
1	0.1	=	=	=		1	2
2	0.2	0.1	0.3	=		3	2
3	0.1	0.1	0.1	=		2	3
4	=	0.1	=	=		3	3
5	=	0.1	=	=		3	1
6	=	0.1	=	=	Esotropia, Botox	2	4
7	0.1	=	0.1	0.2		4	1
8	=	=	=	0.2	Reoperation, exotropia	1	3
9	=	0.1	0.1	=	Reoperation, exotropia	0	3
10	0.1	=	=	0.1	Reoperation, exotropia	3	2
11	=	=	=	=	Esotropia, Botox	4	4
12	0.2	=	=	=		3	2
13	0.1	=	=	=		2	1
14	=	=	0.3	0.2		2	3
15	0.3	0.3	0.3	=		2	2
16	=	=	=	=		2	1
17	=	=	=	=		2	3
18	0.2	0.1	0.2	0.2	Reoperation, exotropia	0	2
19	-0.1	0.3	=	=		3	1
20	=	-0.1	=	=	Reoperation, exotropia	2	4
21	0.2	=	=	=	Reoperation, exotropia	0	3
22	=	=	=	=		3	2
23	=	0.1	=	=		3	2
24	=	=	0.1	=		2	3
25	0.3	0.3	=	=	Exotropia, Botox	0	3
26	0.1	=	0.1	=		3	4
27	=	=	=	=	Reoperation, exotropia	1	3
28	-0.1	=	=	=		3	2
29	0.3	0.3	0.3	0.1		2	2
30	0.1	0.2	0.3	0.2		4	1
31	0.1	=	0.1	0.2		3	4
32	=	=	=	=		1	2
33	0.1	=	0.1	=		2	3
34	0.1	=	0.1	0.2		3	3
35	0.2	0.3	0.2	=		3	2
36	=	=	=	=		3	4
37	0.1	=	0.2	=		3	1
38	0.2	0.2	=	=		3	4
39	0.4	=	0.4	0.2		3	3
40	=	0.1	0.1	=	Reoperation, exotropia	0	2
41	0.1	=	0.1	=		2	4
42	=	=	=	=		1	1

TABLE II - LogMar VISUAL ACUITY (VA) AND SURGICAL PROCEDURE (Preoperative decimal VA)

N.	Age	Type	Association	LogMar VA, right eye	LogMar VA, left eye	Binocular logMar VA	Near VA (Jaeger)	Surgery*
1	25	N-M		0.8	0.7	0.7	0.8	13x13
2	21	N-M		0.5	0.5	0.5	1	13x13
3	17	N-M		0.8	0.8	0.8	0.8	13x13
4	18	N-M.	Torticollis	0.5	0.5	0.4	0.8	13x15
5	20	N-M		0.4	0.7	0.4	0.8	13x13
6	24	N-M		0.7	1	0.7	0.6	13x13
7	49	N-M	Torticollis	0.5	0.4	0.4	0.6	13x13
8	29	N-M		1	1	0.7	0.8	13x13
9	25	N-M		0.4	0.5	0.4	0.8	14x14
10	16	N-M		0.4	0.3	0.3	0.5	14x14
11	25	N-M		0.4	0.1	0.1	1	13x13
12	13	N-M		0.4	0.2	0.1	1	13x13
13	25	Sensory		0.7	0.5	0.5	0.5	14x14
14	33	N-M		1.3	1.3	1.3	0.2	14x14
15	7	Sensory		1.3	1.3	1.3	0.3	14x14
16	22	Sensory		0.3	0.3	0.3	0.8	14x14
17	34	Sensory	Torticollis	1.3	0.7	0.7	0.4	13x13
18	27	N-M	Esotropia	0.4	0.3	0.3	0.8	13x15
19	23	N-M		0.5	1	0.15	1	13x13
20	21	N-M		0.4	0.4	0.4	0.8	13x13
21	22	N-M		1	0.7	0.5	0.6	13x13
22	42	N-M		0.4	0.5	0.4	1	13x13
23	14	N-M	Esotropia	0.7	0.7	0.5	0.6	13x15
24	11	N-M	Torticollis	1	1	1	0.5	13x13
25	23	N-M	Torticollis	1.3	1.3	1	0.3	13x13
26	20	N-M		0.4	0.4	0.4	0.8	13x13
27	26	N-M	Exotropia	0.7	0.5	0.5	0.8	13x15
28	25	N-M		0.2	0.3	0.2	1	13x13
29	36	N-M	Esotropia	1.3	1.3	1	0.4	13x15
30	48	N-M	Torticollis	0.3	0.4	0.3	0.8	13x13
31	18	N-M		0.3	0.7	0.3	0.8	13x13
32	32	N-M	Exotropia	0.4	0.4	0.4	0.8	13x15
33	38	N-M		0.7	0.7	0.7	0.6	13x13
34	34	N-M		0.4	0.4	0.4	0.8	13x13
35	27	N-M		0.2	0.3	0.2	1	14x14
36	22	N-M	Esotropia	0.4	0.7	0.4	0.8	13x15
37	25	N-M	Torticollis	0.3	0.3	0.2	1	13x13
38	15	N-M	Torticollis	0.2	0.2	0.1	1	14x14
39	10	N-M	Esotropia	0.4	0.3	0.4	0.6	13x15
40	14	N-M		0.7	0.7	0.7	0.6	15x15
41	23	N-M		0.7	0.7	0.7	0.6	13x13
42	29	N-M		0.2	0.2	0.2	1	13x13

* Surgery= (medial rectus recession/lateral rectus recession) in mm

(13). The muscular body was pulled back with a cotton tip. Conjunctival closure with 8/0 Vicryl (Ethicon Vicryl) was then performed.

Descriptive statistics were applied to define the sample and Student t and regression formulas to assess the relationship among continuous variables by SPSS statistical program (SPSS/Pc + 8.0 for Windows, SPSS, Madrid, 1998).

RESULTS

All cases had preservation of ductions in all gaze positions. Eyelid anomalies and exophthalmos were not recorded in any case. A decrease in the intensity of the nystagmic movements, in all but four cases (9.5%), was demonstrated from the first follow-up examination, which was objectively reported by the observers, and remained stable afterwards. Nevertheless, motor outcome of nystagmus (direction, amplitude, and frequency) was not studied in this article owing to the subjectivity of the records; only the visual outcome after surgery is analyzed.

Monocular best-corrected vision

Preoperative monocular distance best-corrected vision ranged from 1.3 to 0.1 logMar. Postoperative monocular distance best-corrected vision presented an improvement of at least one logMar line of vision in 38 eyes (45.2%), which correspond to 28 patients (66.6%). The increase in monocular best-corrected vision in those patients ranged from 0.1 to 0.3 logMar. A decrease in monocular best-corrected vision was noted in only three eyes (3.5% of the eyes, corresponding to 7.1% of the patients) of three different patients. This decrease was always of one logMar unit scale, affected only one eye, and did not correlate to a decrease in near or distance binocular best-corrected vision. The differences between monocular BCVA preoperatively and postoperatively were statistically significant ($p<0.01$) (Tab. I).

Binocular best-corrected vision

Binocular best-corrected vision improved in 19 (45.2%) patients and the remaining 23 (54.8%) remained unchanged. This improvement was statistically significant ($p=0.006$). The increase in BCVA was in the range 0.1 to 0.3 logMar. Analysis of the different types of nystagmus revealed that in those patients who presented a sensorial nystagmus, vision remained unchanged in 3 (75%) and improved in 1 (25%); no decrease in visual acuity was assessed (Tab. I). Patients with a neuromuscular nystagmus had improved distance binocular visual acuity in 18 cases (47.4%); it was unchanged in 20 (52.6%), and there was no decrease in any case (Tab. I). Near vision under binocular best-corrected conditions remained stable in 28 (73.7%) and improved in 10 (26.3%) patients with neuromuscular nystagmus and no decrease was recorded ($p=0.001$). Among patients with sensorial nystagmus, all cases remained unchanged (Tab. I).

Torticollis

Torticollis decreased in all our patients. Those in whom torticollis was greater than 25 prism diopters (mean ± SD 36 ± 5 prism diopters) before the operation showed a postoperative result less than 15 prism diopters (8 ± 3 prism diopters). Those in whom torticollis was initially less than 25 prism diopters (15 ± 2 prism diopters) also decreased to less than 15 prism diopters following surgery (5 ± 2 prism diopters). The differences were statistically significant ($p=0.007$).

Complications

Owing to postoperative residual strabismus, not present before surgery, a second surgical procedure was necessary in 11 cases (26.1%) (Tab. III). All of them showed a postoperative strabismus associated with the nystagmus after the first surgery. On the other hand, in those patients with strabismus present before surgery only two cases required a second surgical procedure (Tab. IV).

A botulinum toxin injection was applied as the secondary procedure in 3 (7%) of the cases; in the others, surgery was performed. All botulinum toxin injections were introduced no longer than 3 months after the initial surgery and only one injection was used in each patient. Two patients with residual esotropia were treated with botulinum toxin injection in both medial rectus muscles with good results (esotropia <10 prism diopters). There were nine more cases of consecutive exotropia, six of them without diplopia, requiring a new recession of the lateral recti, which were found at 10 mm from the original insertion, possibly limited by inferior oblique adhesions.

Diplopia was present in 3 cases (7%) after consecutive exotropia following the surgical procedure. All cases were treated successfully: one patient after botulinum toxin injection in both lateral rectus muscles and the other two with an additional surgical procedure. Diplopia was not present at the end of the follow-up in any case.

TABLE III - MANAGEMENT OF CONSECUTIVE STRABISMUS AFTER THE NYSTAGMUS PROCEDURE

N.	Associations	Complications	Follow-up, years
6	No	Botulinum toxin for esotropia	1
8	No	Second surgery for exotropia	3
9	No	Second surgery for exotropia	3
10	No	Second surgery for exotropia	2
11	No	Botulinum toxin for esotropia	4
18	Esotropia	Second surgery for exotropia	2
20	No	Second surgery for exotropia	4
21	No	Second surgery for exotropia	3
25	Torticollis	Botox for exotropia	3
27	Exotropia	Second surgery for exotropia	3
40	No	Second surgery for exotropia	2

TABLE IV - FOLLOW-UP IN PATIENTS WITH PREVIOUS STRABISMUS

N.	Age, years	Type	Surgery	Results	Complications	Follow-up, years
18	27	Esotropia	13x15	Exotropia	Second surgery	2
23	14	Esotropia	13x15	Ortho	No	2
27	26	Exotropia	13x15	Esotropia	Second surgery	3
29	36	Esotropia	13x15	Ortho	No	2
32	32	Exotropia	13x15	Ortho	No	2
36	22	Esotropia	13x15	Ortho	No	4
39	10	Esotropia	13x15	Ortho	No	3

Patient satisfaction

Patient satisfaction after surgery ranged from satisfied to very satisfied in 38 cases; the other 5 patients did not notice any improvement (2.8 ± 0.4 on the subjective scale) (Tab. I). No patient reported a worsening of the eye movements. When considering individual items, 20 patients (47.6% of cases) acknowledged a positive improvement in distance vision after surgery; near vision was reported better than preoperatively in 11 cases (26% of cases) and cosmetic improvement was reported in 36 cases (85%).

DISCUSSION

The aim of the surgical correction of the nystagmus in our study was to decrease the nystagmic movements, to restore the associated strabismus, and to decrease or eliminate torticollis if present. Previously, different techniques have faced these problems simultaneously. Kestembaum procedures, very useful in severe torticollis, frequently cause an increase in nystagmic movements in the field of action of the resected muscles (6). Retroequatorial myopexia techniques have demonstrated great variability in results in some series (16). Our technique is based on the weakening of the horizontal extraocular muscles to avoid the potential risk of increasing nystagmic movements, planning surgery to correct the heterotropia in all gaze directions and consecutively to correct torticollis.

Retroequatorial recession of the four rectus muscles was first performed by Helveston et al in 1991 (14). In their series of 10 patients there was an improvement of at least one line in 80% of the cases and reduction of the torticollis in 50%. Nystagmic movements were not abolished, although a clear improvement was noted in most of the patients. This first report does not note any important complications associated with the technique or limitation of ductions as was initially ex-

pected. Davis et al (17), following this approach, reported wide recession of the four horizontal rectus muscles in albino patients with improvement in visual acuity of one or more lines in 58% of patients and in 25% of second surgeries to correct residual heterotropias.

We report here a group of patients surgically corrected with extended retroequatorial recessions of the four horizontal rectus muscles, although the surgical technique used in our series was different from the previous approaches using large horizontal muscle recession (14, 17). Our surgical approach used a simplified technique, in which the use of hang back sutures makes the very large recession of the horizontal muscles (13, 14) easier and safer.

The oculomotor results obtained with this surgical approach can be considered good, as a subjective decrease of the nystagmus intensity in primary position in 90.5% of cases, associated with an improvement of torticollis in 100% of the patients, was obtained. This oculomotor improvement in the nystagmus was associated with an increase in binocular BCVA in 45% of the cases in our study. Although in some patients an increase of 0.1 logMar units can be considered a variation commonly found at test and retest of visual acuity and may be not considered of clinical significance, 21.4% of our patients increased their binocular distance visual acuity by more than 0.2 logMar units. This improvement in best-corrected vision was observed especially in cases with neuromuscular nystagmus, although it was also present in patients with sensorial nystagmus. This finding correlates well with recent studies that have also shown an increase in monocular and binocular visual acuities in albino patients (17). This finding reflects the influence that nystagmic movements have on the final visual performance of these patients, even in those in whom sensorial aspect is the main cause of low vision. Although a statistically significant improvement is obtained in monocular and binocular visual acuity, an important and clinically significant improvement of vision is present in most patients. Low vision patients benefit from minor increases in visual acuity, which help to improve overall quality of life and learning skills. Improvement in visual acuity as well as improvement in nystagmus intensity may improve adaptation of low vision devices in these patients. According to this study there is little risk of visual deterioration following surgery. Nevertheless, we recognize that these results could change in a longer follow-up, as relapses are reported in nystagmus surgery later in life.

It is also important to mention the low frequency of complications observed in our study with this surgical approach. The most important one was diplopia (3 cases, 7%), always associated with a consecutive exotropia. The greater effect of the recession procedures over the medial rectus as compared to the lateral rectus is possibly the reason. On the other hand, when using hang back techniques the lateral rectus connections with the inferior oblique and Lockwood complex may preclude further retraction of the recessed muscle into the orbit. All cases were resolved after injection of botulinum toxin or a new weakening procedure over lateral rectus. In fact, these results may suggest that the recession procedures of medial recti should be initially less than 13 mm (possibly from 10 to 12 mm). The incidence of residual strabismus in the cases in which correction of nystagmus and strabismus was approached simultaneously, 2 cases out of 7 (29%), indicates the difficulty in achieving a precise indication for the amount of surgery when both oculomotor problems are simultaneously approached.

Patient satisfaction rate in our patients was very high, which denotes the positive perception of our patients concerning both the cosmetic and visual postoperative improvement related to surgery.

We propose retroequatorial recessions of the four horizontal rectus muscles 14 x 14 as standard technique, with a difference of 2 mm (15 x 13) between them when a horizontal strabismus is present. Hang back recession has the additional advantage of avoiding scleral perforation with peripheral retinal potential hazards (18), a finding that has been previously reported after procedures such as Faden operation, in which scleral sutures were placed at the very posterior area of the globe (19). It is mandatory during surgery to carefully eliminate tissue connections (Tenon capsule and cheek ligaments) when hang back techniques are performed. Clinical and experimental evidence suggests that in recessions greater than 7 mm Tenon capsule avoids the posterior displacement of the muscle by anterior anchorage. To avoid this phenomenon we have performed modifications to the original technique by an anchorage of the hang back 7 mm behind the original incision with a hang back of the rest of the surgical planned recession to improve the efficacy of the weakening procedure.

We consider this surgical technique for nystagmus with extended recession of horizontal rectus muscles by hang back sutures a good option for all types of nystagmus to obtain an improvement in the frequency and intensity of the nystagmic movements, and also in torticollis and associated strabismus. Furthermore, an improvement in best-corrected vision can be obtained in 45% of these patients. Such visual improvement is relevant in patients with low vision in whom limited improvements may be functionally important. We propose this technique as elective in patients with jerk and pendular nystagmus associated with torticollis or strabismus, although it should be noted that reoperations could be necessary when simultaneous correction of the strabismus and nystagmus is attempted. Moreover, hang back sutures make the surgical performance of extended recession simpler and less risky than suturing the recessed muscle, which is deeply placed in the back of the eye, to the sclera. Hang back sutures also offer a potential for adherence formation along the plane of the absorbable suture. This probably explains the preservation of the versional and ductional movements of the eye, in spite of the retroequatorial placement of the muscles. The simplicity and efficacy of this hang back recession of the four horizontal rectus muscles makes this technique an excellent alternative to be considered for both sensorial and neuromuscular nystagmus, with or without blockade position, and associated or not with torticollis and strabismus.

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