OPERATION ON THE VERTICAL MUSCLES IN CASES OF NYSTAGMUS*

BY

DERMOT PIERSE

Croydon Eye Unit

ALTHOUGH it has been recognized for a considerable time that operation on a strabismus co-existing with nystagmus may have a beneficial effect on the nystagmus, it does not appear to have been until 1953 that work was published relating to operation on cases of nystagmus with the direct intention of improving this condition. Then, from three different continents within a short time, separate recommendations were made that, in cases of lateral jerky nystagmus worse in one direction than the other, operation on the medial and lateral recti should be considered.

Anderson (1953) suggested a recession of the medial rectus of one eye and the lateral rectus of the other eye in cases of eccentric nystagmus where there was a marked difference in nystagmus to either side. This weakening of the rotators was to be done on the side on which the nystagmus is less evident. Kestenbaum (1953, 1954) recommended surgical rotation of the eyes in the direction of the rapid phase of a nystagmus by resection and recession or controlled tenotomy of the corresponding muscles. Goto (1954) recommended advancement of the appropriate muscles but no corresponding recession.

These procedures must now be considered as useful additions to the treatment of nystagmus and, in a small number of recent cases, I have found them to be of benefit.

In 1953, a case was referred to me in which there was a marked nystagmus in all directions of gaze except downwards, and this seemed to have some points of similarity with the type of case mentioned above. Although operation on similar lines would involve, at the least, recession of the four depressors it seemed justified by the severity of the disability produced by the condition. The results seemed to merit repetition in a similar case seen 3 years later and these two cases are the subject of the present communication.

Case Reports

Case 1, a boy born in 1951, was first seen on June 17, 1953. He had been referred in the first instance to a paediatrician because of suspected mental deficiency, which was due to his difficulty in walking and his facial appearance.

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Examination.—He had a rotatory nystagmus which became violent when he attempted to look straight ahead or upwards. He held his head thrown very far back so that his eyes were constantly depressed. This very exaggerated head posture made walking difficult and from the muscle effort involved his mouth hung open continuously. No general abnormality was found. The refraction was normal, but the visual acuity could not be assessed.

Operation.—On January 22, 1954, a bilateral inferior rectus recession—about 5 mm. each eye—was carried out at the Children's Hospital, Sydenham. On February 5, 1954, bilateral tenectomy of the superior obliques was carried out at the same hospital.

Progress.—Improvement in appearance was apparent as soon as he was ambulant and further improvement continued in the following months. As time went by a hyperphoria became obvious with some tendency of the left eye to diverge. The hyperphoria seemed to be mainly related to an over-action of the left superior rectus muscle, and further operation was considered necessary for these phorias.

Operation.—On December 4, 1956, a recession of the left superior rectus—about 2 mm.—and a recession of the left lateral rectus—about 6 mm.—were carried out at the Croydon Eye Unit.

Result.—He now has a visual acuity, with a slight correction for myopia, of 6/9 in the right eye, and 6/24 in the left, with full binocular vision in the primary position. He walks with his head almost completely erect and the nystagmus does not become marked unless he looks upward.

Case 2, a boy born in 1946, was first seen in November, 1956, having previously attended The Hospital for Sick Children, Great Ormond Street, London, where he had been noted to have bilateral ptosis and convergent strabismus. His records showed that between 1948 and 1950 five operations had been performed for ptosis and that the right medial rectus muscle was recessed in 1954.

Examination.—He had a lateral jerky nystagmus which was most marked when looking up and least when looking downwards. This again produced an exaggerated head posture which made walking difficult. The visual acuity, with a correction for myopic astigmatism, was 3/60 in the right eye and 2/60 in the left. This improved when he held his head far back to 6/60 in the right eye and 6/36 in the left.

Operation.—On July 12, 1957, a bilateral inferior rectus recession—about 4 mm. each eye—and a bilateral superior oblique recession—about 4 mm. each eye—were carried out at the Children's Hospital, Sydenham. The inferior rectus muscles on both sides were found to be abnormal with marked extra attachments to the globe, and considerable difficulty was experienced in freeing them from an excess of fibrous tissue.

Result.—Post-operatively an immediate improvement in posture was noted by the mother and this improvement has continued. He now has a visual acuity of 6/60 in the right eye and 6/24 in the left in the primary position.

Discussion

It is very interesting to consider the extreme resilience of the ocular neuromuscular mechanism. Case 1 started life with a marked congenital nystag-
mus and later had a severe operative procedure on six different extra-ocular muscles, but despite this now has firmly established stereoscopic vision.

**Operative Procedure.**—The difficult problem in considering the procedure necessary to achieve a balanced elevation of both eyes is to match the weakening of the depressor effect of the superior oblique of one eye against that of the inferior rectus muscle of the other.

**Superior Oblique.**—Before 1942 the literature is practically devoid of reference to the surgical correction of superior oblique muscle defects, with the exception of warnings to avoid interference with this muscle. Since that time, however, it has become more usual to operate on this muscle, but there is still little statistical information relating to the amount of correction to be expected by the different procedures recommended for its weakening. Fink (1954) recommended simple tenotomy of the reflected tendon within its sheath to produce a moderate weakening of the superior oblique. If more effect is required he advised removal of a portion of the tendon. He pointed out that the nearer the trochlea the procedure is carried out the greater the effect. In Case 1 this procedure was used and it would appear that a moderate effect was obtained. Recession of the reflected tendon forwards and inwards towards the trochlea was undertaken in Case 2 and did not present technical difficulties.

I have felt that the size and nature of the tendon would make possible a true lengthening by dividing the tendon and its sheath and joining the cut ends by a short length of silk or synthetic suture material, and I have performed this operation in a small number of cases.

**Inferior Rectus.**—On the other hand, recession of the inferior rectus muscle is a straightforward procedure, but most authorities seem to agree that more effect is produced by a recession of a set number of millimetres than by a similar amount in the horizontal recti. In Case 1 it is probable that the right inferior rectus recession was excessive.

**Type of Nystagmus.**—Anderson (1953) considered whether the fact that a nystagmus more marked in one direction than another was due to a central or local cause, and expressed the opinion that the main reason was central. Rucker (1953) pointed out that rotatory nystagmus appears to be positive evidence of the involvement of the vestibular nucleus, which he noted also caused vertical nystagmus, particularly vertical nystagmus which increased on upward gaze. It would seem probable that in Case 1 the cause fitted this type of condition and that there was some lesion in the upper portion of the vestibular nucleus. In Case 2, however, the abnormal attachment of the inferior recti would seem to have caused all the increased nystagmus in attempted elevation.

It is not unlikely that eccentric nystagmus, that is nystagmus more pronounced in one direction of gaze than others, can be brought about either by central or local causes.
VERTICAL MUSCLES IN NYSTAGMUS

Summary

Two cases are described in which a nystagmus was most marked in all positions of gaze except extreme depression. A weakening operation on the two superior oblique and two inferior rectus muscles was performed which resulted in marked improvement in the head posture and improvement of vision in the primary position.

REFERENCES