

MUSCULAR REINFORCEMENT IN CONVERGENT STRABISMUS OBTAINED BY SCREW-LIKE TWISTING (TORSION) OF THE EXTERNAL RECTUS TENDON

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Summary

Forty one cases of unilateral convergent strabismus and three cases of divergent strabismus were operated upon by the technique suggested by Malbran.

Most of the cases had shown a severe degree of amblyopia and weakness of the External Rectus.

In this technique, the muscle is twisted around its longitudinal axis the required amount of turns according to the degree of deviation, and attached again to its original insertion. There is no cutting of the muscle tendon.

The results were very satisfactory, showing a marked strengthening of the action of the External Rectus.

It is suggested that in order to obtain reinforcement of an ocular muscle, resection should be replaced by a screw-like twisting of the muscle.

Malbran (1965) suggested that muscular reinforcement of the ocular muscles could be obtained by twisting the muscle tendon on its axis and attaching it again to its insertion. Twisting is accompanied by shortening and strengthening of the muscle. However, he did not produce a report on the results of cases treated by this particular technique.

Between 1966 and 1970, fortyone cases of concomitant convergent squint and three cases of divergent strabismus were operated upon in our clinic using this technique.

What follows is a report on the results obtained so far.

The main difference between this technique and the older ones is that whereas in a resection or tucking (including the O'Connor Cinch operation, which is basically a tuck) a portion of the muscle is cut off and taken out of action, in the torsion technique the whole muscle, including the vitally important tendon is spared.

The advantages claimed for this technique are that it is a simple operation, carried out without any mutilation of the muscle tendon. The latter is attached to its original insertion without any displacement. If necessary, the torsional effect can be undone. There is no narrowing of the palpebral fissure and no pulling in (Enophthalmos) of the eye ball, as often happens after a severe resection of the muscle. There is a marked strengthening of the action of the weak muscle.

It is considered that a shortening of 6mm is obtained as a result of one turn and 12mm when the tendon is turned twice. When this is translated into degrees of deviation: one turn is necessary to correct 15-25 and two turns to correct angles varying from 25-35. A full recession of not more than 5mm is always carried out at the same time on the direct antagonist.

Some minor alterations to the original Malbran technique were adopted in this series of 43 cases.

Two whip stitches sutures (plain catgut n. 3/0 single armed, an eye curved 16mm needle) are passed transversely,

respectively through the upper and lower third of the Lateral Rectus 3mm from its insertion. No muscle forceps is used. The upper suture is clamped into artery forceps.

The muscle tendon is not cut flush with the insertion. A very small fringe of tissue is left, in order to render easier and firmer the reattachment of the tendon to its original insertions.

After the necessary amount of twisting has been performed, a solid reattachment is ensured if the whip stitch sutures, after passing through the fringe of tissue at the insertion are passed again through the cut muscle tendon and tied down. One must pay particular attention to the possibility of the torsion undoing itself during this phase of the operation.

The age of the patients varied between 3 and 20 years. The majority of cases suffered from unilateral concomitant strabismus. The angle of deviation varied from 25 to 40. A considerable number of cases showed a marked degree of amblyopia. In a good number of cases, there was a weakness of the movement of the external rectus of the amblyopic eye. All patients had their refraction corrected. Orthoptic treatment was carried out whenever possible.

Three cases had been operated upon once before. Four cases had a vertical component besides the convergence. Twentynine cases presented amblyopia of various degree. (Visual acuity did not respond to treatment either because the patient was too old to occlude, or, in two cases, because of abnormalities in the media or because of nystagmus).

Results were satisfactory and encouraging. In twentythree cases, the angle of deviation was completely corrected. In ten cases, there was some residual convergence. The cosmetic result was, however, very good. In five cases, the convergence was still noticeable. There was con-

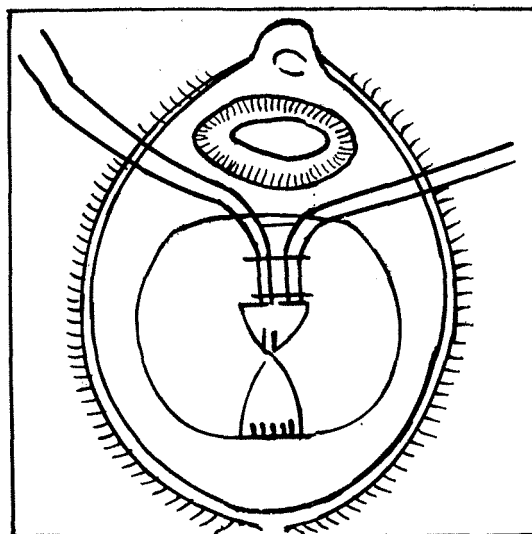


Fig. 1. Torsion of Internal Rectus muscle along its longitudinal axis.

secutive divergence in three originally convergent cases.

In the three divergent cases operated upon by this technique, there was still some residual divergence.

As regards binocular vision, it was present in eleven cases, partial in 6 cases and completely absent in 27 cases.

In all but 2 cases, there was marked strengthening of the action of the External Rectus.

(See Tables overleaf.)

Acknowledgement

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References

- MALBRAN J. *Anna's d'Oculistiques*. 1965. 198.
 DAMATO F.J. *The Eye, Ear, Nose and Throat* monthly, 1968, 47, 246.

POST OPERATIVE REPORT

Name	Age	Sex	Refraction and vision with glasses	Angle of Deviation pre-operative with glasses		Ocular Movements
1. P.J.	20	M.	R. +3.0 D.S. L. +3.0 D.S.	6/9 6/24	+30°	Underaction of Left lateral rectus
2. J.C.	20	M.	R. +4.0 D.S. L. +4.00 D.S. <hr/> +0.50 90	6/6 6/24	+25°	Underaction of Left lateral rectus.
3. L.M.	11	F.	R. +2.5 D.S. L. +2.50 <hr/> +0.50 90	6/6	+35°	Underaction of Left lateral rectus
4. S.M.	13	F.	R. +2.0 D.S. L. +2.0 D.S.	6/9 6/6	+30°	Full movements
5. A.M.	3	F.	R. +1.50 D.S. L. +1.50 D.S.	6/6 6/60	+30°	Marked underaction of left external rectus
6. M.E.	13	F.	R. +2.00 D.S. <hr/> +0.50 90 L. +2.00 D.S. <hr/> +0.50 90	6/9 6/12	+35°	Marked underaction of left lateral rectus Elevation of left eye on adduction
7. A.J.	9	M.	R. +1.00 <hr/> +1.50 90 L. +1.00 <hr/> +1.50 90	6/12 6/24	+30°	Marked underaction of left eye Elevation of left eye in adduction
8. B.A.	6	F.	R. -1.0 D.S. L. -1.0 D.S.	6/60 6/18	+35° R/L	Underaction of Right lateral rectus Elevation of Right eye on adduction

<i>Surgery</i>	<i>Angle</i>	<i>Ocular Movements</i>	<i>Cover Test</i>	<i>Cosmetic State</i>	<i>B. V.</i>
Left lateral rectus torsion 1½ turns	+4	Full	N.A.D.	Good	Not present
Left lateral rectus torsion 1½ turns	0°0	Full	N.A.D.	Excellent	Present
Left lateral rectus torsion 1½ turns	0°0	Full	N.A.D.	Excellent	Present
Right lateral rectus torsion 1½ turns	+5° — -5°	Full	Slight convergence/ divergence	Good	Nil Had bilateral medial rectus recession
Left lateral rectus torsion 1½ turns	+5°	Full	Manifest (L) convergence	Satisfactory Still L.C.S.	Nil
Left lateral rectus torsion 4 turns	+6	Full	N.A.D.	Good	Present
Left lateral rectus torsion 1½ turns	+6	Full	Slight manifest (L) convergence	Good	Suppression
Bilateral medial rectus recession Right lateral rectus torsion 2 turns	+5 R/L	Full Nystagmus	Slight manifest (R) convergence c (R) hypertropia	Residual R.C.S.	(R) Suppression

Name	Age	Sex	Refraction and vision with glasses	Angle of Deviation pre-operative with glasses		Ocular Movements
9. B.P.	12	M.	R. +5.0 <u> </u> +2.0 L. +3.0 <u> </u> +0.50	6/12 6/6	+35° R/L	Underaction of Right lateral rectus
10. P.A.	7	M.	R. +3.5 <u> </u> L. +3.5	6/60 6/6	+30°	Underaction of Right lateral rectus
11. C.T.	20	M.	R. +1.0 L. +3.0	6/6 6/60	+25° R/L	No movement of Left lateral rectus
12. P.C.	5	M.	R. +1.0 D.S. L. +1.0 DS	6/60 6/6	+35° R/L	Poor fixation Right eye Underaction of Right lateral rectus
13. Z.A.	15	F.	_____ R. _____ L.	6/6 6/6	-30°	Alternating divergence Poor convergence
14. C.R.	10	F.	R. +6.0 L. +6.0 <u> </u> +1.0 90	6/6 6/36	+35° R/L	Full
15. B.D.	15	F.	R. +0.50 <u> </u> +2.50 L. +0.50 <u> </u> +1.00	6/12 6/6	+40°	Underaction of Right lateral rectus
16. P.T.	5	M.	R. +1.50 DS. <u> </u> L. +1.50 DS	6/6 6/36	+30°	Poor movement of Left lateral rectus
17. M.V.	9	M.	R. +2.00 D.S. <u> </u> L. +2.00 D.S. +1.00 D.C. 90	6/6 6/9	+25° L.C.S.	Underaction of (L) external rectus
18. D.P.	3	M.	R. } +3.00 D.S. L. } <u> </u> +0.50 D.C. 18°	6/18 6/9	+25° R.C.S.	Underaction of (R) external rectus

<i>Surgery</i>	<i>Angle</i>	<i>Ocular Movements</i>	<i>Cover Test</i>	<i>Cosmetic State</i>	<i>B. V.</i>
Right lateral rectus torsion 2 turns	0° without glasses +15° c gls.	Full	N.A.D. c gls. R.C.S. c gls.	Cosmetically good	Present
Right lateral rectus torsion 2 turns	+5° c. gls.	Full	N.A.D.	Good	(R) Suppression
Left lateral rectus torsion 1½ turns	0° c gls.	Full	N.A.D.	Good	(L) Suppression
Right lateral rectus torsion 2 turns	0°	Full	N.A.D.	Good	(R) Suppression
Right medial rectus torsion 2 turns	-10°	Convergence Insufficiency	R. D.S.	Satisfactory	Nil
Left lateral rectus torsion 2 turns	0°	Full	Slight R.C.S.	Satisfactory	(L) Suppression
Right lateral rectus torsion 2 turns	0°	Full	N.A.D.	Excellent	Good B.V.
Left lateral rectus torsion 2 turns	+5°	Full	Slight L.C.S.	Good	(L) Suppression
Left medial rectus recession Left lateral rectus torsion 1½ turns	0° c gls.	Full	N.A.D. c gls	Excellent	Present
Right internal rectus recession Right lateral rectus torsion 1½ turns	0° c gls.	Full	N.A.D. c gls.	Excellent	Present

Name	Age	Sex	Refraction and vision with glasses	Angle of Deviation pre-operative with glasses	Ocular Movements	
19. A.S.	6	M.	R. } <u>+1.00 D.S.</u> L. } <u>+1.00 D.C.</u>	6/6 6/6	+25° L.C.S.	Full
20. N.A.	6	F.	R. <u>+0.25</u> <u>-0.75</u> L. <u>-3.50</u> <u>-1.75</u>	6/6 6/60	+30° L.C.S./ A.C.S.	Underaction of (L) lateral rectus
21. M.S.	2 ³ / ₁₂	M.	No gls. Ref. within normal	Too young to test	+25°	Underaction of (L) lateral rectus
22. C.D.	3	F.	R. <u>+1.50</u> <u>+1.50</u> 90 L. <u>+1.50</u> <u>+1.50</u> 90	Too young to test	+35° 40°	Underaction of (L) lateral rectus
23. C.M.	10	F.	R. <u>+3.00</u> <u>+0.50</u> L. <u>+4.00</u>	6/6 6/18	+35°	Underaction of (L) lateral rectus
24. A.F.	17	F.	<u>+0.50</u> <u>-1.50</u>	6/60 6/6	+30° R.C.S.	Full
25. D.V.	8	M.	Refraction within normal limits	6/24 6/6/	+35° R.C.S.	Full
26. M.C.	5	F.	R. <u>+2.50</u> L. <u>+2.50</u>	6/9 6/60	L.C.S. +25°	Full

<i>Surgery</i>	<i>Angle</i>	<i>Ocular Movements</i>	<i>Cover Test</i>	<i>Cosmetic State</i>	<i>B. V.</i>
Right internal rectus recession Left lateral rectus torsion 2 turns	+15° c gls.	Full	Manifest Left convergence	Improved but still convergent	Not present Had (R) medial rectus recession previously
Left medial rectus recession Left lateral rectus torsion 2 turns	0° c gls.	Full	N.A.D.	Excellent	(L) Suppression
Left medial rectus recession Left lateral rectus torsion 2 turns	0° c gls.	Full	N.A.D.	Excellent	Too young to test
Left medial rectus recession Left lateral rectus torsion 2 turns	+10° c gls.	Full	Manifest Left convergence L.C.S.	Still convergent but improved	Not present
Left medial rectus recession Left lateral rectus torsion 2 turns	0° c gls.	Full	N.A.D.	Excellent	Weak
Right medial rectus recession Left lateral rectus torsion 2 turns	0° c gls.	Full	Slight manifest (R) convergence	Good	(R) Suppression
Right medial rectus recession Right external rectus torsion 2½ turns	+5° c gls.	Full	N.A.D. for distance R.C.S. for near	Good	(R) Suppression
Left medial rectus recession Left external rectus torsion 2 turns	+5°	Full	N.A.D.	Excellent	(L) Suppression

Name	Age	Sex	Refraction and vision with glasses	Angle of Deviation pre-operative with glasses		Ocular Movements
27. A.E.	10	F.	$\overline{\text{R.} + 1.50}$ 88	6/6	L.C.S. $+ 45^\circ$	Underaction of (R) lateral rectus
			$\overline{\text{L.} + 1.50}$ 10°	6/60		
28. A.T.	4	M.	$\overline{\text{R.} + 4.00}$	6/18	L.L.S. $+ 15^\circ$	Underaction of (L) lateral rectus
			$\overline{\text{L.} + 4.00}$	6/24		
29. B.E.	7	M.	$\overline{\text{R.} + 3.00}$	6/6	L.C.S.	Underaction of (L) lateral rectus
			$\overline{\text{L.} + 3.00}$	6/60		
30. G.J.	20	M.	{ R. Slight hyper- metropia L. but no glasses ordered	6/9 6/5	$+ 45^\circ$	Underaction of (R) lateral rectus
31. M.M.R.	9	F.	$\overline{\text{R.} + 2.50}$	6/9	$+ 35^\circ$	Underaction of (R) rectus
			$\overline{\text{L.} + 1.00}$	6/9		
			$\overline{\quad + 2.00}$.10			
32. C.P.	10	F.	No glasses	6/6 6/36	$+ 40^\circ$	Full
33. A.J.	8	M.	$\overline{\text{R.} + 2.50}$	6/6	$+ 35^\circ$	Full
			$\overline{\quad + 0.50}$ 17°			
			$\overline{\text{L.} + 2.50}$	6/12		
			$\overline{\quad + 1.00}$ 65			
34. B.A.	8	M.	R. + 1.5 L + 1.5	6/36 6/9	$+ 35^\circ$	Full

<i>Surgery</i>	<i>Angle</i>	<i>Ocular Movements</i>	<i>Cover Test</i>	<i>Cosmetic State</i>	<i>B. V.</i>
Left medial rectus recession Left lateral rectus torsion 2½ turns	+10°	Full	Slight manifest (R) convergence	Satisfactory but still convergent	(R) Suppression
Left medial rectus recession Left lateral rectus torsion 2½ turns	+2°	Full	N.A.D.	Good	Weak
Left medial rectus recession Left lateral rectus torsion 2½ turns	+5°	Full	Manifest (L) convergence	Good	(L) Suppression
Right medial rectus recession Right lateral rectus torsion 2 turns	+5°	Full	Manifest (R) convergence	Good	Present
Right internal rectus recession Right external rectus torsion 2½ turns	0°	Full	N.A.D.	Good	Present
Left internal rectus recession Left external rectus torsion 2 turns	+3°	Full	N.A.D.	Excellent	(L) Suppression
Left internal rectus recession Left external rectus torsion 2 turns	+5°	Full	N.A.D.	Excellent	Present
Right medial rectus recession Right lateral rectus torsion 2 turns	+5°	Full	Slight manifest (R) convergence	Good	(R) Suppression

Name	Age	Sex	Refraction and vision with glasses		Angle of Deviation pre-operation with glasses		Ocular Movements	
35. F.M.T.	1½	F.	<u>-1.50</u>	<u>-1.0</u>	6/	+35°	Underaction of (R) eye on abduction	
			-1.50 18°	-1.0 18°	6/			
36. A.P.	4	M.	+1.5DS +1.50DS Greyish fold on Retina (L) Lens		6/9 6/60	+35°	Underaction of (L) Medial rectus	
37. S.J.	4	M.	<u>+0.5</u>	<u> </u>	6/18	+15°	Elevation of (R) eye on adduction	
			+0.50	+0.75 90	6/6			
38. M.M.	25	F.	-1.0DS	-1.0DS	6/6	6/12	+30°	Underaction of (L) eye on abduction
39. B.J.	5	F.	+1.5DS	+1.5DS	6/18	6/60	+45°	Underaction of (L) external rectus
40. S.F.	6	M.	R. <u>-0.50</u>		6/60	6/9	+30°	Underaction of (R) external rectus
			+1.50 80					
41. A.V.	8	M.	+4.5	+4.5	6/9	6/18	+25°	Full
42. G.R.	16	F.	-2.0DS	-2.0DS	6/18	6/6	+40°	Bilateral Underaction Abduction
43. J.L.	14	M.	<u>-2.0</u>	<u>-2.0</u>	6/9	6/9	-30°	Weakness of Convergence
			-2.0 18°	-2.0 18°				
44. C.A.	22	M.	Had (R) Cataract Extraction Aged 5.		CF	6/6	-30°	Underaction of (R) medial rectus

<i>Surgery</i>	<i>Angle</i>	<i>Ocular Movements</i>	<i>Cover Test</i>	<i>Cosmetic State</i>	<i>B. V.</i>
Right medial rectus recession Right Internal rectus torsion	+5°	Full	Slight manifest (R) convergence	Satisfactory but still convergent	No B.V. Nystagmus
Left medial rectus recession Left lateral rectus torsion 2 turns	-2°	Under-action of L. medial rectus	Slight manifest (L) divergence	Satisfactory	No B.V.
Right medial rectus recession Right lateral rectus torsion 2 turns	+5°	Inferior oblique attached to external rectus	Slight R.C.S. c R/L	Good	(R) Suppression
Left medial rectus recession Left lateral rectus torsion 2 turns	-3°	Full	Slight (L) divergence	Good	No B.V.
Left medial rectus recession Left lateral rectus torsion 3 turns	0°	Full	N.A.D.	Good	(L) Suppression
Right medial rectus recession Right lateral rectus torsion 2 turns	0°	Full	N.A.D.	Good	(R) Suppression
Left medial rectus recession Left lateral rectus torsion	0°	Full	N.A.D.	Good	B.V. present
Left rectus recession Left lateral rectus torsion 2 turns	+10°	Full	Manifest (R) C.S.	Still cosmetically convergent	No B.V. Had bilateral medial rectus rec. 1967
Bilateral ext. rectus recession Medial rectus torsion 2 turns	-5°	Full	Manifest alternating divergence	Slightly divergent	Nil
Right external rectus recession Medial rectus torsion 2 turns	-5°	Under-action of (R) medial rectus	Manifest right divergence	Cosmetically satisfactory	Nil