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Treatment for 'A' or 'V' pattern esotropia by slanting muscle insertion

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Abstract

***Background*—Patients with 'A' or 'V' pattern esotropia without vertical muscle overaction have traditionally been treated with medial rectus recession and vertical transposition of the muscle insertions.**

***Method*—Seven cases are presented treated by slanting muscle insertions, whereby the lower margin of the medial rectus is preferentially recessed more than the upper margin in esotropia, and the upper margin is recessed more than the lower margin in A esotropia.**

***Results*—All seven patients had their A or V patterns eliminated, with six achieving good alignment in all positions of gaze.**

***Conclusion*—The slanting muscle insertion should be considered as an alternative technique in all cases of A or V pattern esotropia.**

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The treatment of choice for 'A' or 'V' pattern esotropia in the absence of marked overaction of the oblique muscles has been recession of the medial rectus muscles with vertical transposition of the insertions. Boyd[1] in 1971 reported a slanting muscle insertion as being effective in A or V patterns without vertical transposition. Surprisingly, little has appeared in the literature since then with regard to this procedure. We report seven consecutive cases of A or V esotropia seen in a 1 year period treated with slanting recessions of the medial rectus muscles.

Surgical techniques

In V pattern esotropia, bilateral medial rectus muscle recessions are performed, with the upper margin of the muscle being recessed to correct the deviation in upward position and the lower margin being recessed a greater amount according to the downward deviation. In A pattern esotropia the deviation is greater in upward gaze and so more recession is performed on the upper margin than on the lower margin of the muscle (Fig 1). The difference in recession was between 2 and 3 mm in accordance with the differences in measurements.

The amount of recession was based on the surgery tables of Parks.[2] If the measured angle was less than 15 prism dioptres this meant only a 1 or 2 mm recession. The difference in recession between upper and lower muscle edges was as much as 3 mm. All measurements were from muscle insertion.

Two single armed sutures were inserted and locked in the upper and lower edge of the muscle close to the insertion. The muscle was cut close to its insertion and reattached in accordance with the predetermined amounts.

The size of the strabismus was measured by prism cover test in primary position and at 25° upward gaze and 25° downward gaze with the patient fixing a target at 33 cm and at 6 metres. All patients had clinically significant A-V patterns of at least a 15 prism dioptre difference between upward and downward gaze with a V pattern, and a difference of at least 10 prism dioptres in an A pattern. There was no significant vertical muscle overaction seen on versions.

Binocular function was tested with the Titmus stereo test and Worth four dot test. Length of follow up ranged from 8–12 months with an average of 10 months.

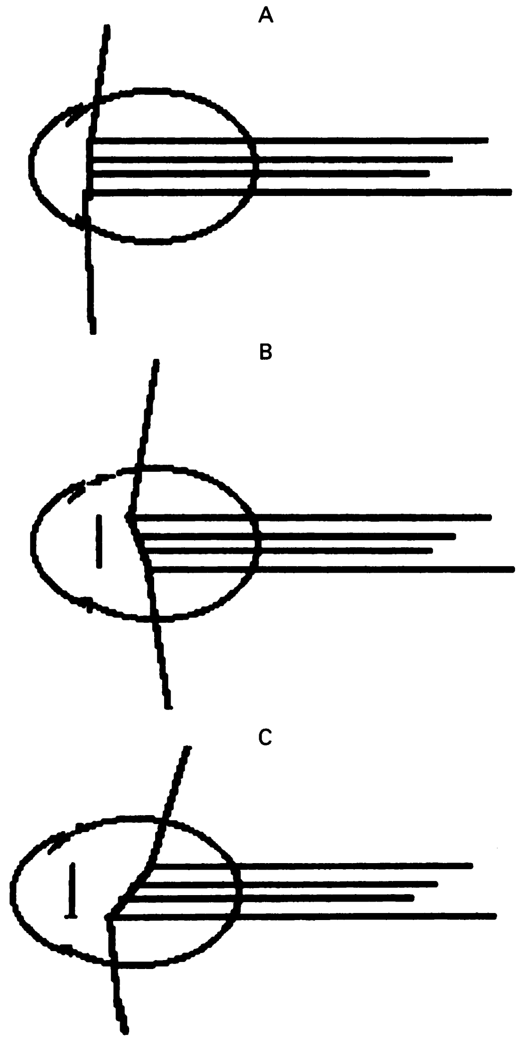

Figure 1 (A) Sutures are inserted and locked at the upper and lower edges of the muscle. (B) Slanting recession of the medial rectus muscle in V pattern esotropia. (C) Slanting recession of the medial rectus muscle in A pattern esotropia.

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Table 1 Pre and postoperative data and surgery performed on four patients with 'V' pattern esotropia

No	Age at surgery (years)	Preop deviation N (up PP	Preop deviation D down)	Preop binocular function	Procedure	Postop deviation N (up PP	Postop deviation D down)	Postop binocular function	Follow up (months)
1	14	15	12		Recess MR OU	OT	XT2		
		ET20	20	None	UM 3·5 mm	OT	OT	None	12
		30	26		LM 5·5 mm	OT	OT		
2	6	20	18		Recess MR OU	ET6	ET4		
		ET28	28	None	UM 3·0 mm	ET6	ET4	None	12
		35	35		LM 5·0 mm	ET8	ET4		
3	8	4	2		Recess MR OU	OT	OT		
		ET12	10	None	UM 1·0 mm	OT	OT	None	10
		20	18		LM 3·5 mm	OT	OT		
4	16	25	20		Recess MR OU	ET12	ET12		
		ET40	35	None	UM 4·0 mm	ET12	ET10	None	8
		60	45		LM 6·0 mm	ET18	ET14		

MR=Medial rectus muscle; ET=esotropia; OT=orthotropia; N=near; PP=primary position; OU=both eyes; UM=upper margin of muscle; LM=lower margin of muscle; D=distance.

Table 2 Pre and postoperative data and surgery performed on three patients with 'A' pattern esotropia

No	Age at surgery (years)	Preop deviation N (up PP	Preop deviation D down)	Preop binocular function	Procedure	Postop deviation N (up PP	Postop deviation D down)	Postop binocular function	Follow up (months)
1	9	28	28		Recess MR OU	ET4	OT		
		ET18	18	None	UM 4·0 mm	ET4	OT	None	8
		16	14		LM 2·0 mm	ET4	OT		
2	6	35	25	AHP	Recess MR OU	ET4	ET2	No	
		ET20	18	100"	UM 5·0 mm	ET2	OT	AHP	
		10	8		LM 2·0 mm	OT	OT	100"	8
3	5	ET20	20		Recess MR OU	OT	OT		
		ET18	15	Fusion	UM 4·0 mm	OT	OT	Fusion	10
		ET 2	OT		LM 2·0 mm	OT	XT2		

AHP=anomalous head posture; MR=Medial rectus muscle; ET=esotropia; OT=orthotropia; N=near; PP=primary position; OU=both eyes; UM=upper margin of muscle; LM=lower margin of muscle; D=distance; XT=exotropia.

Results

Successful alignment (up to 10 prism dioptres eso or exodeviation) in all fields of gaze was achieved in six of the seven cases. The seventh case had his V pattern eliminated, but remained esotropic (Tables 1 and 2).

Discussion

Horizontal muscle surgery with vertical transposition of the muscle insertions is the treatment of choice for A or V pattern esotropia without overacting vertical muscles. However, as pointed out by Boyd,[1] there are theoretical and practical disadvantages to this method. Vertical displacement of horizontal muscles may induce torsional effects because of the change of the muscle plane in relation to the rotational axes of the eye. For example, displacing a medial rectus muscle upward may induce an intorsional element to the muscle action. In addition, measurement of the degree of transposition is difficult because of the variation between patients in muscle breadth, location of muscle insertion, and insertion breadth. In contrast, the slanting technique preserves more normal anatomy with less torsional effects expected, and is technically easier and more reproducible than insertion transposition.

Scott[3] and Nemet[4] have suggested that in downgaze the lower margins of the medial rectus muscles shorten more than the upper. By preferentially recessing these fibres a greater weakening effect would be expected in downward gaze. A similar shortening of the upper margin muscle fibres would be expected in upward gaze and preferentially recessing these fibres would be expected to have a greater effect in upward gaze. Boyd implemented the slanting insertion technique to take advantage of this differential effect in A and V patterns. Nemet[4] used this theory in cases of convergence insufficiency, performing a slanting resection of the medial rectus muscle to give a greater tightening of the muscle in downgaze.

We have confirmed Boyd's experience in our small series of A and V pattern esotropia. A comparison with a control group undergoing the standard vertical transposition of the horizontal muscles with long term follow up would be of importance in elucidating the advantages and disadvantages of this relatively easy technique.

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2 Park MM, Wheeler MB. Concomitant esodeviation. In: Duane TD, ed. *Clinical ophthalmology.* Vol 1; Revised ed. Philadelphia: Lippincott, 1988, 1–4.
3 Scott AB. Strabismus muscle forces and innervation. In: Lennerstrand G, Bach P, Rita Y, eds. *Basic mechanisms of ocular motility and their clinical implications.* Oxford: Pergamon, 1975: 181–91.
4 Nemet P, Stolovitch C. Biased resection of the medial recti: a new surgical approach to convergence insufficiency *Binocular Vision* 1990; **5:** 213–6.