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Author(s): Stephen J Lewis; H N Tasker

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Mechanism related to the lateral rectus muscle capable of retracting the outer canthus of the eye

S J Lewis
Department of Health and Community Studies,
Chester College,
Chester

H N Tasker
Department of Anatomy,
University of Wales College of Cardiff,
Cardiff

Correspondence to
Dr Stephen Lewis,
Department of Health and Community Studies,
Chester College,
Cheyney Road,
Chester CH1 4BJ

Relatively few anomalies of the extrinsic musculature of the human orbit have been identified. Whitnall¹ believed that this was because 'dissecting room conditions do not favour their identification'. This probably remains true given that the most common teaching entry to the orbital cavity is via the thin supraorbital plates.

Case report

During detailed dissection of the contents of the orbital cavity, a distinct fibromembranous slip arising from the belly of the left lateral rectus muscle (Fig 1) was discovered in a male subject. The slip ran parallel with the muscle and was attached to the fascia deep in the lateral canthus. A pronounced elevation of the muscle belly was observed associated with the slip's muscular attachment. Muscle fibre arrangement in this elevation suggested that it could not be involved in movement of the eye but would have pulled instead, via the slip, on the outer canthus. There was no separate nerve supply to this elevation; thus, normal contraction of the lateral rectus in abduction of the gaze would have caused a simultaneous pull on the outer canthus. By pulling with forceps to stimulate this action, an accompanying retraction of the lateral canthus was observed. This appeared to provide an apparently purposeful, additional action for the lateral rectus in that, while abducting the gaze, it also helped draw the lateral canthus posteriorly, reducing restriction of vision laterally. Although similar fibrous structures were evident contralaterally, as distinct a slip was not found beside the right lateral rectus muscle.

In the absence of materials for further detailed dissection, a short study of outer canthus retraction was performed in living subjects asked to follow a pointer moved laterally in the inter-pupillary plane. χ^2 Analysis of the findings (Table 1) suggested no sex difference but that right side retraction was more prevalent (males, $p=0.019$; females, $p=0.005$).

Comment

Although muscular fasciculi have been noted passing from the lateral rectus muscle and inserting into the inferior tarsal plate, the lateral wall of the orbit, to the inferior rectus or even the medial rectus,² variation in the orbital connective tissue has received less attention. Only quite recently has the role of connective tissue in the orbital cavity begun to be more fully appreciated histologically³⁻⁶ such that it is now being considered as an important accessory mechanism involved in eye movement.⁴⁻⁶ Its arrangement has also

been shown to vary between individuals⁶ and bilaterally.⁴ As Koornneef⁵ observed, orbital connective tissue ‘plays an important, yet to be unravelled, role when normal eye movements are performed’. Connective tissue attachments between lateral rectus muscle and the lateral orbital wall have been described.⁴ Whitnall¹ also described how ‘by means of the connections of their fascial sheaths ... the lateral rectus draws the corresponding commissure slightly backwards’ and also, when describing the relation between both the medial and lateral recti and their respective check ligaments, commented that the ‘recession of parts ... seen on strong movements of the eyeball’ was a product of the muscle ‘attachments to the commissure’. The fibrous slip described here appears to be related to that mechanism. Although a role in outer canthus retraction is evident, a movement stabilising role whereby the slip might tether the lateral rectus to its lateral relations could also be postulated.

¹ Whitnall SE. *The anatomy of the human orbit*. Oxford: Oxford University Press, 1932: 284-5 and 297.

² Bergman RA, Thomson SA, Afifi AK, Saadeh FA. *Compendium of human anatomic variation*. Baltimore: Urban and Schwarzenberg, 1998: 33-4.

³ Koornneef L. *Spatial aspects of orbital musculo-fibrous tissue in man*. Amsterdam: Swets and Zeitlinger, 1997.

⁴ Koornneef L. New insights in the human orbital connective tissue. Result of a new anatomical approach. *Arch Ophthalmol* 1977; **95**: 1269-73.

⁵ Koornneef L. Orbital septa: anatomy and function. *Ophthalmology* 1979; **86**: 876-80.

⁶ Koornneef L. Eyelid and orbital fascial attachment and their clinical significance. *Eye* 1988; **2**: 130-4.



Table 1 Outer canthus retraction patterns in living subjects

	<i>Left side only</i>	<i>Both sides</i>	<i>Right side only</i>	<i>Neither side</i>	<i>Totals</i>
Males	7	18	19	34	78
Females	2	25	13	30	70
Totals	9	43	32	64	148