

In cases 1–4 it was difficult to measure the visual function due to the patients' mental retardation and/or behavioural disturbance. Case 6 gives an indication of the degree of unaided visual improvement that can be expected in epikeratoplasty for keratoconus.<sup>5</sup> Where there is significant corneal scarring deep lamellar keratoplasty with lyophilised tissue can be used,<sup>6</sup> and this latter technique could perhaps also benefit from botulinum toxin induced ptosis as part of the early postoperative management.

In conclusion, our case reports suggest that therapeutic botulinum toxin ptosis is a useful adjunct in the management of patients undergoing epikeratoplasty with freeze dried tissue since it promotes stabilisation of the epithelium on the graft.

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## Exotropia as a sign of myasthenia gravis in dysthyroid ophthalmopathy

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The association between thyroid disorders and myasthenia gravis (MG) has long been recognised. The occurrence of Graves' disease is reported in 3–10% of myasthenic patients.<sup>1</sup> In contrast, MG occurs in considerably less than 1% of dysthyroid patients.<sup>2</sup> When a full blown thyroid ophthalmopathy, systemic myopathy, or both are present, additional muscle weakness caused by the onset of MG may be difficult to detect by examination alone. We present four patients with dysthyroid orbital disease who developed exotropia and variable ptosis caused by MG. Subsequent review of the records of 91 patients with dysthyroid orbitopathy, none of whom had MG when evaluated, revealed no additional cases with exotropia.

### Case reports (Tables 1, 2)

Four patients with typical signs of dysthyroid orbitopathy had the new onset of diplopia. All

four patients were being treated with methimazole (Tapazole) or propylthiouracil or had been treated for hyperthyroidism. In each patient, the examination of the visual sensory system, pupils, anterior segment, intraocular pressure, and fundus was normal. Varying degrees of ocular motility limitation resulted from both the thyroid disease and MG. In primary gaze, an exotropia from 5 to 45 dioptres was measured in all four patients. Ptosis associated with proptosis and lid oedema in addition to MG occurred in all four patients. An edrophonium test was positive in three patients; the test was deferred in the fourth because of unstable arrhythmias. The serum acetylcholine receptor antibody assay was negative in all four patients. Three patients had marked improvement after treatment with oral prednisone, started at 60 mg/kg per day and tapered over 4–6 weeks. The fourth patient had a positive skin test for tuberculosis which precluded corticosteroid therapy. Computed tomography (CT) of the orbits, performed in two patients, showed bilateral enlargement of inferior and medial rectus. CT of the chest in all four patients showed no thymoma.

### Comment

Clinical differentiation between MG and dysthyroid orbitopathy is usually not difficult. Although the extraocular muscles are frequently

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Table 1 Ocular motility evaluation

Case	Age/sex	Ptosis (R/L)	Proptosis (mm R/L)	Edrophonium response	Ocular deviation Primary gaze (D)
1	60/F	Mild R	3 L	Infraduction R/L Ptosis	XT 45, LHT 2
2	60/F	Moderate L	5 R/L	Not performed	XT 5, RHT 20
3	28/F	Mild R	–	Infraduction R/L Horizontal gaze R/L Ptosis	XT 30
4	48/M	Mild R/L	4 R/L	Horizontal gaze R/L Ptosis	XT 40

Table 2 Ocular motility change with prednisone therapy

Case	Ocular motility limitation	Forced duction	Prednisone induced improvement
1	Supraduction R/L Infraduction R/L Abduction R/L M Adduction R/L S	Supraduction R/L+ Adduction R/L -	Horizontal gaze R/L Ptosis
2	Interior rectus S	Infraduction R - Adduction R - Supraduction R/L -	Inferior rectus Ptosis
3	Adduction R/L S Abduction R/L M Infraduction L S		Adduction R/L Abduction R/L Infraduction Ptosis
4	Supraduction R/L S Infraduction R/L S Adduction R/L S Abduction R/L S	Supraduction R/L + Abduction R/L -	Not treated

R=right eye; L=left eye; M=mild; S=severe.

involved in both disorders, in Graves' disease a restrictive myopathy, usually of the inferior and medial recti, occurs. Diplopia and deficits of supraduction and abduction causing esotropia and hypotropia are common, but exotropia is rare.<sup>3-6</sup> This is supported by a review of our records of patients with dysthyroid orbital disease alone which did not reveal a case with exotropia.

In ocular MG, variable ptosis and ophthalmoparesis occur.<sup>7,8</sup> Diplopia or ptosis is present at the onset of MG in up to 70% of patients.<sup>9</sup> During the course of MG, ocular symptoms will develop in 90% of patients.<sup>9,10</sup> Orbicularis oculi weakness is also common with ocular myasthenia. Although not seen in our patients, a lid twitch can be elicited in 50% of myasthenic patients.<sup>7,9</sup> Myasthenia gravis does not have a predilection for a particular extraocular muscle. The initial ocular manifestation typically involves more than one extraocular muscle without a consistent pattern of dysfunction.<sup>7,10</sup> However, when a solitary paresis occurs it commonly results in an adduction deficit.<sup>11</sup> Weakness of the voluntary muscles of the head and neck is common in MG and rare in thyroid disease.<sup>10</sup>

In addition to the obvious differences, both diseases share some features, principally weakness and fatigability of voluntary muscles.<sup>4</sup> The course of either disorder can be marked by spontaneous crises and remissions or chronic progression of muscle dysfunction. A cursory clinical examination can lead to an incomplete diagnosis. Lid retraction, a dysthyroid sign, may be apparent in MG in the lid contralateral to a

ptotic lid.<sup>12-14</sup> Upper lid ptosis, typically mild and usually very suggestive MG, can be seen with Graves' disease because of oedema, infiltration, and levator myopathy.<sup>15</sup> Among those with both disorders, hyperthyroidism appears first in 54%, MG first in 37%, and both occur simultaneously in 9% of patients.<sup>3</sup>

These two entities can also be distinguished by pharmacological responses. Thyroid myopathy is not reversed by edrophonium or pyridostigmine and treatment with corticosteroids is of minimal benefit. In contrast, ocular MG typically normalises with small doses of edrophonium and improves with a short course of moderate dose corticosteroids.<sup>16</sup> In our four patients the presence of both a variable ptosis and exotropia suggested concomitant MG. The marked responsiveness to corticosteroids and edrophonium further indicated that the ocular motility disturbance was not solely due to a restrictive myopathy.

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