SHORT REPORT

Acute oropharyngeal palsy is associated with antibodies to GQ1b and GT1a gangliosides

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Abstract
Three patients with acute oropharyngeal palsy had high titre anti-GQ1b and anti-GT1a IgG antibodies. No patients had ophthalmoplegia or ptosis. In all patients limb ataxia or areflexia were present without notable limb weakness. These patients describe an oropharyngeal variant of Guillain-Barré syndrome in terms of anti-GQ1b antibody reactivity and show that high titre anti-GQ1b antibodies, serologically indistinguishable from those found in Miller Fisher syndrome, can occur in a clinical setting without ophthalmoplegia. The anti-GQ1b and anti-GT1a antibody assays may be helpful tests when considering the differential diagnosis of acute oropharyngeal palsy.

Case reports and assay methods
Table 1 summarises the clinical features of the three patients. The initial symptoms in all patients were of dysarthria and dysphagia. At no time did any patient complain of double vision or have clinically evident ophthalmoplegia. In each patient there was no significant functional involvement of other sites although minor symptoms and signs, including paraesthesiae, limb weakness, ataxia, and areflexia were variably present. One patient required tube feeding and two required dietary modification to tolerate an oral intake. All patients made a good recovery. The preceding infections were unidentified upper respiratory tract infections in two patients and serologically established Campylobacter jejuni enteritis in the other patient. Peripheral nerve electrophysiology was abnormal in all patients showing both motor and sensory nerve conduction abnormalities.

A control group of 10 consecutive patients with Miller Fisher syndrome, with the triad of ophthalmoplegia, ataxia, and areflexia, was studied for comparison (summarised in table 1). Nine of these patients with Miller Fisher syndrome had cranioopharyngeal weakness without notable limb weakness, this being the typical pattern of Miller Fisher syndrome seen locally. All patients had preceding unidentified upper respiratory tract infections and abnormal electrophysiological studies compatible with the diagnosis of Miller Fisher syndrome.

Serum samples were collected four days (patient 1), 14 days (patient 2), and eight days (patient 3) after the onset of symptoms and before specific treatment was started. Samples were stored at −70°C until assayed. Antibody
assays were performed with a panel of gangliosides comprising GM1, GM2, GM3, GD1a, GD1b, GD3, GT1a, GT1b, and GQ1b in a standard enzyme linked immunosorbent assay (ELISA), and a thin layer chromatography (TLC) overlay technique as previously described. Titres were calculated by end point dilution analysis. Our normal ranges for antiganglioside IgG antibodies are set at <1/500 (2 SD above the mean of a panel of normal and disease control serum samples). IgG subclass analysis was performed as previously described.

For statistical analysis the antibody titres were log, transformed. Unpaired Student’s t test was then used to assess the significance of the differences of the titres of anti-GQ1b and anti-GT1a antibodies between the group of three oropharyngeal patients and the 10 patients with Miller Fisher syndrome. The ratios (GQ1b:GT1a and GT1a:GQ1b) of the log transformed titres were estimated for each individual patient and the Mann-Whitney U test was used to assess the differences in the ratios between the two groups.

**Results**

IgG antibodies to GQ1b and GT1a gangliosides were found in high titres in all three patients (table 2). Reactivities found by ELISA were confirmed using TLC overlay (not shown). Raised antibodies to GD3 (two patients) or GD1b (one patient) were also present but remained within the normal range. No patients had detectable antibodies to GT1b, GM1, or to the other gangliosides tested. IgG subclass analysis showed that both the anti-GQ1b and anti-GT1a IgG antibody reactivities resided in the IgG3 subclass in patients 1 and 2, and in the IgG1 subclass in patient 3 (data not shown).

All 10 patients with Miller Fisher syndrome had raised antibody titres (table 2) to GQ1b and nine had raised GT1a antibodies. The patient with Miller Fisher syndrome with a low GT1a titre (1/220) had clearly raised titres to GQ1b (1/2600) and to GT1b (1/3200). Many of the patients with Miller Fisher syndrome and oropharyngeal patients also had detectable antibody titres to structurally related gangliosides such as GD1b, GT1b, and GD3 (table 2). Although these titres were below 1/500 in many instances and would not be considered significant in isolation, the fact that they occurred in the presence of high titres to GT1a and GQ1b does suggest that they are a significant element of this acute immune response.

In the oropharyngeal patients the mean antibody titres to GT1a (1/6500) were higher than those to GQ1b (1/2250); by contrast with the patients with Miller Fisher syndrome the mean GT1a titre (1/5000) was lower than the mean GQ1b titre (1/8000). However, statistical analysis of the titres to either antigen showed no significant differences between the patients with oropharyngeal palsy and patients with Miller Fisher syndrome (P = 0.19 for GQ1b; P = 0.78 for GT1a). Similarly analysis of the ratios of the paired values between both groups just failed to achieve significance at the 5% level (0.05 < P < 0.10).

**Discussion**

The oropharyngeal variant of Guillain-Barré syndrome may occur in isolation but usually occurs as a transitional syndrome with other features of either Guillain-Barré syndrome or Miller Fisher syndrome. Although these three patients may fit into a transitional category as
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with their very close structural similarity. The absence of reactivity with GT1b indicates that a terminal disialylated galactose (common to both GQ1b and GT1a but absent on GT1b) is an essential feature of the reactive epitope. The relative reactivity with GQ1b and GT1a does not statistically correlate with the clinical pattern of cranioopharyngeal involvement in the Miller Fisher syndrome or oropharyngeal patient groups. However, the data tend towards the GT1a/GQ1b titre ratio being higher in the oropharyngeal group than in the Miller Fisher syndrome group, suggesting that anti-GQ1b and anti-GT1a antibodies may be markers for ophthalmoplegia and cranioopharyngeal palsy respectively. In addition, the presence of anti-GD1b or anti-GD3 antibodies seems to be associated with more prominent sensory involvement, as previously suggested. The few patients studied preclude detailed statistical analysis but these concepts are compatible with previously published data. Although the relative antigen titre GQ1b in humans and motor nerves compared with peripheral nerve has been analysed and found to be high, its quantitative relation with GT1a and other disialylated gangliosides throughout the craniobulbar region is unknown.

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