ligated to the pMalc vector. Plasmids were transformed into Escherichia coli DH5. Production of the recombinant fusion protein was induced with isopropyl-p-0-thio-galactopyranoside. The DH5 cells were sonicated and centrifuged, after which the supernatant was applied to an amylase resin column and eluted with maltose to separate the Yo protein fused to the maltose binding protein (figure). For ELISA, the r-Yo was bound to immunoplates (0.5 µg/well). Non-specific binding was blocked with 0.3% buffered saline (TBS) containing 0.5% skimmed milk. The patient’s serum then was diluted 1:5000 with the blocking solution and immunostained with avdin-biotin-peroxidase. Absorbance at 495 nm was measured with a spectrophotometer. The normal and disease control samples consisted of serum samples taken from 10 healthy young adults, from 10 patients with spinocerebellar degeneration (mean age 56 (SD 11)), and from seven patients with gynaecological cancer without neurological symptoms. The mean ELISA absorbance of serum samples from the young adult controls was 0.080 (SD 0.025) and that from the disease controls, 0.082 (SD 0.046). The absorbance for serum from the patient with PCD before treatment was 1.200. After three cycles of plasmapheresis, it rose to 1.764. On the basis of her clinical picture and the presence of the characteristic anti-Yo antibody, we did a test laparotomy with her informed consent because the conventional survey had found no tumour. A fallopian tube adenocarcinoma 1.5 cm in diameter was identified and successfully resected. Cancer chemotherapy was started 18 days after operation (cisplatin, adriamycin, cyclophosphamide, and 5-fluorouracil). Two more chemotherapy cycles were given at monthly intervals. The antibody titre of serum taken serially at various times during treatment and during the three year follow up period showed a gradual reduction to 0.401. Patients with PCD who have anti-Yo antibody have been found to have mostly breast or gynaecological cancers. More than half of these patients with PCD showed neurological symptoms only for several months, no underlying cancer being detected despite extensive surveys for malignancy. The detection of antineuronal antibodies, therefore, is important for the early detection of the underlying cancer. These autoantibodies can be detected from the staining distribution obtained by immunohistochemical means as well as by their molecular sizes on immunoblots. But, as there are many molecules of similar size, we constructed r-Yo to use as the ELISA antigen to group patients with PCD with an autoantibody that recognises the same molecule.

In ELISA, our patient’s serum and CSF both had a high titre for the anti-Yo antibody. This titre increased two weeks after plasmapheresis, indicative of rebound overproduction of the antibody. After tumour resection and subsequent anticancer chemotherapy, the patient’s anti-Yo antibody titre gradually decreased. Her neurological symptoms showed mild improvement, suggesting that early tumour resection ameliorates neurological symptoms. Increases in antibody titres indicate the immunological state of the host, indirect evidence of tumour antigen stimulation. Therefore it is very important to follow up changes in specific antibodies in patients with PCD.


Painful paroxysmal dystonia associated with foci of epileptic activity

Painful paroxysmal dystonia, a rare movement disorder, is characterised by recurrent episodes of brief, intensely painful unilateral abnormal posturing of one or two limbs unassociated with clonic movements or impairment of consciousness. The mechanism remains obscure, and most cases with identifiable causes have subcortical lesions, particularly in the brain stem, as in multiple sclerosis. Our patient had typical painful paroxysmal dystonia associated with cortical epileptic activity in the EEG. A 72 year old woman was admitted for the evaluation of recurrent painful dystonic posturing of her left extremities. These attacks were characterised by sudden unprovoked torsion of the head forward, adduction of the left arm at the shoulder with flexion at the elbow and at the wrist and extension of the fingers, extension of the left knee, and plantar flexion of the left

Almost continuous epileptic activity apparent in the right frontal-frontal sagittal region during drowsiness.
foot and toes. During an episode, which lasted for 2 to 30 minutes, he complained of sharp pain in the left extremities that could not be explained solely by the muscle contraction causing the dystonic posturing. There were no alteration of consciousness, loss of sphincter control or clonic movements in the limbs. The attacks had started without obvious precipitating factors 10 days before admission and occurred with a frequency of 5–10 per day.

The patient, a male at the age of 53, had experienced a single similar attack of "painful spasm" in her left extremities that had not been treated and had not recurred. Mild depressive symptoms had been present since the age of 60, being treated with fluvoxamine and benzodiazepines.

Factors for recurrent "painful spasm" of the legs are epilepsy and examination (200 and 230 days before phenol treatment). Treatment of the patient reported that the patient was receiving no medications and that the symptoms were not relieved by any treatment. Treatment with carbamazepine (200 mg three times daily) led to dramatic cessation of attacks and disappearance of the epilpeptic activity on the EEG.

Paroxysmal dystonia was previously described by different terms, such as painful tonic seizures and painful tonic spasm. It represents one of the distinct paroxysmal features of multiple sclerosis.1 Epsiphal activation of axons within demyelinated plaques or other structural lesions may be responsible for the motor and sensory symptoms of the paroxysmal dystonia.2

Bennett3 attributed painful paroxysmal dystonia to the heterogeneity of paroxysmal dyskinesias, stressing their non-epileptic character and emphasizing their importance in the differential diagnosis of epilepsy. The most characteristic features of these fits are their painful nature and typical pattern of unilateral limb posturing.1 Both ictal and interictal EEGs were reported to be normal or showed non-specific changes.1 Supporting the non-epileptic origin of painful paroxysmal dystonia. By contrast, dystonic posturing may occur in epilepsy, albeit it is usually not painful.1

Paroxysmal pain associated with motor phenomena may also be a rare manifestation of epilepsy.4 It has been suggested that episodic pain originates from the contralateral contralateral hemisphere and may be a marker of bilateral thalamus and parietal cortex.5 The motor component of painful epileptic seizures was reported to be represented by unilateral clonic or tonic-clonic convulsions with or without march, tonic deviation of the head and eyes, bilateral clonic movements of the extremities, generalised tonic-clonic convulsions, transient motor weakness without tonic deviation, and "stiffening" of the arm or leg.6 Painful epileptic seizures with a characteristic pattern of unilateral posturing of the extremities meeting the criteria of painful paroxysmal dystonia to our knowledge have apparently never been described.

Our patient had typical unprovoked painful paroxysmal dystonia associated with focal cortical epileptic activity in the contralateral frontal-frontal sagittal region. This approximates to the motor and supplementary motor region that, when activated, may result in postural changes.1 Although we have not obtained an ictal recording, the association of the clinical events with well-defined epileptic focus in the EEG and the disappearance of seizures after carbamazepine treatment, suggest a causal relation between the electrographic phenomena and the patients' symptoms. The patients' episodes diminished despite increasing doses.

Muscles no longer developed weakness, atrophy, or denervation changes on EMG testing. Antibody to bullous pemphigoid could not be detected in the serum. The patient underwent selective peripheral denervation surgery when aged 50 and 51, with only mild improvement. Several months later, BTX injections were repeated with benefit.

He had tonic, uncontrollable turning of the head to the left with a phasic component and mild reticuloblast cell before phenol injection. He maintained this posture for 40 minutes, which he spoke with great difficulty while sitting. Staring and any attempt to talk, walk, or use his hands produced immediate uncontrollable head turning. He had constant posterior neck and intracapsular pain.

Within 18 hours after the initial injection of 100 mg phenol into the left splenius capitis, splenius cervicis, and longissimus capitus muscles, he noted a full range of motion in the neck and mild improved head control while walking. The injected muscles were tender and oedematous but the neck and intracapsular pain was considerably less. After subsequent injections he noted progressive improvement. After receiving a total dose of 500 mg of phenol over one month, he could walk, drive, or sit to eat even in public with only occasional involuntary head turning. Manoeuvres that previously had exacerbated the abnormal head movements now were performed with little or no difficulty. He estimated that pain was reduced by 90%. His only side effects were mild oedema and tenderness over the injected muscles lasting one to two days after each injection. The improvement was sustained for five months after the initial injection. He then experienced gradual worsening of head control and some return of pain. He has subsequently received phenol injections at intervals of six months to maintain improvement.

Treatment of spasmodic torticollis with intramuscular phenol injection

Phenol is a caustic agent that produces tissue destruction and has been used to weaken muscle in patients with spasticity by either nerve block, motor point block, or intramuscular neurolysis.1,4-6 Local muscle pain and tenderness but no systemic or long term side effects have been reported after such use. We have explored the use of intramuscular phenol in the treatment of spasmodic torticollis. I have used this agent in patients with spasmodic torticollis who have not responded well to intramuscular injections of botulinum toxin A (BTX). Both patients gave informed consent to participate in the trial with the approval of the Duke University Institutional Review Board.

The muscles responsible for abnormal head movements were determined by clinical examination and by EMG recordings made with a concentric EMG needle in the sternomastoid, splenius capitus, or other neck muscles involved in head turning. Phenol solution (1% weight/volume USP phenol crystals in sterile aqueous solution) was injected into the involved muscles with a recording monopolar injection electrode to determine that injections were made in muscle active in the abnormal movement. Injections were made to two or six sites in each muscle, in sites where the motor unit action potentials with sharply rising components were recorded, indicating that the needle tip was close to muscle fibres that were activated during the abnormal movement. Areas near major vessels or nerves were avoided. Any subsequent injections were given if improvement was incomplete as determined by the patient's symptoms and by examination. At each visit, examination of strength in the involved muscles and functional assessment of the patient's torticollis were recorded on videotape for comparison with examinations made before phenol treatment.

Patient 1 is a 53 year old man who has had torticollis since the age of 43. Medical treatment had produced no improvement. At the age of 48, he had shown moderate improvement with BTX injections but, after several months, the symptoms returned. The patient consented to a long-term study in which the symptoms diminished despite increasing doses.

Muscles no longer developed weakness, atrophy, or denervation changes on EMG testing after BTX was injected. Antibody to bullous pemphigoid could not be detected in the serum. The patient underwent selective peripheral denervation surgery when aged 50 and 51, with only mild improvement. Several months later, BTX injections were repeated with benefit.