Conduction block in the forearm associated with acute varicella zoster virus infection

We report the case of an adult patient with neurophysiological evidence of persisting conduction block in the forearm segment of the left median nerve and absent responses from the sensory branch of the musculocutaneous nerve (MCN), which had developed during an episode of acute generalised varicella zoster virus (VZV) infection. Clinical manifestations of motor involvement in herpes zoster (HZ) are generally rare and usually due to central nervous system involvement. Motor peripheral nervous system manifestations do exist and have been ascribed to nerve root degeneration due to lymphocytic inflammation and vasculitis with possible spread into the spinal cord. Recently, conduction block has been identified for the first time as the cause of weakness in an immunocompromised patient with HZ, with evidence of extension of VZV infection along the median nerve on magnetic resonance imaging, but persisting conduction block has up to now not been described as a complication of acute VZV infection.

Case report

A 29 year old Caucasian electrician was seen for neurophysiological assessment with weakness of his left hand and numbness along the lateral aspect of his left forearm of 9 months’ duration. The numbness had developed 9 days into a severe primary attack of chickenpox, which required hospitalisation. The weakness remained unnoticed by the patient until detection during routine follow up. Oral aciclovir had been commenced 3 days after the onset of the acute illness. No intravenous access had been used or inadequate management of HZ, with evidence of extension of VZV infection along the median nerve on magnetic resonance imaging, but persisting conduction block has up to now not been described as a complication of acute VZV infection.

Findings on neurological examination were confined to the left arm. There was no muscle wasting or fasciculations and deep tendon reflexes were preserved. Muscle testing revealed weakness in the left hand corresponding to median innervated muscles: abductor pollicis brevis (APB), opponens pollicis (OP)/5/5, and first and second lumbricals (4/5) (MRC rating scale). In addition, there was hypesthesia for light touch and pinprick in the territory of the sensory branch of MCN. Magnetic resonance imaging of both forearms was inconclusive with no evidence of significant signal alteration at the proximal site of the conduction block.

Motor nerve conduction studies revealed partial conduction block in the left median nerve between 9.1 and 11.1 cm above the proximal wrist crease (fig 1) with a reduced forearm velocity (34.6 m/s) and absent F-waves. The elbow mixed median nerve potential was smaller on the left than on the right (15.2 vs 33.9 μV), thus confirming the presence of a partial conduction block in the forearm segment of the median nerve. The sensory nerve action potential for the left sensory branch of MCN was absent with normal amplitudes and velocities from the right. Nerve conduction studies were normal for the right median as well as the ulnar and radial nerves bilaterally. Needle electromyography showed normal motor units with a reduced interference pattern and single fasciculation potentials in left APB and was normal in left first dorsal interosseus, flexor pollicis longus, biceps, and extensor digitorum communis.

Comment

Conduction block in acute VZV infection has, to the best of our knowledge, never been described before. Partial infarction of a mixed nerve in vasculitic mononeuritis multiplex can cause conduction block by selectively damaging Schwann cells, although axonotmesis with axonal damage and sensory-motor symptoms in the affected nerve would be more typical and should have been apparent during neurophysiological testing. Both the median nerve and the sensory branch of MCN share fibre supply from cervical nerve roots which later form the lateral cord, and they are often in close anatomical proximity in the arm due to frequent anatomical variations. The simultaneous involvement of the median nerve and the sensory branch of MCN might thus indicate a direct spread of the virus between the two nerves. Alternatively, indirect spread from the purely sensory branch of MCN via the spinal cord might have occurred. Autopsies of nervous tissue from HZ patients have shown VZV DNA and antigen to be present in damaged nerve fibres including motor neurons, suggestive of neuronal spread. Recently, conduction block in the forearm segment of the median nerve in a case of HZ has speculatively been attributed to local damage of Schwann cells of the motor nerves by direct local invasion or remote allergic mechanisms, although the exact pathophysiology in these cases remains to be established.

The patient was found to have fasciculation potentials but no other forms of spontaneous activity in APB, but in none of the other muscles tested. The observed fasciculation potentials most likely represent axonal hyperexcitability at the site of the conduction block in analogy to the presumed mechanism responsible for the occurrence of single and grouped fasciculation potentials in other neuropathies characterised by persistent conduction block.

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Written confirmation from the Local Research and Ethics Committee in Cardiff was obtained confirming that formal ethical approval was not needed for this case study.

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References


Figure 1 Left median compound muscle action potentials recorded from abductor pollicis brevis muscle of a patient with previous varicella zoster virus infection and weakness in left median nerve innervated hand muscles. Stimulation sites at wrist and elbow (A) and 1.0, 2.5, 3.7, 5.3, 7.2, 9.1, and 11.1 cm above the proximal wrist crease (B). Gain 5 mV per division, sweep duration 20 ms (A) and 30 ms (B), respectively. Slowing of motor fibres and partial conduction block between 9.1 and 11.1 cm above the proximal wrist crease is demonstrated.
Toscana virus causing severe meningoencephalitis in an elderly traveller

Toscana virus (TOSV) is classified in the sandfly fever virus group of arboviruses (family Bunyaviridae, genus Phlebovirus) along with Sicilian (SFSV) and Neapolitan (SFNV) sandfly fever viruses. SFSV and SFNV cause a transient febrile illness, whereas TOSV also causes mild acute aseptic meningitis. In endemic regions TOSV has been identified as an important cause of viral aseptic meningitis along the indigenous population. TOSV is transmitted by the sandfly species Phlebotomus perniciosus and Phlebotomus perfiliewi. Circulation of TOSV follows the distribution of its vectors—that is, the Mediterranean, Middle East, Western Asia, and North Africa—and the disease coincides with the seasonal life cycle of insect vectors.

Laboratory confirmation of clinically suspected cases can be carried out by detection of anti-TOSV IgG or IgM antibodies in blood and cerebrospinal fluid (CSF) using different techniques. Direct detection of virus is possible by cell culture or reverse transcription polymerase chain reaction (RT-PCR) but will often fail because of the short term nature of the viraemia.

Throughout the last decades there have been increasing numbers of cases of TOSV infection imported into northern Europe from endemic areas. Among other causes, it therefore now has to be considered in the differential diagnosis of acute aseptic meningitis.1

Case report

Four days after having returned from Malaga, Spain, in July 2004 an 80 year old woman was found in a state of deteriorated consciousness. There was enuresis and encopresis, probably as a result of an epileptic fit. Apart from adult onset diabetes mellitus the patient’s medical history was unremarkable. On admission to hospital, the patient was confused and agitated, with a body temperature of 39.5°C. There was neck rigidity but neurological examination showed no other abnormalities.

Routine clinical chemistry analyses on admission showed slight increases in liver enzymes (aspartate aminotransferase 50 U/l; alanine aminotransferase 87 U/l; y-glutamyltransferase 93 U/l), erythrocyte sedimentation rate (18 mm/h), and glycated haemoglobin (HbA1C; 7.6%).

Examination of CSF revealed lymphocytic pleocytosis (265 cells/mm³) and raised protein (47 mg/dl) and lactate (4.3 mmol/l) (table 1). PCR for herpes simplex virus 1 (HSV1) and HSV2 was negative.

Both CSF and serum samples collected on days 2 and 6 of disease tested negative for antibodies against West Nile and tick born encephalitis virus by immunofluorescence assay (IFA). RT-PCR for TOSV and enterovirus RNA was negative. Infection of Vero cells with CSF yields no cytopathic effect.

Serum and CSF samples collected on days 2, 6, 13, and 27 after admission were examined for the presence of anti-TOSV, anti-SFNV, and anti-SFSV IgG and IgM antibodies. IgG and IgM IFA1 revealed positive results for both TOSV (strain Iss.Phi.3 1971) and SFNV (strain Sabin 1985), but anti-SFSV (strain Sabin 1985) antibodies were not found in either serum or CSF samples.

Anti-TOSV IgG titres ranged from 1:640 to 1:10240 in serum and 1:20 to 1:5120 in CSF. IgG levels for SFNV ranged from 1:320 to 1:2560 and from 1:20 to 1:1280. IFA IgM titres could only be detected in serum, ranging from 1:80 to 1:160 for TOSV and from 1:40 to 1:80 for SFNV.

The presence of a pattern of cross reactivity typical of TOSV infection supported a preliminary diagnosis of acute TOSV encephalitis. For confirmation, the specificity of antibodies was demonstrated by a commercially available TOSV IgG/IgM enzyme immunoassay assay (EIA) using recombinant antigen (Disees Diagnostica, Milan, Italy). IFA results for serum samples were confirmed by EIA. Nevertheless, EIA appeared more sensitive than IFA in detecting CSF IgM antibodies (first positive result for CSF IgM in EIA on day 2). In contrast, IgG in CSF samples was only inconsistently detected by EIA (negative results for CSF IgG in EIA on days 2, 13, and 27).

The patient was transferred to the neurological critical care unit and treated empirically with intravenous ceftriaxone, levofloxacin, and aciclovir until diagnosis of TOSV meningoencephalitis was confirmed. Consciousness deteriorated subsequently, leaving the patient in a comatose state for three days. On day three after admission a generalised seizure occurred. Electrocencephalography (EEG) showed signs of diffuse encephalopathy with basal activity at 6–7 Hz and symmetrical slow waves. Computed tomography and magnetic resonance imaging of the brain showed diffuse atrophy without evidence of focal lesions. Measurement of TAU protein, S100 protein, and neuron specific enolase in the CSF revealed no signs of neuronal cell damage. Nevertheless, raised β2-microglobulin levels and oligoclonal banding showed that there was an intrathecal immune reaction (table 1).

Ten days after admission the patient recovered from her comatose state. A slow improvement in her level of consciousness and her general condition was observed subsequently as the fever resolved.

One month after admission CSF and liver enzymes were nearly normal. EEG showed an increase of basal activity to 8 c/s. Slightly impaired cognitive functions could still be observed (mini-mental state examination score 17/30).

Comment

Besides Rift Valley fever virus, TOSV is the only member of the Phlebovirus group causing aseptic meningitis. Previously, severe neurological manifestations have been described only occasionally. Within three to six days after infection symptoms such as fever, myalgia, headache, vomiting, and neck rigidity do occur, but a lesser degree of encephalopathic involvement has generally been reported. As in other viral meningoitides, symptoms of aseptic meningitis related to TOSV infection disappear completely within a few days. Asymptomatic infections and infections without CNS involvement also occur.

The brain involvement in this case caused a severe, long lasting impairment of consciousness, seizures as an unusual clinical manifestation, and a prolonged convalescence period. Seldom reported before, liver enzymes can be interpreted as a sign of a systemic infection with involvement of the liver.

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Table 1 Results of cerebrospinal fluid and serum sample analysis after admission (as far as known this is the first time that markers of cell damage and immune reaction have been measured in a patient with acute Toscana virus meningoencephalitis)

<table>
<thead>
<tr>
<th></th>
<th>Reference range</th>
<th>Day 2</th>
<th>Day 6</th>
<th>Day 13</th>
<th>Day 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC count (cells/mm³)</td>
<td>0 to 5</td>
<td>265</td>
<td>60</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>Lactate (mmol/l)</td>
<td>1.1 to 2.2</td>
<td>4.3</td>
<td>3.1</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Glucose (mmol/l)</td>
<td>2.78 to 4.16</td>
<td>7.33</td>
<td>6.16</td>
<td>4.88</td>
<td>4.50</td>
</tr>
<tr>
<td>Total protein (mg/dl)</td>
<td>15–45</td>
<td>47</td>
<td>32</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>Oligoclonal bands</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tau protein (μg/ml)</td>
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<td>194</td>
<td>NA</td>
<td>191</td>
<td>332</td>
</tr>
<tr>
<td>I2-Microglobulin (μg/ml)</td>
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<td>8.2</td>
<td>7.5</td>
<td>5.3</td>
<td>7.1</td>
</tr>
<tr>
<td>S-100 protein (μg/ml)</td>
<td>&lt;2300</td>
<td>NA</td>
<td>1030</td>
<td>NA</td>
<td>644</td>
</tr>
<tr>
<td>Anti-TOSV antibodies in CSF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IgG IFA</td>
<td>1:10</td>
<td>1:20</td>
<td>1:80</td>
<td>1:2560</td>
<td>1:5120</td>
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<tr>
<td>IgM IFA</td>
<td>1:10</td>
<td>1:10</td>
<td>&lt;1:10</td>
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<td>&lt;1:10</td>
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<tr>
<td>IgG EIA</td>
<td>–</td>
<td>–</td>
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<tr>
<td>IgM EIA</td>
<td>–</td>
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<td>–</td>
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<td>–</td>
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<tr>
<td>Anti-TOSV antibodies in serum</td>
<td></td>
<td></td>
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<tr>
<td>IgG IFA</td>
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<td>1:640</td>
<td>1:2560</td>
<td>1:5120</td>
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<tr>
<td>IgM IFA</td>
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<td>1:80</td>
<td>1:3200</td>
<td>1:160</td>
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<tr>
<td>IgG EIA</td>
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<tr>
<td>IgM EIA</td>
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</table>

CSF, cerebrospinal fluid; EIA, enzyme immunoassay; IFA, immunofluorescence assay; NA, not assessed; WBC, white blood cell.
Owing to the large variety of pathogens causing acute aseptic meningitis, clinicians rely on rapid laboratory confirmation of suspected cases by standard methods such as RT-PCR or the plaque reduction neutralisation test (PRNT). Nowadays, PRNT is rarely used owing to its complexity and time consuming nature, while RT-PCR appears inadequate because of the short duration of the viraemia. Recently developed EIA formats can establish the presence of infection by detecting specific IgM in acute phase samples and were able to confirm TOSV infection in this case. With millions of travellers and increasing TOSV infections around the Mediterranean basin, commercially available EIA methods will be of growing importance. In addition to other severe travel related diseases, TOSV infections now need to be considered by physicians.

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References

Intracerebral haemorrhage in CADASIL
Cerebral autosomal dominant arteriopathy with subcortical infarcts and leucoencephalopathy (CADASIL) is a rare hereditary disease characterised by recurrent transient ischaemic attacks, strokes, and vascular dementia. Pathological studies reveal multiple small infarcts and diffuse white matter changes as well as vascular alterations most prominent in small arteries. The presence of granular osmiophilic material in arterial walls on ultrastructural examination is pathognomonic. Mutations in the notch3 gene located on chromosome 19 are associated with the disease. Here we report a patient with an unusual clinical course with recurrent intracerebral haemorrhage.

Case report
A 47 year old woman was admitted after a fall at home, followed by several minutes of unconsciousness. Her past medical history was uneventful. In particular, there was no history of migraine or depression, and she was not taking any drugs. On admission, her husband reported memory deficits for several weeks. Initially, the patient complained about headaches and mild dysarthria. Moderate left sided hemiataxia and pronation of the left arm were present. Blood pressure was raised to 220/120 mm Hg

Figure 1  Bleeding in the left cerebellar hemisphere as shown in pd-T2 tse (A) and T2* (D). White matter lesions in the FLAIR sequence (B, E): note the lesions in the external capsule which are often present in CADASIL (B). (C) Acute ischaemic lesions in the right hemisphere in a diffusion weighted image. (F) Multiple microbleeds shown in T2*. CADASIL, cerebral autosomal dominant arteriopathy with subcortical infarcts and leucoencephalopathy; FLAIR, fluid attenuated inversion recovery.
without a known history of arterial hypertension. Neuropsychological deficits were prominent in impaired semantic, visual-spatial, and executive memory, and in deterioration in cognitive speed. Concentration and mathe-
matical problem solving were also reduced, indicating severe cognitive impairment. Initial cranial computed tomography revealed a haemorrhage of 20 mm diameter in the left cerebellar hemisphere. Subsequent magnetic resonance imaging (MRI) with T2* gradient echo (GE) showed more than 25 small haemorrhages distributed over the entire brain. T2 weighted scans showed white matter lesions with periventricular emphasis (fig 1). Serum markers for vasculitis and coagulation indices were normal, as was the cerebrospinal fluid. An ophthalmological examination showed hypertensive changes. Ultrasound sonography of the extracranial and intracranial vessels revealed arteriosclerotic vessel walls but no stenosis. Electronmicroscopic examination of a skin biopsy showed granular osmiophilic material (GOM) in the basal lamina of small arterioles, establishing the diagnosis of CADASIL. Direct bidirectional sequencing of all exons coding for epidermal growth factor (EGF)-like repeat domains (exons 2 to 24) of notch3 did not reveal any mutation.

After stepwise normalisation of arterial blood pressure, the patient gradually improved over the following weeks. Her headache and dysarthria resolved gradually, but severe neurropsychological deficits remained, rendering her unable to take care for herself. A follow up examination three months after discharge showed further amelioration of gait without any other focal neurological symptoms. The neurropsychological deficits had improved slightly, but there were still severe memory deficits. The patient was aware of these deficits and she reacted in a depressive manner. Activities of daily life were moderately impaired. Follow up MRI showed no new lesions.

Comment
The clinical course of this case with intracerebral bleeding in combination with excessive blood pressure values was consistent with hypertensive intracerebral haemorrhage. Although there was no history of known arterial hypertension, the changes of the retina supported this diagnosis. Hypertension is the most common cause of intracerebral haemorrhage, accounting for 50–70% of cases. Hypertensive bleeding into the cerebellum, however, is relatively rare (<10%). The finding of numerous cerebral microbleeds on T2*-GE MRI led to the suspicion of amyloid angiopathy, a common cause of intracerebral haemorrhage in the elderly. On the other hand, the relatively young age of the patient and the family history (mother and two sisters suffering from migraine; father died at 47 years of unknown cause) was compatible with an autosomal dominantly inherited condition, for example, CADASIL. The finding of GOM in the basal lamina of small vessels is pathognomonic for this disease. In view of this diagnosis, the patient was given a loading dose of phenytoin and magnesium sulphate, the seizures continued. booming for epidermal growth factor (EGF)-

Catastrophic primary antiphospholipid syndrome presenting as status epilepticus
Antiphospholipid syndrome (APS) is defined as the occurrence of arterial or venous thrombosis or recurrent miscarriage, with raised titres of antiphospholipid antibodies, namely lupus anticoagulant (LA) or anti-
cardiolipin antibodies (aCL). An accelerated form of APS is catastrophic antiphospholipid syndrome (CAPS) or Asherson’s syndrome. Proposed diagnostic criteria for definite APS are: multiorgan failure, development of mani-
estations within 1 week, presence of antiphospholipid antibodies and histopatho-
logical evidence of microthrombosis (positive predictive value 99.4%). Precipitants include infection, surgery, and childbirth. Patients typically develop widespread thrombo-
culopancy with marked thrombocytopenia. clinically apparent cerebral infarction occurs much less frequently than in uncomplicated APS but the major pathological manifestation of CAPS is cerebral microthrombosis at postmortem examination.

CASE REPORT
A 30 year old woman delivered her first child following a full term uncomplicated preg-
nancy. Three weeks later, she developed headache and transient hemiparesis. The following day she had an episode of speech arrest, bit her tongue, and held both arms stiffly in the air for about 1 minute. On admission to hospital, she was pyrexic and developed generalised tonic clonic seizures. There was no relevant previous medical history and she was not taking any medica-
tion. Blood tests, including erythrocyte sedi-
mentation rate (ESR) and C reactive protein (CRP), were normal. Computed tomography scan of the brain and analysis of the cerebrospinal fluid (CSF) were normal. Gynaecological examination showed no retained products of conception. The seizures proved refractory to treatment with intrave-
rous lorazepam. She was transferred to a specialist neurological centre that day. On arrival she was agitated, disorientated and pyrexic (38°C). Generalised tonic clonic convulsions continued. Neurological examination was normal except that all limb reflexes were pathologically brisk and plantar responses were extensor. General examination was unremarkable. Despite being given “loading” doses of phenytoin, phenobarbitone and magnesium sulphate, the seizures continued. She was anaesthetised and intubated, and mechanical ventilation was introduced.

Treatment with high dose intravenous aci- clovir for presumed viral encephalitis was commenced. Investigations revealed a normal full blood count and film with a platelet count of 267 x 10^9/L. ESR and CRP were mildly raised at 46 mm/h (normal 1–20) and 28.7 mg/l (normal 0–3). Serial measurements of platelet count, ESR, and CRP did not show any significant change throughout the illness. All other blood tests including coagulation screen were normal or negative.

Magnetic resonance imaging of the brain was normal with no evidence of venous sinus thrombosis, cerebral infarction or haemor- rhage. A second lumbar puncture revealed an opening pressure of 30 cm H2O. CSF analysis showed clear colourless fluid with 4 lympho- cytes/mm³, a red cell count of <1/mm³, total protein of 0.36 g/l and a CSF:plasma glucose ratio of 4.4:8.9 mmol/l. CSF and serum oligoclonal bands were negative. Multiplex PCR for CSF herpes was negative.

EEG confirmed a diffuse encephalopathic process with unequivocal epileptiform activity over the frontal regions bilaterally with some periodic complexes more prominent on the left. A thrombophilia screen was performed during her illness but results were not available until after her death, and revealed the presence of lupus anticoagulant. Immunological assay for aCL was negative. The presence of lupus anticoagulant was confirmed during her illness but results were not available until after her death, and revealed the presence of lupus anticoagulant. Immunological assay for aCL was negative. The presence of lupus anticoagulant was confirmed.

A postmortem examination revealed small cerebral infarcts. An opening pressure of 30 cm H2O. CSF analysis showed clear colourless fluid with 4 lymphocytes/mm³, a red cell count of <1/mm³, total protein of 0.36 g/l and a CSF:plasma glucose ratio of 4.4:8.9 mmol/l. CSF and serum oligoclonal bands were negative. Multiplex PCR for CSF herpes was negative.

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DISCUSSION

This patient developed a thrombotic microangiopathy (TMA) 1 month after a normal term delivery. The premortem laboratory investigations and postmortem examination revealed the presence of lupus anticoagulant (LAC). The alternative postpartum TMA diagnosis of thrombotic thrombocytopenic purpura was excluded by the fibrin nature of the thrombi and the normal platelet count. There was no evidence of large vessel cerebral thrombosis, cerebral infarction or haemorrhages with surrounding muscle degeneration. There was no evidence of large vessel cerebral thrombosis, cerebral infarction or haemorrhages with surrounding muscle degeneration. There was no evidence of large vessel cerebral thrombosis, cerebral infarction or haemorrhages with surrounding muscle degeneration. There was no evidence of large vessel cerebral thrombosis, cerebral infarction or haemorrhages with surrounding muscle degeneration. There was no evidence of large vessel cerebral thrombosis, cerebral infarction or haemorrhages with surrounding muscle degeneration.

CAPS occurs in <1% of patients with APS. However, it is vital to be aware of the diagnosis as patients rapidly develop severe multisystem failure. A review of the patho- genesis of 80 cases of CAPS noted an excess of women (79%) with an average age at onset of 37 years. The majority with multorgan failure had secondary APS, mostly associated with systemic lupus erythematosus. Obstetric complications are recognised precipitants of CAPS, probably because of increases in levels of natural clotting factors. Two cases of CAPS occurring in the postpartum period have been reported, both following fetal loss.

Cerebral involvement has been reported in around 60% of cases of CAPS. However, there are no previous reports of primary antiphospholipid syndrome presenting with status epilepticus. The case was unusual in several other ways. There was no previous diagnosis of APS and no history of mis- carriages or thrombotic events. The patient presented with isolated neurological symp- toms with no evidence of other organ involvement until 7 days later. Daily blood tests did not raise the suspicion of thrombo- philia or blood dyscrasia and, in contrast to a series of 80 patients in whom 98% had high aCL titres, this patient had negative aCL.

The optimal treatment for CAPS is uncer- tain but the rationale is to prevent ongoing thrombosis with anticoagulation and to pre- vent production of mediators that generate the hypercoagulable state by immunosuppression. A review of data from the interna- tional CAPS registry found that patients who received the combination of anticoagulation plus steroids plus plasma exchange or intra- venous immunoglobulin had the best survi- val rate (63%).

This case emphasises that CAPS may present as an apparently isolated cerebral disorder. It is important to maintain a high degree of suspicion of antiphospholipid syn- drome in critically ill patients, particu- larly with known precipitating factors for CAPS such as during the postpartum period. Early treatment with anticoagulation and immunosuppression gives the best chance of improving the >50% mortality rate of the condition.

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Competing interests: none

REFERENCES


Use of mirror dystonia as guidance for injection of botulinum toxin in writing dysfunction

The successful application of botulinum toxin (BTX) injections in the treatment of focal hand dystonia is largely dependent on careful evaluation and selection of muscles to be injected. It has been suggested that patients should be examined for abnormal postures at rest and while writing and while writing or performing other tasks in question as well as other tasks (such as using a cup or a comb). Simple techniques such as the localisation of subjective pain and fatigue accompanied by palpation of the area of discomfort can also be used.

Mirror dystonia consists of dystonic pos- tures and movements of the dominant hand while writing or performing other tasks with the non-dominant hand. We present a series of six patients who were successfully injected with BTX using mirror dystonia as an additional tool for muscle evaluation.

We carried out a retrospective review of the case records of consecutive patients with writing dystonia while writing or performing other tasks in question as well as other tasks (such as using a cup or a comb). Simple techniques such as the localisation of subjective pain and fatigue accompanied by palpation of the area of discomfort can also be used.

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We carried out a retrospective review of the case records of consecutive patients with writing dystonia while writing or performing other tasks in question as well as other tasks (such as using a cup or a comb). Simple techniques such as the localisation of subjective pain and fatigue accompanied by palpation of the area of discomfort can also be used.

Mirror dystonia consists of dystonic postures and movements of the dominant hand while writing or performing other tasks with the non-dominant hand. We present a series of six patients who were successfully injected with BTX using mirror dystonia as an additional tool for muscle evaluation.
observation of the mirror dystonia movements of the same limb while writing with the non-dominant hand. The formulation and preparation of BTX was carried out using standard methods. Overviews of the demographic, clinical, and treatment variables are presented in table 1. We identified six patients with writing dysfunction (M:F:1.5, mean age 46 years (range 30 to 75), mean duration of disease 7.16 years (range 2 to 13)). Four patients (cases 1, 2, 3, and 6) had writer’s cramp and two (cases 3 and 4) had features overlapping writing tremor with writer’s cramp. Three patients reported marked (cases 1, 2, and 5), two moderate (cases 3 and 4), and one mild improvement (cases 6). We further identified two subgroups: four patients where mirror dystonia consisted of any combination of extension/abduction of the thumb, fingers, and wrist (subgroup A: cases 2, 3, 4, and 5) and two patients where mirror dystonia consisted of hyperflexion of wrist or thumb and fingers (subgroup B: cases 1 and 6). In subgroup A two patients experienced marked improvement and two had moderate improvement following injections. Two of these four patients did not show mirror dystonia movements when seen 15–17 weeks later at the time they were due for repeat injections. In subgroup B one patient experienced marked improvement and one mild improvement. None of our patients had evidence of mirror dystonia in the non-dominant hand when writing with the dominant hand. Regarding adverse events, transient weakness was experienced by four patients (for one to four weeks). No other adverse events were reported.

Concordance in the action of writing and observation of the mirror dystonia movements in the same limb was found in four patients. In three there was enrichment of the observation in that additional muscles could be shown to be active. The two discordant patients had writing tremor with no overt deviation noted when the dominant hand wrote.

The importance of recognition of mirror dystonia in patients with writing dysfunction has been previously highlighted by Jedynak et al. He reported that 29 of 65 patients with writer’s cramp had evidence of mirror dystonia and suggested that mirror dystonia may be useful in muscle selection (it may help in the differentiation between primary and compensatory movements). Borgohain et al. also reported on the subject; however, that work has only been published in abstract form. The investigators proposed that mirror dystonia used as a guide for muscle selection for BTX injections may reduce the difference in outcome between extensor and flexor writer’s cramp and suggested that mirror dystonia was a superior method for muscle selection compared with compensatory movements.

Although the mechanism of mirror dystonia remains unclear it has been suggested that it is likely to be related to the metabolic abnormalities shown to involve the primary sensorimotor and supplementary motor cortices in patients with focal hand dystonia. Magnetic cortical stimulation has confirmed that corticocortical inhibition is reduced over both hemispheres. Jedynak et al suggested that mirror dystonia is the consequence of abnormal cortical inhibition and decreased selectivity of muscle patterns for highly skilled manual tasks.

We conclude that analysis of the pattern of dystonic posturing displayed in mirror dystonia when examining patients with writing dysfunction is a useful guide for selection of muscles to be injected with BTX. A prospective trial of BTX injections in muscles selected through analysis of mirror dystonia could provide further information about the therapeutic results of this method.

Table 1

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age</th>
<th>Duration</th>
<th>Type</th>
<th>Mirror dystonia</th>
<th>Muscles selected (dose)</th>
<th>Benefit</th>
<th>Adverse effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>75</td>
<td>13 years</td>
<td>WC</td>
<td>Flexion of thumb and index finger</td>
<td>R FPL 12.5 U R FDS 12.5 U</td>
<td>Marked</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>42</td>
<td>8 years</td>
<td>WC</td>
<td>Dorsiflexion of thumb, index finger and wrist</td>
<td>R EPL 7.5 U</td>
<td>Marked</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>48</td>
<td>3 years</td>
<td>WT</td>
<td>Dorsiflexion of fingers (not thumb) and wrist</td>
<td>R ECU 10 U</td>
<td>Moderate</td>
<td>Transient (one month) weakness of extension of 2nd, 3rd, and 4th digits</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>38</td>
<td>2 year</td>
<td>WT</td>
<td>Hyperextension of the thumb</td>
<td>R EDC 10 U R FCU 10 U (*)</td>
<td>Moderate</td>
<td>Transient (one week) weakness of dorsiflexion of the wrist</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>30</td>
<td>11 years</td>
<td>WC</td>
<td>Dorsiflexion of index finger</td>
<td>R EIP 10 U</td>
<td>Marked</td>
<td>Transient (2 weeks) weakness of dorsiflexion of finger (and milder weakness of extension of the thumb)</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>43</td>
<td>6 years</td>
<td>WC</td>
<td>Flexion of wrist and fingers</td>
<td>R FCR 12.5 U R FCU 12.5 U</td>
<td>Mild</td>
<td>Weakness lifting objects</td>
</tr>
</tbody>
</table>

*Patient injected in FCU owing to discomfort in the volar aspect of the forearm

AFL, abductor pollicis longus; ECR, extensor carpi radialis; ECU, extensor carpi ulnaris; EDC, extensor digitorum commumis; EIP, extensor indicis propius; EPL, extensor pollicis longus; FCR, flexor carpi radialis; FCU, flexor carpi ulnaris; FDS, flexor digitorum superficialis; FPL, flexor pollicis longus; L, left; R, right; WR, writer’s cramp, WT, writing tremor.

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References

Drug induced pseudolymphoma secondary to ethosuximide

Ethosuximide is an antiepileptic succinimide, widely used in the treatment of absence seizures. Haematopoietic complications associated with the administration of this drug have included leucopenia, agranulocytosis, pancytopenia with or without bone marrow suppression, and eosinophilia. We report a patient with pseudolymphoma induced by ethosuximide, a complication never reported previously.

Case report

A 12 year old boy presented with a two months history of fever, weight loss (3 kg), and painful swellings on the neck, axillae, and inguinal regions. The patient had been on ethosuximide for three months for childhood absence epilepsy. It was being given at a dose of 30 mg/kg/day, in three divided doses, and the seizures had been under reasonable control.

Physical examination on presentation revealed enlarged lymph nodes on the both sides of the neck, axillae, and inguinal regions. All the nodes were non-tender, firm, measuring 1 to 2 cm in diameter, and freely mobile. The liver and spleen were not palpable and all other systems were normal. A full blood count revealed a leucopenia of $3.6 \times 10^9/\mu l$ (48% neutrophils, 3% eosinophils, 40% lymphocytes, and 9% monocytes) and a decreased platelet count of 119,000/μl. The patient was negative for EBV, CMV and HHV-6. The lymph nodes were biopsied and revealed a heterogeneous T cell and B cell population. Immunohistochemical stains revealed a diffuse large cell population with neoplastic cell proliferation. CD20 was negative, while CD3 and CD4 were positive. The final diagnosis was pseudolymphoma.

Comment

Lymphadenopathy has been recognised as a complication of drug treatment, particularly with antiepileptic drugs, since the first report of phenytoin-induced pseudolymphoma in 1940. Since then, this idiiosyncratic reaction has also been described with carbamazepine, lamotrigine, nifedipine, thioridazine, atenolol, amiloride/hydrochlorothiazide, metuxeline, penicillin, captoril, enalapril, and methotrexate. Most of these are associated with cutaneous pseudolymphomas, but the antiepileptic drugs are more likely to precipitate cervical lymphadenopathy.

Pathologically, the term “pseudolymphoma” has been used to describe lymphoid cell proliferation with effacement of nodal architecture, so that there is a false appearance of malignancy. Although the precise pathogenesis of this drug reaction is unknown, pseudolymphoma may develop as a hypersensitivity reaction when a drug or one of its structural ligands acts as an antigen, triggering an immune reaction. Alternatively, the drug in question may promote a dysregulated immune response to another drug or non-pharmacological antigen.

Ethosuximide is widely used in the treatment of absence seizures. On the basis of more than a decade of studies on its cellular effects, the mechanisms of action are thought to include blockade of the low threshold, T-type $Ca^{2+}$ current and a reduction in both the non-inactivating $Na^+$ current and the $Ca^{2+}$ activated $K^+$ current in thalamic and cortical neurones.

The most common dose related side effects are gastrointestinal complaints (nausea, vomiting, and anorexia) and central nervous system (CNS) effects (drowsiness, lethargy, euphoria, dizziness, headache, and hiccup). Some tolerance to these effects develops. Parkinson-like symptoms may also develop. Urticaria and other skin reactions, including Stevens–Johnson syndrome, as well as systemic lupus erythematous, eosinophilia, leucopenia, thrombocytopenia, pancytopenia, hepatic dysfunction, and aplastic anaemia, have also been attributed to ethosuximide.

In this case, the disappearance of lymphadenopathy with withdrawal of the drug, and its prompt reappearance when the drug was reintroduced, suggests a strong cause–effect association between ethosuximide and lymphadenopathy. To our knowledge, this is the first case report of ethosuximide induced pseudolymphoma and the second to report lymphadenopathy as an adverse effect of ethosuximide.
Catastrophic primary antiphospholipid syndrome presenting as status epilepticus

L J Coward, D M Kullmann, N P Hirsch, R S Howard and S B Lucas

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