In conclusion, parainfectious myositis with preferential forearm involvement is important to recognize for its benign and self-limited course. Management is supportive. Comprehensive viral studies, including nasal and stool PCR plus convalescent serology, may help to identify the precise infectious agent in future outbreaks.

Ethical Publication Statement: We (the authors) confirm that we have read the Journal’s position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

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10. Kessler, HA, Trenholme, GM, Harris, AA, Levin, S. Acute myopathy associated with influenza A/Texas/1/77 infection.stiters were all normal. Antinuclear and acetylcholine receptor antibodies were negative.

MRI with coronal and axial short-tau inversion recovery images showed extensive edema in both upper and lower

A CHILD WITH ANTIBODY-NEGATIVE IMMUNE-MEDIATED NECROTIZING MYOPATHY

Immune-mediated necrotizing myopathy (IMNM) is a recently recognized category of idiopathic inflammatory myopathies manifesting as symmetric proximal limb muscle weakness and high serum creatine kinase (CK) level, along with specific histopathological findings. IMNM is divided into 3 groups: anti-signal-recognition particle (anti-SRP); anti-3-hydroxy-3-methylglutaryl-CoA reductase (anti-HMGCR); and autoantibody-negative IMNM. Thus far, most reported patients with IMNM have been adults. Some pediatric patients were identified in 3 previous studies with limited information. Rouster-Stevens and Pachman described 3 juvenile polymyositis patients with anti-SRP antibody. Suzuki et al. reported 2 Japanese girls with anti-SRP myopathy. Anti-HMGCR autoantibodies were detected in a total of 13 children with inflammatory myopathy in 2017. We describe a boy with a diagnosis of antibody-negative IMNM who improved after treatment with intravenous immunoglobulin (IVIg).

An 11-year-old boy was admitted for evaluation of 3 weeks of acute-onset, progressive, proximal symmetrical weakness in all limbs. He had been vaccinated for influenza 3 weeks before he became symptomatic. His initial symptoms were trouble raising his arms. Over a few days, his family noted that he could barely rise from a chair. He had pain in his limb muscles. He lost 3 pounds, without changes in bowel or bladder habits or control, and had no diurnal variation in his weakness. His family denied any trauma, preceding febrile illness, rash, numbness, dysphagia, ptosis, diplopia, or dysarthria. The family also denied use of herbal medicines, or other toxic exposures. There was no family history of neuromuscular or autoimmune diseases.

On general examination, there was no skin rash or joint swelling. Neurologic examination revealed mild bilateral facial and eye closure weakness. He had diffuse hypotonia and areflexia. He had muscle weakness predominantly in the proximal limb muscles. He could raise his arms to ear level but had no active elbow flexion. He had marked weakness of hip flexor and quadriceps muscles. He could not kneel or rise from a chair. He had no distal muscle weakness. He had normal deep tendon reflexes except for a left ankle clonus.

On examination, he was a well-developed boy with a body mass index of 16.8. He had no facial rash, eye lid ptosis, or muscle atrophy. On general examination, there was no skin rash or joint swelling. Neurologic examination revealed mild bilateral facial and eye closure weakness. He had diffuse hypotonia and areflexia. He had marked weakness of hip flexor and quadriceps muscles. He could not kneel or rise from a chair. He had no distal muscle weakness. He had normal deep tendon reflexes except for a left ankle clonus.

In conclusion, parainfectious myositis with preferential forearm involvement is important to recognize for its benign and self-limited course. Management is supportive. Comprehensive viral studies, including nasal and stool PCR plus convalescent serology, may help to identify the precise infectious agent in future outbreaks.

Key words: antibody negative, immune-mediated necrotizing myopathy, inflammatory myopathy, myositis, pediatric

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FIGURE 1. (A) Short-tau inversion recovery axial MRI sequences at the level of trunk muscles, showing muscle edema (white arrows). (B) Short-tau inversion recovery axial MRI sequence at the level of the femur, showing extensive muscle edema (white arrows). (C) Short-tau inversion recovery axial MRI sequence at the level of the humerus, showing extensive muscle edema (white arrows).

FIGURE 2. (A) Hematoxylin and eosin (H&E) paraffin section of a deltoid muscle biopsy demonstrates myofiber atrophy distributed throughout the fascicles; many of the atrophic myofibers are regenerating. Necrotic myofibers (white arrows) are distributed throughout this area. There is only minimal focal perivascular lymphocytic infiltration in this region (upper right quadrant). (B) Detail of a region included in the previous image (A). White arrows indicate 2 necrotic myofibers. There is moderately severe myofiber atrophy. Some of the atrophic myofibers in this area are regenerating, as identified by their basophilic (slightly blue) cytoplasm and large nuclei. (C) This region of a paraffin H&E section has a focus of very mild perimysial lymphocytic inflammation. Multiple regenerating myofibers are present in this area, some identified by the black arrows. (D) The human leukocyte antigen class I immunohistochemistry study demonstrates labeling of the surfaces of myofibers and staining of sarcoplasm; this study is considered strongly positive, which provides evidence of an immune-mediated process. Scale bar = 50 μm in (A), (C), and (D); scale bar = 20 μm in (B).
proximal extremity muscles and trunk muscles, compatible with myositis (FIG. 1).

Anti-Ro/La, dsDNA, thyroid peroxidase, anti-Smith, and anti-thyroid antibodies were all negative. Tests were negative for the following infections: Lyme; herpes simplex virus; human immunodeficiency virus; human T-lymphotrophic virus 1/2; adenovirus; coronavirus; human metapneumovirus; rhino/enterovirus; influenza A/B; Coxackie virus; parainfluenza; respiratory syncytial virus; Bordetella; chlamydia pneumonia; and mycoplasma.

Biopsy (FIG. 2) of the deltoid muscle demonstrated a necrotizing myopathy with scant focal inflammation and a positive human leukocyte antigen (HLA) class I immunohistochemistry study, the latter providing evidence of an immune-mediated disorder despite the paucity of inflammation. There were approximately 5 necrotic myofibers per low-power (100× magnification) field, which is considered to be a moderate degree of active myofiber necrosis, and at least twice that number of regenerating myofibers, all with a random distribution throughout the sample. Moderate nonspecific myofiber atrophy, some attributable to the regenerating myofibers, was present. There was no perifascicular patterning of the atrophy, necrosis, or regeneration, as would be characteristic of dermatomyositis. There were only a few isolated perimysial foci of scant lymphocytic inflammation. Features of polymyositis, such as endomysial inflammation and an attack by autoaggressive lymphocytes on non-necrotic myofibers, were absent. The (HLA) class I (or class ABC) immunohistochemistry study was strongly positive, demonstrating surface labeling and sarcoplasmic staining of all myofibers in the sample. Immunohistochemistry demonstrated no upregulation of utrophin, which is normal, and normal patterns of expression of dystrophin N-terminal, C-terminal, and rod domain epitopes, for α-, β-, and γ-sarcoglycan, and for laminin-2α, β-dystroglycan, dysferlin, and emerin. Electron microscopy demonstrated no ultrastructural abnormalities within myofibers; there were only nonspecific pathological findings in a few necrotic myofibers.

Myositis antibody panel (RDL laboratory), including anti-SRP (via radioimmunoprecipitation assay), HMGCR (<20 units, enzyme-linked immunoabsorbent assay), Mi-2, PL-12, PL-7, EJ, OJ, Ku, U1snRNP, PM/Sc, Jo-1, U1-RNP, SS-A 52, fibrillinar, MDA-5, NXP-2, and TIF1-γ antibodies, were all negative.

Electrocardiogram, echocardiogram, pulmonary function tests, and chest X-ray were all unremarkable.

The patient was initially treated with methylprednisone 1 g/day for 3 days, without improvement. After an initial loading dose of IVlg 2 g/kg, followed by 3 monthly 1-g/kg infusions, he recovered considerably and could dress himself, with 4/5 proximal upper extremity strength. A provisional diagnosis of IMNM was entertained, with a potential etiology of an immune-mediated disorder. He was then treated with a single loading dose of IVIg 2 g/kg, followed by 3 monthly infusions of 1 g/kg. He recovered considerably and could ambulate without any assistance. Immune-mediated necrotizing myopathy was highly unlikely in a muscular dystrophy, so this type of testing was not pursued. A paraneoplastic syndrome is possible, but this was unlikely in an individual of this age and clinical presentation. One may consider a viral or postviral-associated myositis, but there was no history nor any clinical and/or laboratory signs of an infection.

In conclusion, a high index of suspicion is necessary to diagnose pediatric IMNM, and our case report expands the phenotypical spectrum of IMNM in children. This case also highlights the importance of early recognition and correct choice of treatment to prevent rapid and severe disease progression.

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