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| RESEARCH ARTICLE

Myositis: A Comeback Complication of Viral Endemics

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| ABSTRACT
Acute benign childhood myositis (ABCM) is an uncommon presentation of viral upper respiratory tract infection. Multiple etiologies exist, with the common association of influenzas A and B. The patient usually presents with lower limb pain with associated gait abnormalities in much more severe cases. The diagnosis is made through certain laboratory investigations, with an important aspect of excluding more serious differential diagnoses. This case report follows a 6-year-old male presenting with a complaint of bilateral calf pain and weakness, The Patient tested positive for influenza A leading to the diagnosis of ABCM.

| KEYWORDS
"Myositis", "calf pain", "influenza B", "Viral", and "Acute Benign Childhood Myositis".

| ARTICLE INFORMATION
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1. Introduction

Lower Limb weakness and gait abnormalities in the pediatric age group have multiple differential diagnoses. From Gillian-Bare syndrome, stroke, and myositis, such a wide range of differentials makes the recognition of such causes important. Proper history taking, extensive physical examination, and proper investigations will aid in the proper treatment and diagnosis of such illness. In terms of categorizations, such complaints can be divided into upper motor neuron (UMN) and lower motor neuron (LMN) lesions (Agyeman et al. 2004). Furthermore, they can be categorized into anterior horn cell disease and peripheral nerve disease (1). In the case presented below, the history of previous upper respiratory tract infection, lower limb weakness, and tenderness indicate the likelihood of myositis. Myositis is the inflammation of the muscular tissue in the body (Brisca et al. 2001).

Regarding viral myositis, the pathophysiology of the illness is unknown, with a consideration of muscle fiber injury rather than inflammatory cell infiltration noted (Brisca et al. 2001). Such histopathological features indicate that viral myositis is an extremely rare diagnosis, where it shall be considered when other differentials are excluded (Brisca et al. 2001). The case study below shows the probable diagnosis of acute benign childhood myositis, with the first diagnosed case in the Kingdom of Bahrain post-COVID-19.

2. Case Study

A 6-year-old, medically and surgically free, came to the emergency department complaining of bilateral lower limb weakness for one-day duration. The pain was concentrated in his calves, which affected his gait. The patient was able to walk but with difficulty. The patient had a history of subjective fever, sore throat, and a blocked nose for the past four days. He was diagnosed as a case of influenza in the local health care center and discharged on symptomatic treatment. One day before lower limb pain, the patient felt fatigued. The patient denied a history of dizziness, loss of consciousness, convulsions, abdominal pain, dark urine, change in urine, or bowel habits. On examination, the Glasgow Come Scale was 15 out of 15, vitals within normal range, and afebrile.

Furthermore, throat and ear examinations were normal with the rest of the systemic examination being unremarkable. His lower limb was tender, yet no erythema was regarded, nor swelling, and temperature on both sides was normal. The patient had a wide-based gait with cerebral ER signs negative. Laboratory investigations and imaging were done. Laboratory investigations can be seen in Table 1. CT brain was done to rule out any cerebrum and cerebellum abnormalities and it was normal.

Table 1: Laboratory Investigations Conducted in the Emergency Department

Investigations	**Results**
Hemoglobin	12 g\dL
White Blood Cells	4.88 x 109 g\dL
Creatinine Kinase	6948 U\L
Myoglobin	More than 1000
Myoglobin (Urine)	Negative
Lactate Dehydrogenase	405
Creatinine	24
Urea	3.6
Erythrocyte Sedimentation Rate	20

The patient was referred to pediatrics. The patient was admitted as a case of acute benign childhood myositis (ABCM). Upon further investigations, Epstein Barr Virus (EBV) Antibody IgG to nuclear antigen, anti-cytomegalovirus (CMV) IgG, and influenza A polymerase chain reaction were positive. Upon writing this case report, the patient was treated as a case of ABCM.

3. Discussion

In the post-COVID era, the incidence of acute benign childhood myositis (ABCM) has been on the rise. Prevalence of ABCM was regarded as 2.96 per 100,000 cases with the median age of diagnosis being 8.3 years old and a ratio of 2:1 between males and females (Buss et al. 2009). ABCM typically presents after the resolution of an upper respiratory tract infection. Etiology commonly includes viral agents such as influenza A and influenza B. Less commonly EBV, CMV, and hepatitis B viruses may lead to such presentation (Buss et al. 2009; Ferrández et al. 2013). In a study conducted in 2022, 17% of patients were Influenza B positive, regarding the virus as the most common cause of ABCM (Magee, 2017). The typical presentation includes gait abnormalities, refusal to walk, tip-toe walking, tenderness in the lower limbs, and generalized fatigue. In the case presented above, a wide base gait, commonly known as an ataxic gait, is due to poor muscle function and loss of coordination (Brisca et al. 2021). Such abnormalities are usually an indication of cerebellar disease, therefore exclusion of other differentials such as cerebellar stroke must be excluded.

Table 2: Differential Diagnosis of Weakness and Gait Abnormalities

Differentials	**Symptoms**
Gillian Bare Syndrome	Post Gastroenteritis with ascending lower limb weakness.
Stroke	Risk factors must be present such as thromboembolic disease and appear as weakness ataxia, and difficulty in speech.
Dermatomyositis	Proximal muscle weakness, skin rash, and abnormal gait.
Muscular Dystrophy	Family history is usually present with earlier age of onset, between 3 to 5 years.

An important aspect of the diagnosis of ABCM is excluding another differential diagnosis (table 2). Weakness within children has a broad differential which may include stroke, Gillian bare syndrome, dermatomyositis, and in endemic areas, polio myositis. In the case above, most of these differentials were excluded through proper history and physical examination. Polio is excluded due to the last reported case in the Kingdom being in 1993 (TANAKA et al. 1989). The patient has distal muscle pain, weakness, and no rash thus excluding dermatomyositis. Furthermore, such gait presentation is regarded as a rare finding, as patients usually appear

with lower limb tenderness and weakness. Thus, more serious differentials must be excluded before the diagnosis of ABCM is made. Therefore, CT brain was ordered in the emergency room and was normal (Magee, 2017).

Although ACBM is a clinical diagnosis, laboratory investigations are an important factor in determining the etiology of the illness and the exclusion of more serious complications of myositis such as acute kidney injury and rhabdomyolysis. Creatinine kinase (CK), lactate dehydrogenase (LDH), and myoglobin, regarded as enzymes found in muscle cells, must be ordered. Recent literature has indicated that although laboratory investigations must be done, the probability of normalization is high with late presentation to the hospital (6). The normalization of CK is rapid, typically occurring within two to three days, therefore it is not regarded as a diagnostic feature of ABCM. Within the case presented above, CK, LDH, and myoglobin were elevated indicating the presence of an inflammatory process within the muscular tissue. An interesting aspect of the pattern of ABCM is the presence of leukopenia, where a mean white cell count of 4.59 was noted in a study conducted in 2015 (www.uptodate.com, n.d). Such a finding was noted in the case presented above, leading to the diagnosis of ACBM more likely and indicating the likelihood of a muscle fiber injury more than an inflammatory process, even with the presence of elevated ESR.

Rhabdomyolysis is the most feared yet, rare complication of ABCM. It was recorded in 3% of overall causes of ANCM. The risk of acute kidney injury, and subsequent renal failure, is preventable with proper management of the pathology. It is important to note that the risk of the kidney is increased in patients with CK values over 1,000 U\L (TANAKA et al. 1989). In terms of management, recovery usually occurs within seven to ten days. Treatment modalities include proper hydration, anti-pyretic, and analgesia. There is no evidence indicating the efficacy of Intravenous Immunoglobulins (IVIG), therefore symptomatic therapy is only indicated. In the cases of rhabdomyolysis, further management may be required including dialysis in very severe forms (www.uptodate.com, n.d). Reoccurrence of ACBM can occur in 10% of cases and usually is triggered by viral infections (TANAKA et al. 1989). ABCM has an excellent prognosis with no evidence of neurological deficits post-treatment (www.uptodate.com, n.d).

4. Conclusion

In the post-COVID-19 era, there is an increase in the incidence of ABCM. Although it has multiple etiologies, influenza B remains among the most common causes. ABCM is a clinical diagnosis, with an increase in CK and myoglobin levels seen in some causes. The risk of complications such as rhabdomyolysis is low yet must be excluded to prevent the risk of morbidity post-treatment. ABCM is usually self-limiting with symptomatic management for pain and fever to keep the patient comfortable. The case above is the first presentation of ABCM in the Kingdom of Bahrain post-COVID-19 pandemic.

Statements and Declarations

This research received no external funding, and the authors declare no conflict of interest. All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organization or those of the publisher, the editors, and the reviewers. Authors must state whether ethical approval was sought for the present study, especially if the study is a clinical trial or animal experiment. The authors took verbal consent from all participants to use the data.

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