Coalesce Research Group

Global Journal of Microbiology and Infectious Diseases

Case Report

2021: Volume 1, Issue 1

Pyomyositis of The Forearm in a 4-year-old Male: A Case Report with Comprehensive Review of The Literature

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Received Date: **12-12-2021** **Published Date:** **16-02-2022**

Abstract

Introduction: Pyomyositis, originally reported in tropical areas is a rare condition, most often caused by Staphylococcus aureus. Usually affecting large muscles of the body, it occurs more frequently in immunocompromised patients and is also related to risk factors such as intensive exercise, muscle trauma, malnutrition, bacteremia, chronic illnesses and concurrent infection. If misdiagnosed and not treated rapidly it can progress to toxic shock syndrome that is associated with high mortality rates.

Case Presentation: We were presented with an atypical case of pyomyositis of the forearm in a four-year-old male with the history of elbow trauma, concurrent infection and hypoproteinemia. When admitted to the hospital, the patient was febrile, with local symptoms of inflammation and increased parameters of inflammation. Magnetic resonance imaging (MRI) showed the presence of pyogenic infection of the brachial, pronator teres and flexor carpi radialis muscle. Pus drainage and lavage as well as intravenous administrating of double antibiotic therapy were performed. The patient was discharged ten days after being admitted to the hospital, with no complications.

Conclusion: Although pyomyositis is a rare condition usually affecting large muscles of the body, other muscles, such as forearm muscles, can also be atypically affected. Muscle trauma, concurrent infection and hypoproteinemia are reported to be risk factors for the disease that is most often caused by community-acquired methicillin-resistant Staphylococcus aureus. Rapid diagnosis and prompt treatment avoid progression to toxic shock syndrome associated with high mortality rates.

Keywords: Children; Elbow Joint; Forearm; Pyomyositis, Trauma

Introduction

Pyomyositis is defined as a rare pyogenic condition of the skeletal muscles, manifesting mainly in the form of single or, rarely, in the form of multiple intramuscular abscesses [1,2]. Predominantly as a disease of tropical countries, it was originally reported from tropical regions of Asia and Africa and thus is reffered to as "tropical" pyomyositis [1,3]. Most often caused by *S. aureus*, with no obvious local source of infection, it usually affects large muscles of the body, such as quadriceps or gluteal muscles, although muscles of the upper limb, trunk and spine can also be affected [1,3,4]. Among other causes, streptococcus and anaerobes were also described in the literature [4]. The pediatric population comprises approximately 35% of reported cases, showing the male predominance [2-5]. It occurs more frequently in immuno-compromised patients and also related to risk factors affecting the muscle itself, such as intensive exercise, direct muscle trauma or factors such as malnutrition,

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Citation: Ducic S, Djuricic G, Bukva B, et al. Pyomyositis of The Forearm in a 4-year-old Male: A Case Report with Comprehensive Review of The Literature. Glob J Microbiol Infect Dis. 2022;1:1-4.

bacteremia, chronic illnesses, concurrent infection [6-8]. The disease progresses through three clinical stages: invasive stage, suppurative stage and disseminated form of the disease and its unfamiliarity, non-specific, subtle clinical symptoms and local signs may lead to the delay in diagnosis, which is based on magnetic resonance imaging (MRI) [6,9]. Early recognition of the disease, intravenous administration of both empirical and targeted antibiotic therapy, accompanied with prompt surgical intervention are crucial in its proper treatment and prevention of sepsis, septic shock and death [9].

Case Presentation

In this report we present a rare case of pyomyositis of the elbow region in a four-year-old male with the previous history of elbow contusion which occurred seven days before the patient was hospitalized. After suffering the above mentioned injury, patient was treated conservatively, with adequate plaster immobilization and examined every second day, free of all clinical and radiographic signs of fracture [**Figure 1**]. The child was admitted to the University Children's Hospital, Belgrade, Serbia a week after suffering elbow contusion and was with no history of chronic diseases and therapy. Family history anamnesis revealed no specific information. All immunizations were on schedule with no recent immunization.

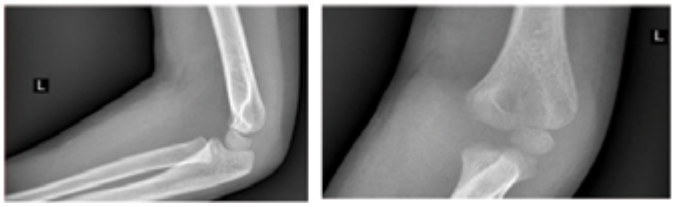

Figure 1: a- initial radiographs, b-admission to the hospital radiographs.

Clinically, he was febrile, with pain, swelling and impaired mobility of both forearm and fingers of the hand, while the pulse of the radial artery was slowed. The parent gave hetero-anamnestic data that the child was both febrile up to 400 °C and coughing during previous four days. Radiographs of the elbow were performed again, as well as radiographs of the lungs. Laboratory blood tests showed leukocytosis (21.4 x 109/l) with the predominance of granulocytes (84.1%); while C-reactive protein (CRP) was 207 mg/l and then increased to 258.7 mg/l, while procalcitonin was 0.51 ng/ml. Capillary blood gas analyzes showed metabolic acidosis (pH=7.31), while laboratory analyzes of urine were within the reference range. Blood culture and urine culture were both sterile. After being admitted and completely laboratory examined, double intravenous antibiotic therapy (vancomycin and meropenem) was administered empirically.

MRI findings of the left elbow showed the presence of abscessive pyomyositis, predominantly of the brachial, pronator teres and flexor carpi radialis muscle, as well as the presence of olecranon bursitis, fasciitis and cellulitis [**Figure 2**].

the brachialis, pronator teres and flexor carpi radialis muscle, located anteromedially from the elbow joint, in the length of 45 mm cranially and 30 mm caudally.

Clinical, laboratory and MRI findings indicated an urgent surgical treatment that was performed during the first day

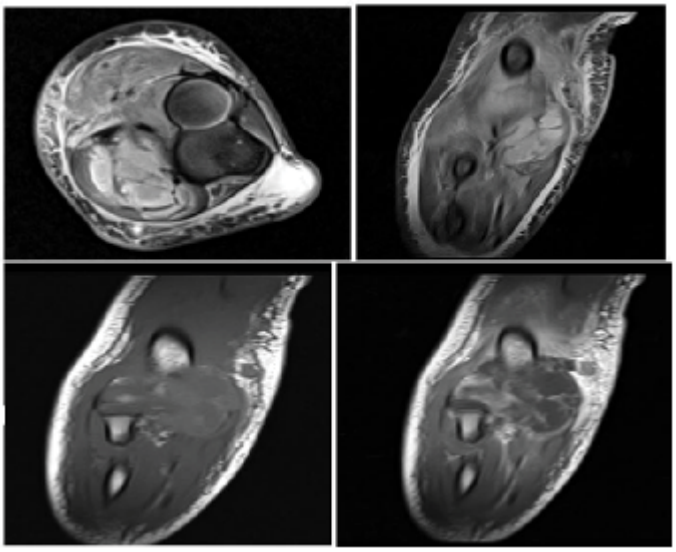

Figure 2: MRI of the left elbow joint (a,b,c,d): macrolobulated, septate fluid collection in the brachialis, pronator teres and flexor carpi radialis muscle, located anteromedially from the elbow joint, in the length of 45 mm cranially and 30 mm caudally.

of the hospitalization. After longitudinal medial surgical approach to the elbow joint, with preservation of the surrounding neurovascular structures, the presence of an extensive soft-tissue, periarticular purulent collection was identified, after which extensive lavage and drainage of the volar forearm compartment were performed, as well as capsulotomy, biopsy of the lymph node in the area of the medial epicondyle of the humerus and wound's edges' approximation with three sutures, after placing one drain [**Figure 3**]. The sample of wound pus swab was microbiologically tested positive for methicillin-resistant Staphylococcus aureus (MRSA). Pathohistological analysys of the biopsied lymph node showed the presence of sinus histiocytosis and reactive follicular hyperplasia.

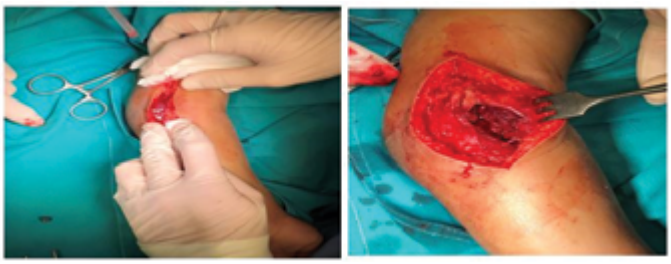

Figure 3: Intraoperative findings of the affected elbow region: a-before pus drainage and lavage, b-after pus drainage and lavage.

Further clinical and laboratory examination of the patient were continued postoperatively. As expected, CRP was postoperatively increased (274 mg/l) but then consecutively decreasing during the entire further hospitalization (4.4 mg/l at the discharge day. Hypoalbuminemia (24 g/l) was detected and then corrected. Patient was afebrile and vitally stable, with no pain and swelling, able to move both forearm and fingers and then discharged from the hospital treatment, ten days after being admitted, with no early consequences and complications.

Discussion

Pyomyositis is a rare infectious condition of the skeletal muscles, affecting children in 35% of reported cases, with the

male predominance (2:1) [1,2]. The first case of pyomyositis was documented by Scriba in Japan in 1885, while first cases in temperate climates such as North America and Europe were not reported until 1971. It was thought to be endemic to tropical countries and thus is reffered to as "tropical pyomyositis" (2.2-4% of surgical admissions) but is now being increasingly reported from temperate areas [2]. Induced by bacteremia and caused by *S. aureus* in up to 90% cases in tropical and 75% cases in temperate climates, it usually affects large muscles of the body, such as quadriceps or gluteal muscles, although muscles of the upper limb, trunk and spine can also be affected [1,2]. According to microbial genome sequencing and bacterial genome-wide association studies (GWAS), the increasing incidence of bacterial pyomyositis in temperate regions has been correlated with the spreading of community-associated-methicillin-resistant *S. aureus* clones that produce Panton-Valentine leukocidin (PVL), a pore-forming toxin encoded by two genes, lukF-PV and lukS-PV, usually carried on bacteriophages. This toxin, more frequently associated with community isolates is linked to a broad array of soft tissue infections and can kill myeloid cells by forming channels in the plasma membrane, leading to loss of osmotic balance that ultimately lyses the cell [9-12].

In our report we presented a case of methicillin-resistant *Staphylococcus aureus* pyomyositis with atypical, forearm localization that is reported in only 1.3% of literature cases [2]. A four-year-old male from a temperate area with the history of previous elbow trauma was admitted with local symptoms of inflammation and symptoms of concurrent respiratory infection. Both direct muscle trauma and concurrent infection were described in the literature as risk factors for pyomyositis as well as hypoproteinemia that was also detected in our patient [1,12,13]. The patient was in the suppurative stage of the disease that is reported in about 90% patients and is characterized by the presence of abscess formation [2]. Rarely, if not diagnosed and treated rapidly and properly, with intravenous antibiotics and pus drainage, it can lead to the late, disseminated stage of the disease, toxic shock syndrome that is associated with high mortality rates, varying from 0.89% to 23% in different studies [2,11,13]. On the other side, if not misdiagnosed because of its rarity outside of tropical climates and promptly treated, the prognosis remains excellent [14,15].

Conclusion

Pyomyositis is a rare pyogenic condition of skeletal muscles usually caused by *S. aureus*. It usually affects large muscles but we were presented with an atypical case of forearm pyomyositis that was diagnosed rapidly and treated promptly with surgical pus drainage and double intravenous antibiotic therapy so the toxic shock syndrome was prevented.

Consent

The patient's parent has given informed consent for the case report to be published.

Competing Interests

The authors declare that they have no competing interests.

Authors' contributions

Besides being involved in the process of the patient's treatment, SD, FM and BB have given substantial contributions to the conception or the design of the manuscript as well as contributions to acquisition, analysis and interpretation of the data; GDj did MRI diagnostics while ML, MB, NV and VR were involved in the process of the patient's postoperative observation. All authors have participated in writing the manuscript, while DN also revised it critically. All authors contributed equally to the manuscript, read and approved the final version of the manuscript.

Funding

The authors report no involvement in the research by the sponsor that could have influenced the outcome of this work.

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