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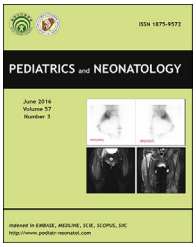

CASE REPORT

Musculoskeletal Sepsis Associated with Deep Vein Thrombosis in a Child

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Deep vein thrombosis (DVT) is a rare disease in pediatric patients. We report a pediatric patient who developed DVT in association with methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia complicated with septic arthritis, osteomyelitis, and myositis extensively. It is crucial to consider musculoskeletal infection associated with DVT in any child who presents with severe swollen limbs and limitations of motion. Prompt antibiotic and anticoagulant treatments should be initiated to reduce the risk of fatal complications.

1. Introduction

Deep vein thrombosis (DVT) is a relatively rare disease in pediatric patients.[1,2] According to previous studies, venous thromboembolic disease has an annual incidence of 1 per 100,000 and 0.74 per 100,000 in Singapore and Hong Kong Chinese children (< 15 years of age), respectively.[3,4] The most important risk factor for DVT in children is the presence of a central venous line. In addition to infection, trauma and congenital heart disease are also common risk factors. The Virchow triad, including venous stasis, endothelial damage, and a hypercoagulation state, is the pathophysiology in venous thromboembolic disease. Outcomes of DVT in children may differ depending on anatomic sites, hemorrhage, superior vena cava syndrome, renal insufficiency, limb gangrene, and recurrent DVT. Herein, we report a pediatric patient with exceptionally extensive

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regional septic arthritis, osteomyelitis, and myositis complicated with septic DVT secondary to community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA). After a complete course of antibiotics plus anticoagulation treatments, without surgical intervention, this patient recovered fully. No complications were noted during the following 2 years.

2. Case Report

A previously healthy 23-month-old boy with an initial presentation of intermittent high fever up to 39.5 °C for 3 days was sent to the emergency room (ER) of our hospital. According to the statement of the patient's mother, he had suffered from a mild cough, decreased activity, poor appetite accompanied with vomiting, and right lower extremity pain that had been ongoing for approximately 2 days. The patient had no known history of major trauma prior to this episode. Physical examination at the ER revealed a mildly injected throat and bilateral coarse breathing sounds. The white blood cell count was 29,500/CUMM with a band of 1% and segment of 84%. The level of C-reactive protein (CRP) was 35.7 mg/L (normal 0—5 mg/L). The urine analysis results were negative. A chest radiograph showed mild bilateral infiltration. The patient was then admitted to the ward under the suspicion of a lower respiratory tract infection.

Pain and swelling over the right hip with weakness of the right lower extremity were noted on the 3rd day after admission. A physical examination showed local heat, tenderness, and erythematous changes over the right hip joint and inguinal area, accompanied by right lower extremity swelling and edema. The range of motion of the patient's right lower extremity was limited. Doppler ultrasonography of the limbs showed DVT of the right femoral vein. Laboratory examinations revealed: D-dimer 6.62 ug/mL (normal $<$ 0.55 μg/mL), fibrinogen 527 mg/dL (normal 200—400 mg/dL), fibrin degradation products 16.54 μg/mL (normal $<$ 5 μg/mL). The osteomyelitis scan showed an increased signal over the right hip region (Figure 1). A magnetic resonance imaging (MRI) study of the lower extremities revealed thrombophlebitis of the right femoral vein, septic arthritis over the right hip joint, osteomyelitis over the right femoral bone, and myositis (Figure 2A and B). The coagulation profile and immunity tests from this patient all showed no abnormal findings: a protein C functional assay of 63% and a protein S functional assay of 161%.

Antibiotic treatment with Unasyn (ampicillin + sulfactum, 25 mg ampicillin/kg/dose, q6h) was given after hospital admission. A blood culture revealed MRSA on the 3rd day after admission. MRSA was sensitive to gentamycin, vancomycin, linezolid, trimethoprim/sulfamethoxazole and resistant to oxacillin, ampicillin, clindamycin, penicillin-G, ceftriaxone, tetracycline, and cefazolin. Antibiotic treatment was therefore shifted to vancomycin (10 mg/kg/dose, q6h) because of diffuse soft tissue infection and bacteremia. Owing to the rise in CRP to 14.7 mg/dL and intermittent fever that persisted after 4 days of vancomycin treatment, the antibiotic regimen was switched to daptomycin (10 mg/kg/dose, qd), according to the recommendation of a pediatric infectious disease specialist because of poor clinical response and elevated laboratory parameters. A pediatric orthopedist was also consulted and he suggested no indication of surgical intervention due to the fact that no motion limitations were observed clinically and no pus formation was observed according to the image. Antibiotic treatment with daptomycin was provided for 6 weeks and follow-up blood culture showed no bacteria growth.

After DVT was diagnosed by Doppler ultrasonography of the limbs, low molecular weight heparin (LMWH) was administered for 2 weeks, and then shifted to the oral form antithrombotic agent, warfarin. Warfarin was given for nearly 5.5 months and the dosage was adjusted to keep the International Normalized Ratio (INR) at approximately 2—2.5. The total duration of the anticoagulant therapy, including LMWH and warfarin, was 6 months.

An MRI study was performed 1 month later after antibiotic and anticoagulant treatment, and it showed a regressive change. Recanalization of the femoral vein was noted on the Doppler ultrasonography of the limbs after 40 days of treatment. The Doppler ultrasonography of the limbs was followed 3 months later after completion of warfarin treatment, and it showed partial residual thrombosis of the right femoral vein.

This patient experienced no major complications during the entire course of antibiotic and anticoagulant treatment.

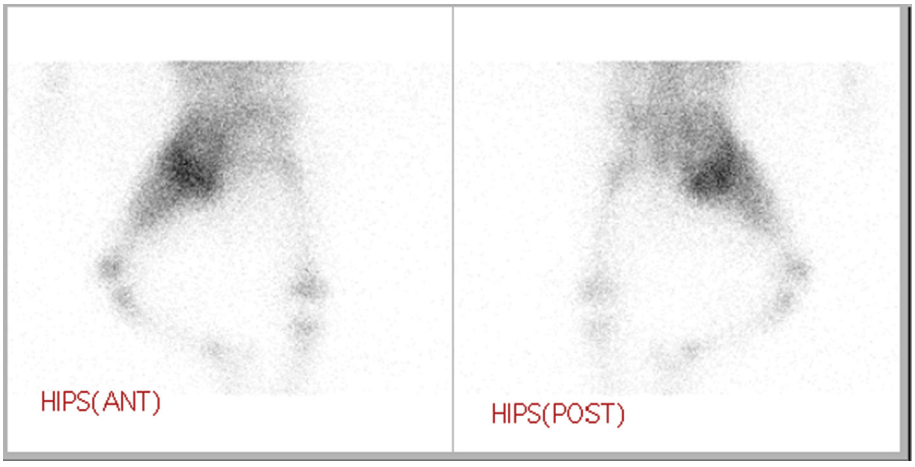

Figure 1 Osteomyelitis scan: increased blood pool and Ga-67 in the right hip region, compatible with cellulitis.