Original Article

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Assessment of Features of Musculoskeletal Involvement in Children Diagnosed with Severe Sepsis: An Institutional Based Study

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Abstract

Background: Sepsis represents the leading cause of mortality among infants and children globally. Hence; the present study was conducted to assess features of musculoskeletal involvement in children diagnosed with severe sepsis. **Materials & Methods:** 50 children under the age of twelve who exhibited disseminated infections were included in the study. Demographic information was gathered, and patients displaying clinical signs indicative of septic arthritis and acute osteomyelitis were assessed throughout their hospital stay following a comprehensive clinical evaluation. The hematological and biochemical profiles of these patients were analyzed. Musculoskeletal involvement was assessed in all the patients. **Results:** Mean age of the subjects was 11.8 years. 58 percent of the subjects were boys while the remaining were girls. Musculoskeletal involvement was seen in 60 percent of the subjects. Among these 30 subjects with musculoskeletal involvement, osteomyelitis was seen in 66.67 percent of the subjects while septic arthritis was seen in 33.33 percent of the subjects. Femur, Humerus, hip and shoulder involvement occurred in 33.33 percent, 26.67 percent, 16.67 percent and 10 percent of the patients respectively. **Conclusion:** The incidence of osteoarticular infections is notably elevated in pediatric patients with disseminated disease, necessitating a heightened clinical awareness for these conditions.

Keywords: Musculoskeletal, Sepsis.

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Introduction

Sepsis represents the leading cause of mortality among infants and children globally. The incidence of childhood pneumonia is estimated at 0.29 episodes per child-year in less developed nations and 0.05 episodes per child-year in more developed regions, positioning it as the primary contributor to pediatric sepsis. Furthermore, pneumonia is the foremost cause of death in children under five years of age. Countries with large populations of children that are still developing face the greatest challenges related to pediatric sepsis.[1] Annually, there are approximately 156 million new pneumonia cases worldwide, with an estimated 151 million occurring in developing countries. Factors such as contaminated water, inadequate sanitation, indoor air pollution, overcrowding, low birth weight, and insufficient immunization and nutrition facilitate the unchecked proliferation of pathogens within the body.[2, 3] Consequently, the first tier of a three-tiered strategy aimed at preventing pediatric sepsis and its consequences emphasizes the enhancement of public health initiatives to address these critical issues. The second tier focuses on the early detection and intervention necessary to halt the progression from infection to sepsis and ultimately to septic shock, which can result in end-organ damage. The third tier encompasses intensive care and supportive measures designed to avert sepsis-related mortality and morbidity.[4-6] Hence; the present study was conducted to assess features of musculoskeletal involvement in children diagnosed with severe sepsis.

Subjects and Methods

The present study was conducted to assess features of musculoskeletal involvement in children diagnosed with severe sepsis. 50 children under the age of twelve who exhibited disseminated infections were included in the study. Demographic information was gathered, and patients displaying clinical signs indicative of septic arthritis and acute osteomyelitis were assessed throughout their hospital stay following a comprehensive clinical evaluation. The hematological and biochemical profiles of these patients were analyzed. An ultrasound examination was performed, followed by blood culture testing. Specific treatment protocols involved the administration of antimicrobial agents, diligent monitoring for abscess formation, and surgical intervention for drainage when necessary.

Supportive care measures encompassed the maintenance of blood pressure, management of fluid and electrolyte levels, provision of analgesics, prevention of pressure ulcers, implementation of physiotherapy, adherence to aseptic techniques, and initiation of early enteral nutrition. Musculoskeletal involvement was assessed in all the patients. All the results were recorded and evaluated using SPSS software.

Table 1: Demographic data.

Variable	Number	Percentage
Mean age (years)	11.8	
Boys	29	58
Girls	21	42

Table 2: Incidence of musculoskeletal involvement.

Musculoskeletal involvement	Number	Percentage
Present	30	60
Absent	20	40
Total	50	100

Table 3: Type of musculoskeletal involvement

Musculoskeletal involvement	Number	Percentage
Osteomyelitis	20	66.67
Septic arthritis	10	33.33
Total	30	100

Table 4: Frequency of bone involvement

Bone	Number	Percentage
Femur	10	33.33
Humerus	8	26.67
Hip	5	16.67
Shoulder	3	10
Others	4	13.33
Total	30	000

Results

The mean age of the subjects was 11.8 years. 58 percent of the subjects were boys while the remaining were girls. Musculoskeletal involvement was seen in 60 percent of the subjects. Among these 30 subjects with musculoskeletal involvement, osteomyelitis was seen in 66.67 percent of the subjects while septic arthritis was seen in 33.33 percent of the subjects. Femur, Humerus, hip and shoulder involvement occurred in 33.33 percent, 26.67 percent, 16.67 percent and 10 percent of the patients respectively.

Discussion

Osteomyelitis and septic arthritis occur most commonly in children. Osteomyelitis is an inflammation in the bone. The term osteomyelitis generally refers to a bacterial infection of bone. Osteomyelitis may be acute, subacute or chronic. Septic arthritis is a joint infection usually caused by bacteria. Bacteria can reach the bone and joint through several routes. Osteomyelitis and septic arthritis have a potential for life-long disability if treated insufficiently. Osteomyelitis In children, osteomyelitis is most often acute, with the bacteria usually reaching the bone through the bloodstream; it is commonly referred to as acute haematogenous osteomyelitis (AHO). Rarely an infection may spread to the bone from an adjacent infected focus or by direct inoculation through an open wound at the time of an open fracture or following surgery.[7-9] Irritable hip serves as the primary differential diagnosis for septic arthritis of the hip. Distinguishing between irritable hip and septic arthritis can pose significant challenges. Notably, irritable hip is more prevalent than hip joint infections. Typically, a child with an irritable hip presents with a sudden onset of pain, limping, or an outright refusal to bear weight. In fact, among children aged 3 to 7 years diagnosed with septic arthritis of the hip joint, irritable hip is often the initial diagnosis. Kocher et al. established a clinical prediction algorithm that utilizes four clinical variables to differentiate between septic arthritis and irritable hip. Their findings indicate that when all four criteria are satisfied, there is a 99% likelihood that the child is suffering from septic arthritis of the hip. The probability decreases to 93% when three criteria are met, 40% with two criteria, and only 3% when one criterion is satisfied.[3] Hence; the present study was conducted to assess features of musculoskeletal involvement in children diagnosed with severe sepsis.

The mean age of the subjects was 11.8 years. 58 percent of the subjects were boys while the remaining were girls. Musculoskeletal involvement was seen in 60 percent of the subjects. Among these 30 subjects with musculoskeletal involvement, osteomyelitis was seen in 66.67 percent of the subjects while septic arthritis was seen in 33.33 percent of the subjects. Femur, Humerus, hip and shoulder involvement occurred in 33.33 percent, 26.67 percent, 16.67 percent and 10 percent of the patients respectively. McCarthy JJ et al conducted a systemic review on pediatric musculoskeletal

involvement. The following data was summarized by them. Pediatric musculoskeletal infections are common disorders that can result in significant disability. Because the understanding, diagnosis, and treatment of infections of the bones, joints, and soft tissues have continued to improve over time, it is important for orthopaedic surgeons to have an understanding of etiology, diagnosis, basic treatment principles, and recent advancements to achieve successful outcomes. Although each infectious process is unique, there are certain treatment principles that apply to all pediatric musculoskeletal infections. These include prevention, prompt and accurate diagnosis, and timely medical and/or surgical intervention. Continued evaluations are mandatory to assure good long-term outcomes. Because the effects of infection may last beyond the acute episode in pediatric patients, long-term follow-up is needed to assess for late sequelae such as angular deformities and limb-length inequalities.[10] Monsalve et al evaluate the demographic distribution of septic arthritis and osteomyelitis in children and to explore optimal imaging guidelines for these patients. They performed a retrospective study of children up to 18 years old who were treated for osteomyelitis or septic arthritis. Studies were reviewed to determine the incidence of septic arthritis or superimposed osteomyelitis. The reference diagnosis was based on the combined review by the orthopedic surgeon and infectious disease notes, discharge summary, operative report, and MRI examination. One hundred sixty-two children who underwent 177 MRI examinations were diagnosed with acute musculoskeletal infection. One hundred three patients were included in the septic arthritis category, of whom 70 (68%) had septic arthritis with osteomyelitis. Seventy-four (42.1%) patients had isolated osteomyelitis without septic arthritis. Children under 2 years old were more likely to have septic arthritis (either isolated or with osteomyelitis) than isolated osteomyelitis compared with older children ($p = 0.0003$). In children who underwent MRI for suspected musculoskeletal infection, septic arthritis was more prevalent in children under the age of 2 years than in older children. However, both septic arthritis and osteomyelitis were found frequently in older children. Musculoskeletal infection imaging workup guidelines for children of all ages should address the frequent association of osteomyelitis and septic arthritis.[11]

Conclusion

The incidence of osteoarticular infections is notably elevated in pediatric patients with disseminated disease, necessitating a heightened clinical awareness for these conditions.

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