



ORIGINAL RESEARCH PAPER

Neonatology

CLINICAL PROFILE OF NEONATAL SEPTIC ARTHRITIS IN A TERTIARY CARE CENTRE IN SOUTHERN INDIA

KEY WORDS: Newborn, Septic arthritis

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ABSTRACT

Background: Neonatal septic arthritis needs a special attention due to its subtle signs and symptoms and catastrophic complications. There is little literature regarding their clinical profile and their outcomes. **Objectives:** The objective was to study the clinical profile of neonates admitted with septic arthritis, their clinical and radiological features. **Methodology:** Neonates with septic arthritis as assessed by retrospective inpatient records over a period of two years were included. Their clinical and radiological features were studied. **Results:** Data of 90 neonates admitted with septic arthritis were collected. Single joint involvement was common (81.1%), and hip joint was the most common joint involved (34.4%). Gram-negative organisms were predominant and *Klebsiella* was the most common organism isolated from blood culture followed by *Staphylococcus aureus*. **Conclusions:** Most neonates had monoarticular joint involvement. Hip joint is being the most commonly involved joint. Ultrasound is a good tool as it detects effusion in all cases. We should focus on clinical examination, early initiation of intravenous antibiotics, early referral to tertiary care centers, timely surgical intervention, and measures to ensure good joint mobility at the time of discharge and regular follow-up of these neonates to achieve best outcomes.

INTRODUCTION

Septic arthritis is one of the most seriously disabling conditions in all age groups. Because of their innate deficiencies and inabilities in defense mechanisms the incidence of septic arthritis is high in infancy and childhood. Bone and joint infections, though uncommon in neonatal sepsis, contribute to a significant number of cases in developing countries. The incidence of septic arthritis and osteomyelitis is 1 in 1500 among inborn neonates in India compared to 1 in 5000 (U.K) to 1 in 15,000 (U.S.A) in the western world [1]. Diagnosis and management of neonatal septic arthritis has great challenges to clinicians. Diagnosis is hindered and it is difficult to establish because the physical signs are frequently minimal, laboratory findings are often normal, and initial roentgographic appearance is often unhelpful or difficult to interpret as joint structures are primarily cartilaginous. If it is not identified early and treated properly, the condition might lead to long-term osteoskeletal handicaps. A number of studies document poor outcomes highlighting the potential to cause permanent sequelae even with modern treatment facilities [2,3].

Septic arthritis can lead to permanent joint disabilities or disturbances in skeletal growth secondary to damage to the cartilaginous growth plate. They include arthritis, decreased range of movements, limb-length discrepancy, and gait abnormalities. The reported incidence of permanent sequelae varies from 6% to 50% [4]. Identification of factors leading to adverse outcomes are clinically important. These factors might help us to decide on the type and timing of therapeutic interventions, duration of antimicrobial therapy, to predict the occurrence of adverse sequelae and thereby prevent them. The scanty literature evidence available from developing countries throws little light, especially on these factors and poor long-term outcomes [4,5]. Hence, we studied the clinical and bacteriological profile, risk factors of neonatal septic arthritis.

METHODOLOGY

We undertook a retrospective descriptive study. We did the study in a tertiary neonatal care teaching hospital in Southern India. We reviewed the medical records and radiographs of all patients diagnosed with septic arthritis from June 2016 to May 2018. We collected data from their inpatient records. Institutional Ethics Committee approval was obtained. We assigned a diagnosis of septic arthritis when a patient had a positive culture in aspirated joint fluid. If culture was negative, we presumed a diagnosis of septic arthritis when Morrey's criteria were satisfied with at least 2 of major criteria, namely, pus aspirated from the joint, marked elevation of erythrocyte sedimentation rate, specific roentgographic changes in the involved site, and at least 5 of the minor criteria such as fever greater than 38.3°C, pain (localized to the joint) made worse by gentle passive movements, swelling of the involved joint, systemic symptoms of lethargy, malaise,

irritability, no other demonstrable pathological process, satisfactory response to antibiotic therapy, and supportive evidence of ultrasound showing joint fluid collection [6]. We studied their clinical profile and assessed clinical and radiological outcomes. We used descriptive statistics to describe baseline variables.

We compared categorical outcome variables by Chi-square test or Fisher's exact test; normally distributed variables by Student's t-test, variables with skewed distribution by Mann-Whitney U-test. We used Statistical Software Package SPSS version 13.0 for analysis.

RESULTS

We studied 90 babies diagnosed with neonatal septic arthritis from existent medical records. We studied the clinical examination and radiological investigations. The mean (standard deviation [SD]) gestational age at birth and birth weight of our study group were 37.89 (2.12) weeks and 2.58 (0.48) kg, respectively (Table 1). Low birth weight neonates constituted one-third of the population. Primary reason for admission was septic arthritis in 12 neonates. Septic arthritis was diagnosed during their hospital stay in remaining 78 infants. The mean (SD) age of onset of symptoms was 14.7 (6.24) days and mean duration of symptoms before intervention was 4.8 (3.8) days. 35 neonates (38.8%) had a history of hospitalization previously for other illnesses. In 71 (78.8%) neonates, their venous lines either peripheral or central had been accessed during their hospitalization. Significant comorbidities such as hypoxic ischemic encephalopathy (HIE), patent ductus arteriosus, neonatal jaundice and congenital heart disease were present in 16(17.7%) neonates. Six neonates had undergone invasive procedures such as mechanical ventilation and exchange transfusions.

Table 1: Baseline characteristics of the study Newborns

Variables	Newborns n=90 (%)
Male	48(53.3)
Birth weight (Kg)*	2.58±0.48
Gestational age(weeks)*	37.89±2.12
Age at presentation(days)*	14.7±6.24
Pre intervention period from onset of symptoms (days)*	12.9±3.1
Comorbidities	16(17.7)
Previous hospitalisation	35(38.8)
Duration of IV antibiotics before intervention (days)*	10.2±5.8
Exchange transfusion	2(2.2)
Mechanical ventilation	4(4.4)

*Values are represented as mean±SD. IV: Intravenous

A total of 113 joints were involved in our 90 infants. Multiple joint involvements were seen in 17 (18.8%) neonates and 73(81.1%) had single joint involvement. Hip joint was involved in 31(34.4%) cases, followed by knee 11(12.2%) and shoulder 7(7.7%) (Table 2). Newborns had bilateral hip joint involvement in 5.5% of cases. Joint effusion was present in all the cases. The joint fluid showed no growth. The blood culture taken at admission grew organism only in 11 (12.2%) infants. Klebsiella was the predominant organism in blood culture (6 newborns) and 5 babies had S. aureus. 14 (15.5%) newborns had undergone arthrotomy and needle aspiration was done in 24(26.6%) babies. There was a need for a repeat procedure in 3(3.3%) neonates. The infants were treated with antibiotics for a mean (SD) duration of 6 (0.96) weeks, of which antibiotics were administered intravenously for 4.9 (0.7) weeks. At the time of discharge, 17(18.8%) babies had restricted range of movements in the involved joints. All these children were enrolled physiotherapy clinics and were advised follow-up both with us and orthopedics.

Table 2: Clinical profile of the study Newborns

Variables	Newborns n=90(%)
Joint distribution	
Hip	31(34.4)
Knee	11(12.2)
Shoulder	7(7.7)
Elbow	1(1.1)
Multiple	17(18.8)
Radiological findings of joint	
Soft tissue swelling	34(37.7)
Increased joint space	25(27.7)
Ultrasound finding of joint	
Effusion	90(100)
Effusion and subluxation	1(1.1)
Type of surgical intervention	
Arthrotomy	14(15.5)
Needle aspiration	24(26.6)
Need for repeat procedure	3(3.3)
Total leucocyte count(cells/mm3)*	15724±3586
Positive blood culture	11(12.2)
Infants with restricted movement at discharge	17(18.8)

*Values are represented as mean±SD

DISCUSSION

Our study throws light on clinical profile in neonatal septic arthritis that might help us in treating and in implementing preventive measures. Our study population was predominantly term neonates (58.7%) and preterm (41.3%). Babies were symptomatic after the 2nd week of life after getting exposed to many risk factors for bloodstream infections either during hospitalization or from the community. Many of them had monoarticular involvement, and hip joint was the most common. Gram negative and Gram positive organisms were the profile suggesting a nosocomial origin from their hospitalization and also from the community.

Most of the recent literature on neonatal septic arthritis deals with preterm infants admitted in intramural nurseries [1, 4, 7], except the study by Berberian et al. which was done in a tertiary care extramural nursery [8]. Risk factors such as prior hospitalization and peripheral venous access were high in our neonates (38.8%) suggesting a nosocomial etiology similar to the Berberian's study. In the past studies, risk factors such as umbilical vessel catheterization, presence of central venous catheters, and femoral vessel blood sampling were also identified [9-12]. In our study,

history of umbilical venous catheterization was present in 1 baby. In our study, 18.8% of babies had multiple joint involvements, which is comparable to Berberian's study. The high incidence seen in other studies by Narang et al. (32%) and Frederiksen et al. (35%) could be due to the immune handicaps of the preterm population in their study [1,4]. An increased coexistence of osteomyelitis and septic arthritis is appreciated predominantly in neonatal population compared to pediatrics. This can be explained by the peculiar nature of neonate's osteal blood supply where the communication between the metaphyseal and the epiphyseal vessels facilitates the rapid spread of infection, thus offering a route of infection into the joint [13-15].

Blood culture was positive in 12.2% of our babies. The joint fluid culture positivity was low in our study because of low yield and antibiotic usage when compared to other studies by Narang et al. (48%), Frederiksen et al. (68%), Deshpande et al.(60%), and Berberian et al. (82%) [1,4,7, 8]. In addition, our blood culture positivity was also lower when compared to these studies. These low yields can be explained by prolonged antibiotics received even before admission (mean of 10.2 days). Organisms were predominantly Gram-negative organisms, Klebsiella being the most common. Most of the post-millennium studies reported Gram-negative organisms predominantly. There is a paradigm shift from the predominance of Gram-positive organisms observed in pre-millennium studies [16].

Our mean pre-intervention period was 12.9 days compared to other studies where pre-intervention period was shorter (2-3 days). The sequelae were significantly more in babies who had long pre-intervention periods. Long pre-intervention period is found to be a risk factor in other studies as well [4,17,18].

Wilson and Di Paola have advocated a minimum waiting period of 4 days with interim intravenous antibiotics and aspiration, before a decision of arthrotomy is made [19]. In spite of having received intravenous antibiotics before, the long preintervention period in our study reflecting a delay in the surgical intervention (arthrotomy) might have led to higher rate of complications.

Whenever multiple joints were involved or restriction of joint mobility was present at the time of discharge, there was a significant chance of poor outcome on follow-up indicating initial severe illness predisposes to osteoskeletal handicaps later. A delay in intervention seems to have a greater impact on the later outcomes prompting earlier intervention to prevent sequelae. Our study suggests the importance of clinical examination in a symptomatic child at the time of admission as well as at discharge and long preintervention period and restricted joint mobility at discharge can lead to poor outcome.

The strength of the study is that it was a study with large number of neonates in a tertiary care centre. The study is limited by its retrospective design. Factors such as compliance of oral antibiotics post-discharge and comorbidities such as HIE influencing the restriction of joint mobility could not be accounted for in our study either due to lack of data or due to small numbers.

CONCLUSION

Most neonates with septic arthritis have a monoarticular joint involvement. Hip joint is being the most commonly involved joint. Ultrasound seems to be a good tool as it detects effusion in all cases. The bacteriological profile is still dominated by Gram negative organisms, especially Klebsiella. We should focus on clinical examination, early initiation of intravenous antibiotics, early referral to tertiary care centers, timely surgical intervention, and measures to ensure good joint mobility at the time of discharge. These factors would improve the outcomes in neonates with septic arthritis.

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