International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 11; Issue 01 (B); January 2022; Page No.75-78
DOI: http://dx.doi.org/10.24327/ijcar.2022.78.0006

Research Article

MUSCULOSKELETAL INFECTION AMONG NEONATES ADMITTED IN TERTIARY CARE HOSPITAL IN KASHMIR

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A R T I C L E I N F O

Article History:
Received 12th October, 2021
Received in revised form 23rd November, 2021
Accepted 7th December, 2021
Published online 28th January, 2022

Key words:
Musculoskeletal infections-Septic arthritis-Acute osteomyelitis-Neonates

A B S T R A C T

Background: Acute osteomyelitis and septic arthritis represent two inflammatory diseases that affect bone and joint and synovial joints and are both caused by bacterial infection. Our study aimed to describe the pattern of these infections in a tertiary care hospital of Kashmir.

Patients and methods: It was a prospective study carried out over a period of one year. All the neonates who were diagnosed to have any musculoskeletal infection viz a viz osteomyelitis and/or septic arthritis and /or soft tissue abscess were included in our study. For each diagnosed patient detailed clinical history and examination were done followed by imaging. Blood and tissue culture was done in all cases.

Results:8[53.3%] were males and 7 [46.6%] were females.11[73.3%] were born term whereas 4 [26.6%] were born before 37 weeks of gestation. The median age at presentation was 17 days [IQR: 13 -26 days].Symptoms restricted to the musculoskeletal system that is localized swelling and mobility limitation were seen in 12 [80%] and 8[53.3%] neonates respectively. C - reactive protein was elevated with median C reactive protein 52mg/dl. Gram-positive cocci represented 72.1% of all isolate, Escherichia coli from 2 [18.1%] isolates and 1 [9.09%] revealed Klebsiella. All patients received antibiotic treatment, and 10[66.6%] also needed open surgical drainage.

Conclusion: Bone and joint infections can lead to severe complications in the newborn period. Once a diagnosis is suspected, findings from imaging studies, accompanied by blood and tissue cultures are the most useful diagnostic tests. To avoid treatment delays, MRSA should be kept in mind even in cases involving otherwise healthy, full-term newborns.

INTRODUCTION

Acute osteomyelitis and septic arthritis represent two inflammatory diseases that affect bone and joint and synovial joints and are both caused by bacterial infection[1,2,3]. These two diseases can occur alone or in combination. Acute osteomyelitis (AO) is a relatively rare disorder in the neonatal period, with considerable morbidity and mortality. Concomitant septic arthritis (SA) is a frequent complication of AO and is associated with long-term consequences.

In the first 4 weeks of life, the incidence of AO ranges from 1 to 3 per 1,000 admissions[4]. Management of the condition remains a significant challenge in neonatal intensive care medicine, as early recognition and prompt institution of therapy are essential for a successful outcome [5].

Limited data is available from our region regarding musculoskeletal infections in neonates. Our study aimed to describe the clinical profile, together with the treatment of neonates admitted with musculoskeletal infections in the neonatal intensive care unit of tertiary care hospital in Kashmir.

MATERIAL AND METHODS

Population and inclusion criteria

It was a prospective study carried out in the Neonatal intensive care unit in the tertiary care hospital of Kashmir from August 2018 to September 2019. All the neonates who were diagnosed to have any musculoskeletal infection viz a viz osteomyelitis and/or septic arthritis and /or soft tissue abscess were included in our study.

Arthritis was defined as an association of joint pain or functional disability with clinical and/or radiological joint effusion. Osteomyelitis was defined as a combination of clinical signs, fever and or pain and or loss of function, with radiological signs on X-ray and ultrasound. Radiographic

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changes included metaphyseal rarefaction or periosteal reaction. An abnormal ultrasound was defined as at least one of the following: joint effusion, synovitis, periosteal abscess, the eccentricity of the humeral or femoral head.[6]
For each diagnosed patient detailed clinical history and examination were done. Septic workup was done with complete blood count, C reactive protein, ESR, and blood culture.CSF examination was done wherever necessary. Routine biochemistry, LFT, KFT was done in all patients.

Statistical analysis

Categorical variables were described as frequencies. Continuous variables were described by medians and interquartile ranges (IQR). Statistical analyses were performed using Excel 2013 (Microsoft Corp).

RESULTS

During the study period of 1 year from August 2018 to September 2019, 15 neonates were admitted with any form of musculoskeletal infection. Their patient characteristics are described in Table 1. 8[53.3%] were males and 7 [46.6%] were females.11[73.3%] were born term whereas 4 [26.6%] were born before 37 weeks of gestation. The median age at presentation was 17 days [IQR:13 -26 days].

Table1 Demographic characteristics of patients [N=15]

	N[%]
MALE	8[53.3%]
FEMALE	7[46.6%]
TERM	11[73.3%]
PRETERM <37 WEEK GESTATION	4[26.6%]
Median age at onset of symptoms [Interquartile range]	17 days [IQR 13-26 days]

The clinical presentation was fever seen in 13 [86.6%] neonates. Symptoms restricted to the musculoskeletal system that is localized swelling and mobility limitation were seen in 12 [80%] and 8[53.3%] neonates respectively. We found that some neonates presented initially with non-specific symptoms. 2[13.3%] neonates presented with seizures. 3[20%] neonates presented initially with features of neonatal sepsis, poor feeding and lethargy. [Table 2]

Table 2 Presenting complaints

	N [%]
Fever	13[86.6%]
Swelling	12[80%]
Mobility limitation	8[53.3%]
Other non-specific symptoms	
Seizures	2[13.3%]
Lethargy /poor suck	3[20%]
Irritability	5[33.3%]

In our series, the median WBC count was 12,300/ mm^3 [Interquartile range 9800 -17100], with neutrophil predominance (73%). The median platelet count was 130000 [Interquartile range 114000 -250000]. C - reactive protein was elevated with median C reactive protein 52mg/dl.[Table 3].

Table 3 Septic screening/laboratory parameters of all patients [N=15]

Total leucocyte count	12,300 (median)	9,800-17,100 (IQR)
Neutrophilia	73% (as defined for age)	
Lymphocytosis	27% (as defined for age)	
Platelet count	1,30,000	1,14,000 - 2,50,000 (IQR)
C reactive protein	52 mg/dl (median)	9 -192 mg/dl

The microbiological confirmation was obatained by performing blood culture and cuture of the aspirate. 11 [73 %] cases were culture positive of which 6 [40%] had positive culture of aspiration fluid.3 [20%]neonates had microbial growth in blood and 2 neonates[13.3%] organisms were isolated both from blood and aspiration fluid.[Table 4]

Table 4 Microbiology of bone and joint infections

Table 4a: Microbiological confirmation	
	N =15[%]
Blood culture positive	3 [20%]
Joint culture positive	6[40%]
Both blood and joint culture positive	2{13.3%]
Culture negative	4 [26.7%]
Table 4b: Microbiological distribution	
Organisms	**N= 11[%]**
Methicillin-Resistant Staphylococcus Aureus (MRSA)	8[72.7%]
Escherichia coli	2[18.1%]
Klebsiellapneumonia	1[9.09%]

Table 5 Distribution of infection in the affected bones and joints

	Septic arthritis N=4[26.6%]	**Osteomyelitis N=5[33.3%]**	**Septic arthritis and osteomyelitis N=1[6.25%]**	**Abscess N=5 [33.3%]**
Hip	1			
Knee	2		1	
Femur		3		
Humerus		1		
Shoulder	1			
Tibia		1		
Elbow				
Thigh				3
Arm				1
Scalp				1

DISCUSSION

The diagnosis of musculoskeletal infection, acute osteomyelitis and septic arthritis in neonates is often delayed because of nonspecific symptoms and may be discovered accidentally in the course of routine radiographic examinations, or it may not be apparent until the formation of a local subcutaneous abscess. Local signs may be mild and systemic symptoms may be absent [,7,8,9]. Clinical presentation may be divided into two groups: The first is the localized form, where preceding bacteremia is of low grade or transient, with a little or no evidence of systemic infection other than local swelling or disability, and symptoms may last for several weeks. The other is the “generalized form”, where prolonged or intense bacteremia is frequent and systemic manifestations of sepsis predominate with an acute presentation with common multiple joint involvement.[10] In our patients, as in other reports, the “localized form” was more frequent.

In a study by Berberian G *et al* [11]pain and limitation of motion were the most common clinical presentations (90% and 96% respectively). Other local signs such as swelling were present in 58 patients (75%) and erythema in 35 (45%).In our series, symptoms restricted to the musculoskeletal system that is localized swelling and mobility limitation were seen in 12 [80%] and 8[53.3%] neonates respectively. We also found that some neonates presented initially with non-specific symptoms. 2[13.3%] neonates presented with seizures. 3[20%] neonates presented initially with features of neonatal sepsis, poor feeding and lethargy.

The white blood cell count (WBC) is of little value in diagnosing neonatal osteomyelitis and infective arthritis. In more than 150 cases, in which these values were recorded, the median WBC count was 17,000 (range: 4,000-75,000) with neutrophilia in 60%[12]. C-reactive protein (CRP) is a rapid indicator of inflammation and tissue necrosis and may be useful as an acute phase reactant with more sensitivity in the follow-up. High serial CRP concentration is related with sequelae-prone patients[12].

Microbiological confirmation was done by performing blood culture and culture of aspirate.[Table 4a,4b].11 [73 %] cases were culture positive of which 6 [40%] had positive culture of aspiration fluid.3 [20%]neonates had microbial growth in blood and 2 neonates[13.3%] organisms were isolated both from blood and aspiration fluid. A microbiological diagnosis is achieved in barely more than half of all cases. In their systematic review, Dartnell *et al*. reported that microbiological diagnosis is achieved in approximately 50% of all cases of musculoskeletal infection[13],however, it reaches approximately 70% in the neonatal age groupunder 3 months [6]

In our experience, Gram-positive cocci represented 72.1% of all isolates. Escherichia coli from 2 [18.1%] isolates and 1 [9.09%] revealed Klebsiella. S. aureus is a major cause of Acute osteomyelitis in neonates. Methicillin resistance among S. aureus isolates has become an emerging problem in pediatrics. The prevalence of MRSA varies among countries as well as among hospitals. MRSA strains are typically viewed as hospital pathogens, but this image is now changing. Outbreaks of community-acquired MRSA infections have recently been described worldwide, mainly in previously healthy children with no recognizable risk factors[6]. In neonates, MRSA can cause potentially serious infections including Acute osteomyelitis and Septic arthritis[14].

Among 15 neonates admitted with musculoskeletal infection 5 [33.3%] had osteomyelitis. Soft tissue abscess was present in another 5 [33%],septic arthritis in 4 neonates [26.6%].One patient presented with concomitant septic arthritis and osteomyelitis of the knee.[Table 5]Lower limb involvement was predominantly seen in 10 [66.6%] neonates which include 3 neonates with abscess, 3 with septic arthritis and 4 had osteomyelitis.

Clinical presentations in neonates differ from older children. This can be explained partly by the neonate's blood supply to the bone. The metaphyseal vessels communicate with the epiphyseal vessels in the cartilaginous precursor of the ossific nucleus. This facilitates a rapid spread of the infection from the metaphysis to the epiphysis, which is often destroyed, offering a route of infection into the joint. This explains why neonatal septic arthritis and osteomyelitis often coexist.[10]. A report of 485 newborns with musculoskeletal infection the lower extremities was involved in more than 70%, similarly to most reports.[15,16]

In our series, all patients received antibiotic treatment, and 10[66.6%]also needed open surgical drainage which include either arthrotomy of the affected joint or incisional drainage of the absess. The median duration of treatment was 6 weeks.4 weeks of Intravenous antibiotics and two weeks of oral antibiotics. One child expired during the course of treatment who had concomitant septic arthritis and osteomyelitis and hematogenous dissemination.

CONCLUSIONS

Bone and joint infections can lead to severe complications in the newborn period. Musculoskeletal infections although rare, is an emergency situation and should be included in the differential diagnosis of neonates with localized soft tissue swelling, as well as of neonates with non-specific signs and symptoms of bacteremia.

Once a diagnosis is suspected, findings from imaging studies, accompanied by blood and tissue cultures are the most useful diagnostic tests and are necessary for appropriate diagnosis. To avoid treatment delays, MRSA should be kept in mind even in cases involving otherwise healthy, full-term newborns.

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How to cite this article:

Syed Baasit Shafi Shah *et al* (2022) 'Musculoskeletal Infection Among Neonates Admitted In Tertiary Care Hospital In Kashmir', *International Journal of Current Advanced Research,* 11(01), pp. 75-78.
DOI: http://dx.doi.org/10.24327/ijcar.2022.78.0006

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