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Case Series

Spectrum of Non-Suppurative Arthritis in Meningococcal infection in children: A Case Series

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ABSTRACT

Introduction: Arthritis is a recognized manifestation of meningococcal infection and may occur due to either direct infective involvement or immune-mediated mechanisms, the latter being relatively uncommon.
Methodology: This case series included hospitalized patients aged ≤18 years diagnosed with meningococcal infection who developed joint involvement during the course of illness. Clinical presentation, pattern of joint involvement, laboratory findings, management, and outcomes were reviewed retrospectively from hospital records.
Aim and Objectives: To describe the clinical profile, pattern of joint involvement and outcomes of arthritis associated with meningococcal infection in children.
Results and observations: Out of total 110 cases, 7 (6.3%) had non-suppurative arthritis. Four (3.6%) in 1-5 years, 2 (1.8%) in 5-10 years and 1 (0.9%) in the age group of 10-18 years. Average age was 6.28 years. Sex ratio was male : female = 2.5:1. Bilateral knee joints were the most common joints to be involved, seen in 5 cases (71.4%). Other clinical presentations of the patients with arthritis – fever (100%), purpura (100%), rash (71.4%), headache (42.9%), meningeal signs (42.9%), altered sensorium (14.29%) and vomiting (14.29%). The seven cases with arthritis were proven by positive CSF culture in 2, petechial fluid culture in 1, positive gram stain of CSF in 1, and positive Gram stain of petechial fluid in 1 patient. USG of joints was done in all cases and was suggestive of mild to moderate effusion and synovial thickening of the involved joints. Average duration of hospital stay was 8.43 days. All 7 patients recovered without sequelae on subsequent follow up.
Conclusion: Prompt diagnosis and management will lead to healing without complications in most cases of non-suppurative arthritis associated with meningococcal infection.

Keywords: *Meningococcal disease; arthritis; children; immune-mediated; dexamethasone; intravenous immunoglobulin.*

INTRODUCTION

Meningococcal disease is a significant health problem worldwide with high morbidity and mortality. Invasive meningococcal disease is seen in a small proportion (1-5%) of cases with meningococcal infection **[1]**. Arthritis in meningococcal infection may be caused by immune or non-immune mediated mechanisms. The incidence of non-suppurative arthritis in meningococcal disease is 4-6% **[2]**. We hereby report a series of seven cases of non-suppurative arthritis developed during the meningococcal infection.

METHODOLOGY

This retrospective study was done in admitted patients under 18 years of age with meningococcal infection in the paediatrics department of a tertiary care hospital of north-east India. Cases were identified from inpatient records, and discharge summaries and case files were studied well in terms of history, investigations, and daily progress notes to ascertain the diagnosis of meningococcal disease and features suggestive of arthritis. The study was conducted with the aims to study the clinical presentation, pattern of joint involvement, laboratory findings, management, and outcomes of arthritis in meningococcal disease.

RESULTS & OBSERVATIONS

Out of total of 110 patients admitted in our hospital with meningococcal infection, seven (6.3%) patients had arthritis, of which four (3.6%) were in the age group of 1-5 years, two (1.8%) were in 5-10 years and one (0.9%) was in the age group of 10-18 years. Sex ratio of the patients with arthritis was 2.5:1 [5 (4.5%) patients were male and 2 (1.8%) were female]. Median age of the patients with arthritis was 5 years (ranging from 1 year 11 months to 13 years). All cases with arthritis involved multiple joints of the body mainly involving the large joints. Bilateral knee joints involvement was the most common and seen in five (71.4%) patients. Bilateral hip joints and bilateral ankle joints involvement was found in one patient each. In one patient with arthritis there was involvement of the left shoulder joint first followed by bilateral knee joints and then the left sided metatarsophalangeal joint involvement. The other clinical presentations of the patients with arthritis were fever (100%), purpura (100%), rash (71.4%), headache (42.9%), meningeal signs (42.9%), altered sensorium (14.29%) and vomiting (14.29%). Culture from different body fluids were performed to isolate the causative organism. CSF culture was found to be positive for *N. meningitidis* in two patients with arthritis (28.57%). Blood culture was sterile in all the seven patients. Culture of the fluid from petechial rashes was positive for *N. meningitidis* in two patient (28.57%). In one patient with arthritis, Gram stain of fluid from petechial rash showed Gram negative diplococci. Synovial fluid culture was not done in those patients as the effusion was not liable to tapping. The medications used for treatment of the joint manifestations were inj. dexamethasone in 6 patients for 48 hours, Oral prednisolone in one patient, along with ibuprofen in all cases for an average duration for 4 days. Tab tramadol was used in one patient only. One patient was given ibuprofen followed by naproxen but no response to multiple antibiotics and the non-steroidal anti-inflammatory agents, he was given intravenous immunoglobulin (IVIG @ 2 g/kg single dose) to which there was a dramatic response and the child became asymptomatic in the next 48 hours **[3]**. The antibiotics used in these cases for the meningococcaemia were inj. chloramphenicol in five patients, inj. ceftriaxone in one patient. In one patient multiple antibiotics were used (inj. ceftriaxone for 7 days, oral azithromycin followed by inj. vancomycin with no response). The associated co-morbidities seen in patients with arthritis were shock in 4 (57.14%) patients, hypokalaemia in 2 (28.57%) patients, purpura fulminans in 2 (28.57%) patients. In one of the cases (14.29%), on evaluation for persistent fever, plasmodium falciparum infection was detected, while another case developed acute exacerbation of asthma. Herpes labialis was documented in one (14.29%) patient. The average duration of hospital stay of those patients with arthritis was 8.43 days. All the seven patients with arthritis recovered without any residual joint problem on subsequent follow up.

Table 1: Distribution of Joint Involvement Among Patients Presenting with Arthritis

Case	Hip joint	Knee joint	Ankle joint	Metatarso-phalangeal joints	Shoulder joint	Elbow joint
Case 1	+	-	-	-	-	-
Case 2	-	+	-	-	-	-
Case 3	-	+	-	-	-	-
Case 4	-	+	-	-	-	-
Case 5	-	+	-	-	-	-
Case 6	-	-	+	-	-	-
Case 7	-	+	-	+	+	-

DISCUSSION

In meningococcaemia even after survival from the acute crisis, the convalescent period of the illness may be complicated by immune complex reactions. Arthritis is usually monoarticular or oligoarticular and involves large joints. Long-term sequelae are uncommon. Immune complex-mediated arthritis occurs in the late phase of the disease, usually 4-9 days after the onset of the symptoms. Persistence or recrudescence of fever after 5 days of antibiotics suggests immune complex-mediated complication. Non-suppurative arthritis, as seen in our patients, responds to non-steroidal anti-inflammatory drugs and steroid therapy. But non-immune mediated arthritis occurs early in the course of the disease due to direct bacterial invasion of the joints and responds to antibiotic therapy. The incidence of non-suppurative arthritis in our study is 6.3% with more than 50% of cases being in the younger age group (1-5 years). Other studies demonstrated a similar incidence of non-suppurative arthritis ranging from 5-13.8% **[4–7]**, except in one study where a low incidence (1.6%) was noticed **[8]**. Out of the multiple joints involved, knee joints were the most common joints in our patients.

Other studies also found the involvement of multiple large joints with knee joints as the most commonly involved joints **[4-8]**. In one patient in our study, left-sided metatarsophalangeal joint involvement was found. Small joint involvement was also mentioned in other studies **[4]**. No specific treatment is required for arthritis **[5,6,9]**. Ibuprofen was used most commonly for treatment of arthritis followed by dexamethasone. Only one patient required multiple analgesics followed by single-dose IVIg therapy. Similar to the other studies **[5]**, no residual joint sequelae were seen in all the cases in our study.

CONCLUSION

Recognition and differentiation of non-suppurative arthritis from septic arthritis are pivotal steps in optimizing patient management. A significant percentage of patients can be expected to develop non-suppurative arthritis in meningococcal infection. A high index of suspicion, prompt diagnosis and management will lead to healing without complications in most cases.

Conflict of Interest: The authors declare that they have no conflict of interests.
Data Availability: Data available on request.

Authors' Contributions:
BKD contributed to the conception and design of the study, data collection, data analysis, manuscript writing and critical revision of manuscript.
HB, RDH contributed to manuscript preparation and critical revision. RRD contributed by preparing the manuscript
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