

Septic arthritis in children

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Summary

Background: Septic arthritis is an important osteoarticular infection in children. There is insufficient data on its pattern of presentation and sequelae in our environment.

Objective: To identify the aetiologic factors, patterns of presentation and sequelae of septic arthritis in Nigerian children.

Methods: A retrospective analysis of the clinical, roentgenographic and laboratory records of children with septic arthritis admitted over a 14-year period to Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria was undertaken.

Results: Ninety three patients with septic arthritis involving 104 joints with a mean age of 4.5 years \pm SD (range 2 months to 15 years) were studied. The most commonly involved joint was the hip (48.4%) though the shoulder was the most commonly affected joint in infancy (36%). Trauma (a history of fall and intramuscular injection) was associated in 28% of the cases. *Staphylococcus aureus* was the predominant aetiologic bacterial agent (50%) even in patients with sickle cell disease. Anaemia was a common complication (64.5%). The overall result of treatment was unsatisfactory as only 37.7% had complete resolution while most had varying degrees of joint destruction resulting in limb length discrepancy and ankylosis.

Key-words: Septic arthritis, Nigeria, Children.

Résumé

Introduction: Arthrite septique est une infection ostéoarticulaire très importante chez des enfants. Il n'y a pas assez de données sur sa tendance de présentation et sequelae dans notre région.

Objectif: Identifier des facteurs étiologiques, tendance de présentation et sequelae de l'arthrite septique chez des enfants nigériens.

Méthodes: Nous engageons à faire une analyse retrospective des dossiers cliniques, roentgenographiques et laboratoires des enfants atteints d'arthrite septique hospitalisés au cours d'une période de 14 ans au centre hospitalier universitaire d'Ile-Ife, Nigéria.

Résultats: Quatre-vingt-treize patients atteints de l'Arthrite septique impliquant 104 articulations avec un âge moyen de 4, 5 ans \pm SD (tranche d'âge de 2 mois au 15 ans) ont été étudiés. L'articulation la plus concernée était la hanche (48,4%) quoique culin épaule était la plus ordinairement impliquées chez des enfants (36%). Traumatism (une histoire de la diminution et de l'injection intramusculaire) constitue 28% des cas. *Aureus staphylococcus* agent étiologique

bactérien le plus prédominant (50%) même chez des patients atteints de la maladie de la drépanocytose. Anémie était une complication ordinaire (64,5%). Dans l'ensemble le résultat de la prise en charge était non satisfaisant parce que 37,7% seulement avaient une résolution complète tandis que la plupart avaient des degrés divers de la destruction d'articulation provoquant un desaccord entre la longueur de membre et d'ankylose.

Introduction

Septic arthritis refers to all joint infections caused by pyogenic bacteria excluding tuberculosis¹. It is most often secondary to bacteraemia or septicaemia though a joint space may be infected by direct inoculation of microorganisms or by extension from a contiguous infection like osteomyelitis or cellulitis¹. Though not as common as osteomyelitis^{1,2} it is a medical emergency and delay in recognition and initiation of therapy can increase morbidity and permanent sequelae. Pus and articular cartilage are incompatible³. Though any synovial joint may be the seat of septic arthritis the most commonly affected joint in childhood is the hip^{1,4,5}. Septic arthritis, especially of the hip, is usually diagnosed late in our environment with tragic consequences. This is especially so in neonates and young infants in which the clinical signs are much less specific^{1,4,6}. The aetiologic factors, patterns and sequelae of septic arthritis in children have not been adequately documented in our environment. This communication is to examine these features over a 14-year period.

Patients and methods

The clinical and laboratory records of patients with septic arthritis seen in the Children's Emergency Ward and Children's Orthopaedic Ward of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) Ile-Ife, Nigeria, over a 14-year period (1990-2003) were retrospectively analysed. The data extracted included age, sex, presenting symptoms and signs and duration, antecedent history, involved joint and side(s) affected, aetiologic bacterial agents, x-ray features, full blood count, Hb Genotype, ESR, treatment received and duration and outcome.

Results

The records of 93 patients with septic arthritis involving 104 joints were available for analysis. The peak incidence was 6-10years where 26 patients(28%) were affected. The mean age was 4.5years \pm SD (range 2months to 15 years) (Fig. 1). The hip was the most commonly involved joint,

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Table 1 Age distribution and prevalence of septic arthritis of different joints

Age (yrs)	Hip	Knee	Shoulder	Elbow	Ankle	Multiple	Total(%)
0 - 1	5	7	9	1	1	2	25(26.9)
>1 - 5	13	5	4	2	0	0	24(25.8)
>5 - 10	13	10	1	0	0	2	26(28.0)
>10 - 15	14	2	0	0	1	1	18(19.3)
Total(%)	45(48.4)	24(25.8)	14(15.1)	3(3.2)	2(2.1)	5(5.4)	93(100)

Table 2 Presenting clinical features

Clinical features	No of patients	%
Joint pain	69	74.2
Joint swelling	65	69.9
Limping	36	38.7
Fever	68	73.1
History of fall or trauma to joint	17	18.3
Intramuscular injection to the buttocks	9	9.7
Septic spots in the skin	4	4.3
Septicaemia	29	31.2
Cardiac failure	5	5.4
Tetralogy of fallot	1	1.1

Table 3 Isolated aetiologic bacteria agents (Joint aspirate) in 56 joints

Bacteria	No of patients	%
<i>Staphylococcus aureus</i>	28	50
<i>Pseudomonas aeruginosa</i>	8	14.2
<i>Salmonella spp.</i>	2	3.6
<i>Klebsiella</i>	2	3.6
No growth	16	28.6
Total	56	100

Table 4 Packed cell volume (PCV)

PCV	No of patients	%
10 - 19	13	13.9
20 - 25	29	31.2
26 - 29	18	19.4
≥30	33	35.5
Total	93	100

Table 5 Treatment modalities

Treatment	No of patients	%
1. Open arthrotomy, antibiotics ± traction	52	55.9
2. Antibiotics and traction	19	20.4
3. Antibiotics + POP back slab	9	9.7
4. Needle arthrotomy + antibiotics (systemic)	4	4.3
5. Physiotherapy only	8	8.6
6. Discharged against medical advice	1	1.1
Total	93	100

Table 6 Outcome of septic arthritis in children

Outcome	No of patients	%
Completely resolved	36	38.7
Limb length discrepancy	18	19.4
Ankylosis	9	9.7
Pathologic dislocation	10	10.7
Lost to follow up	20	21.5
Total	93	100

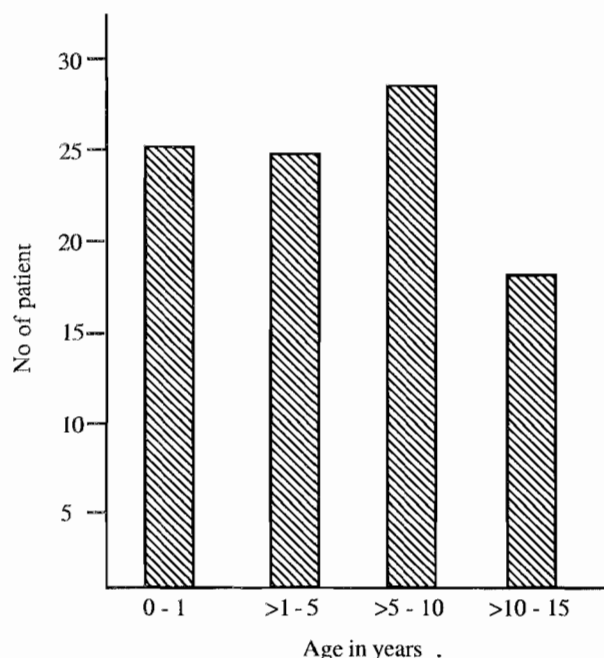


Fig. 1 Age distribution of septic arthritis in children

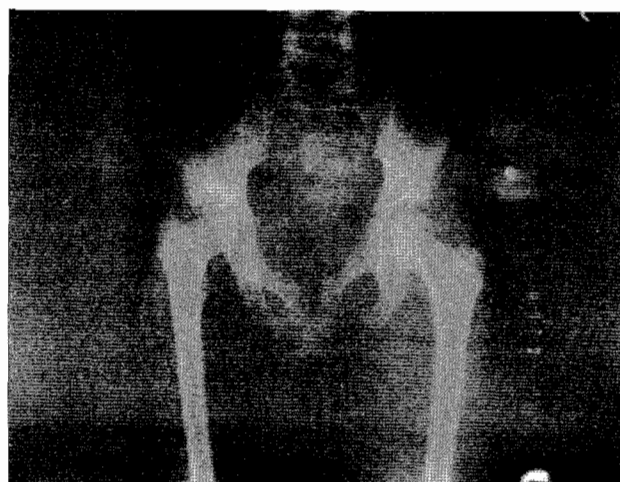


Fig. 2 X-rays of the pelvis showing septic arthritis of right hip with narrowing of the right hip joint space.



Fig. 3 X-rays showing septic arthritis of right hip with pelvic obliquity and destruction of the right femoral head



Fig. 4 X-rays showing destruction of right femoral head and pathologic dislocation of the right hip

affecting 45 children (48.4%). This is followed by the knee (25.8%) and shoulder (15.1%). The shoulder was however the most commonly involved joint in infants (9 out of 25). Five patients (5.4%) had multiple joint involvement (table 1).

i. Presenting features:

The common presenting symptoms were joint pain (74.2%), joint swelling (69.9%), fever (73.1%) and limping (38.7%). A history of fall was given in 18.3% of the children while 9.7% had intramuscular injections into the buttocks of the affected hip before the onset of symptoms. Septicaemia was the presenting feature in 31.2% of our patients, most of them below the age of 5 years (table 2). Duration of symptoms before presentation ranged from 1 day to 13 weeks (mean 2 weeks).

ii. Laboratory results

Aspirate for microscopy, culture and sensitivity (m/c/s) was available for only 56 joints (53.8%). *Staphylococcus aureus* was isolated in 28 joints (50%), 8 of which had HbSS;

Pseudomonas aeruginosa in 8(14.2%); *Salmonella typhi* in 2 joints (3.6%), both in patients with HbSS; *Klebsiella* in 2 joints (3.6%) while there was no growth in 16 joints (28.6%) (Table 3).

All the patients had raised Erythrocyte sedimentation rate (ESR) with a range of 24-152mm/hr (mean 88.5mm/hr). Sixty patients (64.5%) had anaemia with PCV of 12% to 29% (table 4). All the children with septicaemia had anaemia. All recovered following blood transfusion and haematinics. The haemoglobin genotype records of 76 patients (81.7%) were available. Fifty-one patients (67.1%) had AA; 13 patients (17.1%) had AS, 2 patients (2.6%) had AC while 10 patients (13.2%) had HbSS. The patients' white blood cells count ranged from 2,300 to 25,300/cmm (mean 8,500/cmm). Forty-five percent of the patients had a wbc count of 10,000 and above.

iii. Treatment modalities and outcome

Fifty two patients (55.9%) had open arthrotomy with antibiotics; 19(20.4%) had skin traction with antibiotics; 9 (9.7%) had antibiotics and POP back slab, 4(4.3%) had needle arthrotomy and antibiotics while one patient discharged against medical advice.

The duration of treatment ranged from 1 week to 24 weeks (mean 4.5 weeks). Thirty six patients (38.7%) had complete resolution of septic arthritis; 18(19.4%) had limb length discrepancy and 9(9.7%) had ankylosis, both from joint destruction. Ten patients (10.7%) had pathologic dislocation and 20 patients (21.5%) were lost to follow up.

Discussion

Septic arthritis remains a serious disease in children because of the potential for permanent damage to the affected joint and systemic morbidity. This is especially true of the hip because of its anatomic features^{4,6}. The hip was the most commonly involved joint in our series, affecting 48.4% of the patients (table 1). This is similar to the findings of most workers^{1,4,7,8}. Wang et al⁷ in Southern Taiwan reported a prevalence rate of 54%. The shoulder was the most commonly affected in infancy in our study, accounting for 36% (9 out of 25). More than one joint was involved in about 9.7% (5.4% multiple and 4.3% bilateral hip and knee). This is similar to about 10% quoted by Nade¹. The mean age of septic arthritis in our series is similar to findings by Wang et al⁷ with a mean age of 3 years (range 12 days to 16years). The most common presenting symptoms were also not too different from findings by Wang et al⁷. Trauma is an important associated factor in our series. While cases of septic arthritis following intramuscular injections could be explained as resulting from spread of infection from contiguous site of gluteal abscess or cellulitis the role of falls in septic arthritis is not clear. The duration of symptoms before presentation ranged from 1 day to 13 weeks (mean 2 weeks). This delay in presentation was due to delay in making a diagnosis by the referring physicians, activities of traditional medical practitioners and poverty. Septicaemia was the mode of presentation in 31.2% of our patients, most of them below 5 years of age. It was noted by Oblatz⁹ that in the infant several days delay in diagnosis of septic arthritis of the hip was almost the rule. "Pus and articular cartilage are incompatible"³. Only 38.7% of our pa-

tients had complete resolution of septic arthritis though the fate of 32.2% of patients lost to follow up is not known.

Staphylococcus aureus was the most common bacteria isolate (50%), followed by *Pseudomonas aeruginosa* in 14.2%, *Salmonella spp* in 2 joints (3.6%). There was no growth on culture of specimen (pus) from 16 joints (28.6%). The predominance of *Staphylococcus aureus* (50%) is similar to the findings of other workers^{1,6,7,8,10,11,12}. The prevalence of *Salmonella spp.* in this study is also similar to the findings of Wang et al⁷ who found 3 of 58 isolates and Chiu et al¹⁴ who reported a child with typhoid fever and septic arthritis in whom *Salmonella typhi* was isolated from joint aspirate. The inability to obtain bacteriologic proof of infection (no growth on culture) may be due to prior use of antibiotics (a rampant practice in our environment), inadequate anaerobic cultures, the standard of microbiological laboratories, the changing patterns of the organisms involved and their cultural characteristics and failure to obtain blood for culture¹.

Anaemia is an important complication in our patients, occurring in 64.5% (Table 4). All the children with septicaemia had this complication. This was due to haemolysis or toxic depression of bone marrow. The raised ESR in all the patients is consistent with findings of most workers^{7,10}. Erythrocyte sedimentation rate and C-reactive protein (CRP) are useful indicators of septic arthritis and are commonly raised in this condition.

Septic arthritis is a paediatric as well as an orthopaedic emergency¹⁵. The principles of treatment of septic arthritis revolve round three basic steps. First, the joint must be adequately drained of pus to decompress it. Secondly, antibiotic must be given to diminish the systemic effects of sepsis. Thirdly, the joint must be rested in a stable position¹³. The method of draining pus from the joint has been a subject of controversy. Ward et al¹⁶ advocated repeated aspiration of the joint in addition to antibiotics and reserved surgical drainage for those cases that responded inadequately to antibiotics and aspiration. Schmid and Parker¹⁷ and Griffin¹⁸ also advocated needle aspiration of joints as often and as soon as fluid accumulated with instillation of antibiotics. However, Paterson¹⁵ in a clinical review of 50 patients with proven suppurative arthritis treated at Adelaide Children's Hospital showed no failures if open arthrotomy was performed within 5 days of the onset of symptoms. With the advent of modern anaesthesia and adequate preoperative preparation early open arthrotomy should not pose any problem. Repeated needle arthrotomy is painful, results are uncertain as there is recurrence of tension within the joint, the pus may be thick and difficult to aspirate even under tension and the instilled broad spectrum antibiotics are irritants to cartilage^{1,15}. There is no controversy in the usefulness of antibiotics. All authors recommend parenteral route of administration. Intraarticular instillation of antibiotics is no longer popular for reasons already stated. The choice of antibiotics is initially made on a "best guess" basis¹ and changed according to the culture and sensitivity results. The initial choice at our center usually covers *Staphylococcus aureus*. This includes Ampicillin and cloxacillin or any of the second or third generation cephalosporins like cefuroxime and ceftriaxone and is given parenterally until patients demonstrate clinical improvement.

They are then switched over to oral antibiotics, all for a total of about six weeks or more. All the patients in this series were hospitalized throughout treatment though some workers recorded good results from outpatient parenteral antimicrobial therapy¹⁹.

About 56% of our patients had open arthrotomy, antibiotics with or without traction; 20.4% had antibiotics and traction, 9.7% had antibiotics and POP back slab, 4.3% had needle arthrotomy and systemic antibiotics, 8.6% had only physiotherapy and one patient discharged against medical advice. The patients who had antibiotics and traction or POP back slab were those treated in the early 90's before open arthrotomy became routine. The four patients who had needle arthrotomy and antibiotics for septic arthritis of the knee presented early to the paediatricians and had complete resolution.

Arthroscopic debridement and drainage is another modality of treatment¹¹. None of the patients in our series received this treatment as this facility is presently not available in our centre.

The outcome of septic arthritis in our patients is not satisfactory. Only 38.7% had complete resolution. Limb length discrepancy and ankylosis occurred in 19.4% and 9.7% respectively as a result of joint destruction. Ten patients (10.7%) had pathologic dislocation. These complications were as a result of delay in presentation and initiation of appropriate treatment. The mean duration of symptoms before presentation was 2 weeks. This led to the disastrous consequences demonstrated in figures 2, 3 and 4. About 21.5% of our patients were lost to follow up making it difficult to assess their final outcome.

In the preantibiotic era, Badgley et al²⁰ reporting the end results of 113 cases of septic arthritis of the hip found that only seven had complete resolution of the hip, 43 with destruction of the femoral head and 23 cases with functional hip joint having more than 50 percent of the normal range of motion.

Several workers like Eyre-Brook²¹, Sharrard²² and Lunseth and Heiple²³ have reported varying degrees of complications like destruction of the capital epiphysis with dislocation of the hip, osteomyelitis and limitation of movement. Mortality is now negligible since the introduction of antibiotics. None of the patients in our series died. One common factor for poor prognosis in most studies is the duration from clinical onset to initiation of appropriate therapy.

This study has shown that septic arthritis, though not as common as acute or chronic osteomyelitis, is an important childhood disorder in our environment. Early diagnosis, prompt and adequate treatment are essential if normal function of the affected joint is to be restored. Delay in diagnosis and institution of appropriate treatment will result in crippling sequelae.

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