October 2003

Septic arthritis of the hip in children--Aga Khan University Hospital experience in Pakistan

M Umer
Aga Khan University, masood.umer@aku.edu

P Hashmi
Aga Khan University, pervaiz.hashmi@aku.edu

T Ahmad
Aga Khan University, tashfeen.ahmad@aku.edu

M Ahmed

masood umer
Aga Khan University, masood.umer@aku.edu

Septic Arthritis of the Hip in Children - Aga Khan University Hospital experience in Pakistan

M. Umer, P. Hashmi, T. Ahmad, M. Ahmed, M. Umar
Department of Surgery, The Aga Khan University Hospital, Karachi.

Abstract

Objective: To present clinical, radiological and bacteriological features and short term outcome of septic arthritis of the hip in children.

Methods: There were 23 male and 16 female children, including 6 neonates and 10 infants with a mean age of 3.9 years. Diagnosis of septic hip was made on clinical grounds, supplemented by X-rays, leukocyte count and the erythrocyte sedimentation rate (ESR). Thirty nine patients with 40 hips were followed for a mean time period of 76 weeks. All patients had a positive joint aspirate (pus) and underwent surgical decompression alongwith intravenous antibiotic therapy.

Results: Symptoms of pain, fever and restricted range of hip motion were common to all patients. The mean leukocyte count was 14,000 and the mean ESR was 63 mm. Cultures of blood and joint aspirate were positive in 9 and 28 patients respectively. Staphylococus Aureus was the commonest organism (14 patients) identified, and only one patient had Hemophilus Influenzae. Seven patients had a mixed osteoarticular infection. Positive clinical response was noted in the mean time period of 8.6 days. In follow-up, four cases developed myositis ossificans and 2 cases showed signs of partial growth plate destruction.

Conclusion: Our findings of the absence of H. Influenzae and the presence of a number of gut organisms are different from the previous studies. Duration of symptoms was an important prognostic factor and correlated well with the final outcome. Early surgical decompression was found to be the treatment of choice. A combined osteoarticular infection should be kept in mind in cases which show a poor response after the initial joint debridement (JPMA 53:472;2003).

Septic arthritis of the hip is a relatively less common clinical entity among bacterial infections in children. It can occur at any pediatric age and in any socioeconomic group. As tertiary level medical care is still not available to every person in Pakistan, a lot of these children remain untreated or maltreated. The infection is mostly blood-borne with a spontaneous, sudden onset. The natural history of this disease is quite progressive and destructive. The suppurative effusion in the joint causes tamponade of the retinacular vessels and a delay in joint decompression can lead to complications like avascular necrosis of femoral capital epiphysis, destruction of joint capsule and dislocation of the hip joint. Unlike the knee or ankle joint, hip is a deep-seated joint and this makes it clinically difficult to pick up an early effusion. The signs and symptoms are subtler in neonates and septicemic patients who may have other primary foci of infection. Although the antibiotic therapy has significantly reduced a previously very high mortality rate, the morbidity of neglected septic hip is still quite high. Early diagnosis and proper surgical management is important to obtain long-term successful results. The most effective treatment is immediate surgical decompression of the joint along with appropriate antimicrobial chemotherapy.[1,2] A large number of studies have been published In the western literature[1-6] describing different modes of presentation of septic hip in children highlighting its unique nature and the need for urgent treatment. Very little local information is available about the demographics of this serious surgical entity. In this study we present the clinical, radiological, bacteriological spectrum and complications of septic arthritis of hip in children.

Patients and Methods

In this retrospective study, all pediatric patients admitted to the Aga Khan University Hospital, Karachi, during January 1990 to December 1998 were included. Patients were included if they had clinical signs and symptoms of localized hip joint pathology, laboratory evidence of neutrophilia, raised ESR and a positive joint aspirate.

The patients with a negative joint aspirate, open joint injury, tuberculous infection and infections after elective surgery were excluded. Also, patients with a follow-up of less than 6 months were not included in the study. The resulting study population comprised of 39 patients with 40 afflicted hip joints. There were 23 male and 16 females with a mean age of 3.9 years (range: 9 days to 13 years). Twenty-five (64.1%) patients were under five years of age and 6 (15.4%) were neonates. The patients were followed up in the out door clinic monthly for the first six months and quarterly for next two years. Regular X-rays of the involved hip joint were taken at six monthly intervals to document any late skeletal changes. The mean follow-up period was 76 weeks (range: 45-105) and the mean hospital stay was 21 days (range: 15-39 days). Our treatment protocol was as follows:

Under general anesthesia, hip joint aspiration was performed in the operating room with the help of an image intensifier. A positive aspirate (pus) was immediately proceeded by an open debridement of the joint. Both anterior and posterior approaches to the hip joint were used in different patients, depending upon the individual

surgeon. The synovium was sent for routine histopathology and culture. If the aspirate was clinically negative for pus, the position of the needle was confirmed by a hip arthrogram (Figure 1) and the aspirate sent for culture. All post-operative patients were started on empirical intravenous antibiotic therapy, which was usually a combination of Cloxacillin (200mg/kg/day) and Gentamycin (7.5mg/kg/day). In neonates and younger infants we usually preferred to give a third generation cephalosporin like Cefotaxime rather than Gentamycin. This regimen was later on modified according to the results of culture and antibiotic sensitivity of the joint aspirate and/or synovium. The total duration of antibiotic therapy was six weeks, with three weeks of parenteral and three weeks of oral therapy. Patients, who showed a swift clinical response in terms of settling down of fever and pain, were switched to oral therapy after 10-14 days of surgery.

The follow-up evaluation of these patients included assessment of walking, running and climbing stairs. The presence of pain, limp and range of motion of the hip joint was also noted. All the patients had an X-ray of the pelvis on arrival at the hospital. The final prognosis was evaluated using the criteria of Griffin et al3 as shown in Table 1.

A 52 variable Performa was used for recording the information of individual patients. Data was analyzed using the epi-info statistical program.

Results

Symptoms of localized pain, fever and restricted range of motion of the affected joint were present in all patients. Four (10.3%) patients had localized swelling, 14 (35.9%) had feeding difficulty and 18 (46.2%) had concomitant nausea and vomiting. The mean duration of symptoms prior to presentation at our hospital was 6 days ranging from 1-20 days. Twenty-seven (69.2%) patients had pre-existing co-morbidities. Twelve (30.7%) had upper respiratory tract infection, 6 (15.4%) had enteric fever, 4 (10.3%) had pneumonia, 3 (7.7%) had meningitis and one (2.6%) had conjunctivitis.

Twenty percent of the patients had a positive history of minor trauma or a fall on the side of the affected limb. Sixty seven percent had a positive history of prior antibiotic usage. All of our cases had an elevated ESR above 30 (mean 63mm in the 1st hour) and an elevated white cell count above 10,000 (mean 14,000 x106 per cubic mm).

On radiological evaluation, 32 patients (82.1%) were found to have capsular distention with displacement of iliopsoas and gluteal muscle shadow (Figure 2). Seven (17.9%) patients also had evidence of metaphyseal rarefaction and/or periosteal reaction on a delayed film (Figure 3).

Blood culture was sent in all patients and was positive in 9 (23.1%) patients. The organisms grown in blood culture were Staphylococcus Aureus in 4 (10.3%), Hemophilus Influenzae in 2 (5.1%), Salmonella in 2 (5.1%) and Streptococcus Pneumoniae in 1 (2.6%) patient. Joint culture was positive in 28 (71.8%) patients with Staphylococcus Aureus being the commonest organism in all age groups. The distribution of various organisms according to their age is shown in Table 2.

There were 10 (25.6%) cases of early joint stiffness, 4 (10.3%) of myositis ossificans (Figure 4) and 2 (5.1%) of partial growth plate injury. One case (2.6%) developed partial avascular necrosis of the femoral capital epiphysis.

The final functional and radiological outcome according to the criteria of Griffin et al was good or excellent in 30 (76.9%) patients (Figure 5), fair in 4 (10.3%) patients and poor in 5 (12.8%) patients. Four of the 5 patients with poor results presented quite late (>10 days) after the onset of symptoms (Table 4).

Discussion

The treatment of acute septic arthritis of the hip is aimed at achieving a fully viable and functional hip joint. Because of the limited capacity of the hip joint, collection of an exudate can quickly lead to tamponade of the blood vessels supplying the femoral capital epiphysis and the growth plate. This can result in serious long term disabling problems. Hence early diagnosis and immediate surgical decompression gives the best clinical results. All patients in our study were treated with immediate surgical decompression along with appropriate antibiotic therapy. There was no mortality in our series.

It is well known that septic arthritis of the hip joint is a surgical disease and that anything short of an open arthrotomy is bound to give poor sequelae such as femoral head necrosis, dislocation and growth arrest especially in younger children.[3-6] Some reports have however questioned the need for arthrotomy in older children[1,7] especially if they present very early. We believe that treatment by aspiration alone may have a limited role in very early stages of the disease and results may still not be superior to surgery. Most studies demonstrate that delay in the institution of treatment is the most important prognostic indicator.[4,7,8]

Our study showed good correlation between the duration of presentation and clinical outcome. Majority of the patients with good to excellent results presented within four days of the onset of their symptoms. Five patients (12.8%) had a poor clinical outcome and four of these presented later than 10 days. These patients had a limited range of motion of the hip joint along with pain at rest. Three of five patients with poor results ended up with myositis ossificans, two had partial growth arrest and one had avascular necrosis. These patients are still under clinical observation. Our results strongly suggest an early surgical approach in managing septic hip to avoid complications.

The symptoms of feeding difficulty, nausea and vomiting were peculiar to the neonatal and infantile age groups. In older children, pain, inability to move the extremity and fever were the dominant symptoms. We conclude that symptoms of septic hip are not universal and differ in different age groups.

Neutrophilia with left shift of myeloid cells and toxic granulation is an important predictor of acute infection.[1,7,9] Similarly, ESR is another important sensitive test in cases of acute infections. In all of our patients, the white cell count and ESR was elevated. Our

results closely agree with a number of other clinical studies.[6,9-13] In neonates, neutrophilia and fever are often not present but ESR is elevated even in this age group.[12] In our series also, ESR was elevated in all the 6 neonates. Currently we routinely check the C-reactive protein (CRP) values in all of our septic hip cases. This investigation was not done in the initial phase of this study, hence the data regarding CRP values was incomplete and therefore not included. In this study, blood cultures were performed in all patients. Although blood cultures were drawn before the start of systemic antibiotics, they were only positive in 9 (23%) patients. This yield is quite low as compared to other series by Wilson[7] (40%) and Chen[6] (56%). The percentage of a positive joint aspirate in our series (71.8%) is quite close to that reported by Wilson[7] (60%) and Chen[6] (59%). The reason of low yield of blood culture in our patients may be due to the fact that majority of patients were taking antibiotics prior to presentation.

It is known that an X-ray film taken earlier in the course of the disease may not reveal any bone changes. However, subtle signs of joint space widening and displacement of iliopsoas and abductor tissue planes can be appreciated. In our series, these radiographic subtle changes were evident in 32 (82.1%) patients. It has been shown that ultrasound is also a sensitive indicator of detecting effusion in the hip joint.[14] However, differentiation between septic and reactive inflammatory effusions is only possible in expert hands. We, therefore, did not rely on ultrasound to obtain the diagnosis. 99mTechnetium bone scan is a useful diagnostic tool to differentiate between septic arthritis and osteomyelitis.[15-17] It also identifies osteomyelitis adjacent to septic arthritis. Various studies have shown the accuracy of the technetium scan to be about 70-90%.[15-17] We did not use this diagnostic modality because of its non-availability in our institution at the time of this study.

A mixed osteoarticular infection should always be considered in patients presenting with septic hip. There is not much written about this entity in the literature. In our study, seven (17.9%) patients did not improve after the initial surgery and continued to have pain and fever. A delayed X-ray film taken in these patients was suggestive of proximal femoral metaphyseal osteomyelitis. These patients were reoperated for metaphyseal decompression and drilling of the proximal femur. The patients were found to have a mixed osteoarticular infection and a good clinical response was observed after the metaphyseal decompression. It is difficult to explain whether the septic arthritis led to proximal metaphyseal osteomyelitis or vice versa. In this study, patients with mixed osteoarticular infection were generally older and majority had a history of trauma. They also had a delayed clinical response, required longer duration of antibiotic therapy, longer hospital stay and were consequently a greater financial burden on their families. The overall complications were also higher in this group with a mixed osteoarticular infection. We strongly emphasize a high index of suspicion for a mixed osteoarticular infection in cases that do not show clinical improvement after an initial joint debridement.

In most of the studies, Staphylococcus Aureus has been described as the commonest organism in all age groups.[9,18] Hemophilus Influenzae is another common pathogen especially in the 1-3 year age group. In our series, Staphylococcus Aureus was the commonest organism in all age groups.[9,18] Hemophilus Influenzae is another common pathogen especially in the 1-3 year age group. In our series, Staphylococcus Aureus was the commonest organism in all age groups. We only had one patient with Hemophilus infection and this finding is quite different from that reported in Middle East, Europe and USA.[9,13,18] Chen's study[6] from Taiwan, also had no infection with Hemophilus in his series of 31 cases, suggesting a possible regional influence. Hemophilus infections have decreased in many countries after introduction of routine vaccination programs. The incidence of Hemophilus was low in our series despite the fact that vaccination against Hemophilus is still not a routine in Pakistan. The cases of Salmonella septic arthritis have been reported only in sickle cell disease.[19] As enteric fever is quite a common clinical entity in our pediatric population, Salmonella septic arthritis was not an unusual finding despite the absence of sickle cell disease. We believe that the presence of gut organisms in four patients (Salmonella in two, Enterococcus in one, and Eschericia Coli in one) could also be attributed to the high prevalence of infective diarrhea in our population.

Septic arthritis of the hip joint is an orthopedic emergency. Early surgical decompression is the treatment of choice in septic arthritis of the hip joint and a combined osteoarticular infection should be kept in mind in cases which show a poor response after the initial surgery. The absence of H. Influenzae and the presence of a number of gut organisms are findings quite different from other series presented in the western literature. Duration of symptoms was an important prognostic factor in our series and correlated well with the final outcome.

References

1. Morrey BF, Bianco AJ, Rhodes KH. Suppurative arthritis of the hip in children. Orthop Clin North Am 1975; 6:923-34.
2. Nelson JD, Buchol RW, Kusmiesz H, et al. Benefits and risks of sequential parenteral-oral cephalosporin therapy for suppurative bone and joint infections. J Pediatr Orthop 1982;2:255-62.
3. Griffin PP, Green WT. Hip joint infections in infants and children. Orthop Clin North Am 1978; 9:123-34.
4. Fabry G, Miere E. Septic arthritis of hip in children: poor results after late and inadequate treatment. J Pediatr Orthop 1983;3:461-6.
5. Bennet, OM, Namnyak SS. Acute septic arthritis of the hip joint in infancy and childhood. Clin Orthop 1992;281:123-32.
6. Chen CH, Lee ZL, Yang WE, et al. Acute septic arthritis of the hip in children - clinical analysis of 31 cases. Chang Keng I Hsueh 1993;16:239-45.
7. Wilson NIL, Dipaola M. Septic arthritis in infancy and childhood. J Bone Joint Surg 1986; 68B:584-7.
8. Salmilson RL, Bersani FA, Watkins MB. Acute suppurative arthritis in infants and children: the importance of early diagnosis and surgical drainage. Pediatrics 1958:21: 798-804.
9. Dan M. Septic arthritis in young infants: clinical and microbiological correlations and therapeutic implications. Rev in Dis 1984; 6: 147-55.
10. Herndon WA, Krauer, Sullivan JA, Gross RH. Management of septic arthritis in children. J Pediatr Orthop 1986; 6: 147-55.
11. Jackson MA, Nelson JD. Etiology and management of acute suppurative bone and joint infections in pediatric patients. J Peditr Orthop 1982; 2: 313-9.
12. Klein DM, Barbera C, Gray ST, et al. Sensitivity of objective parameters in the diagnosis of pediatric septic hips. Clin Orthop 1997;338:153-59.

15. Conway JJ. Radionuclide bone imaging in pediatrics. Pediatr Clin North Am 1977; 24:701-12.
16. Gelfand MJ, Silberstein EB. Radionuclide imaging use in diagnosis of osteomyelitis in children. JAMA 1977; 237:245-7.
17. Tuson CE, Hoffman EB, Mann MD. Isotope bone scanning for acute osteomyelitis and septic arthritis in children. J Bone Joint Surg 1994;76-B:306-10.
18. Paterson DC. Acute suppurative arthritis in infancy and childhood. J Bone Joint Surg 1970;52B:474-82.
19. Mallouh A, Talab Y. Bone and Joint infection in patients with sickle-cell disease. J Pediatr Orthop 1985;5:158-63.