Osteomyelitis and it is therapy in children with staphylococcal septicemia

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Objective We investigated the acute osteomyelitis of 63 cases with staphylococcal septicemia between 1990 and 1994 years.

Methods Mean age of them was 6.5 years. Diagnosis was established clinically,radiologically and laboratorial. Antibiotic and other supportive facilities were initially held in all cases. Duration of antibiotic therapy was 6 weeks in patients with normal clinical course, but 8 weeks in cases with clinically diagnosed abscess.

Results Diagnosis was established by these means in 17(26 %) cases. While clinical, radiological and laboratorial healing were achieved by conservative therapy alone in 12 (71 %) patients at the end of the follow-up period, abscess formation observed in 5 (29 %). Surgical intervention was carried out in 5 (29 %) cases. Satisfactory results were obtained by conservative therapy in 12 of 17 cases, but by conservative therapy plus surgical intervention in 3 cases only.

Conclusion Early diagnosis and antibiotic therapy alone or coupled with surgical intervention may enhance the change of success in treatment of acute osteomyelitis, but they didn't completely heal it.

Key words Septicemia, acute osteomyelitis

Introduction

Although therapy of osteomyelitis showed dramatic advancement in recent years, some controversies still ensue, and not only its therapy changes according to the stages of acute osteomyelitis (1). Trueate (2) described three clinical sages; In stage I, abscess is in the metaphyses and can not be seen by plain radiographies. In stage II; abscess is in the subperiosteal space. In stage III; abscess has invaded the soft tissue by perforating periosteum. Tachdjian (1) classified this stages as early, without abscess and late, with abscess. Some controversies exist in duration and selection of antibiotic therapy, and surgical intervention and its time to perform. On the other hand, it was also clear that protocol of osteomyelitis therapy may be complicated by the coexistence of septicemia and osteomyelitis. Therefore, the purpose of this study was to observe the results of nonsurgical therapy of early, nonabscessed form of osteomyelitis secondary to septicemia.

Material and Method

Sixty three cases with staphylococcal septicemia diagnosed Pediatric Clinic of School of Medicine, Dicle University between 1990 and 1994 years were investigated. Diagnosis of ostemyelitis was established by clinically, radiologic and laboratory facilities in 17 of them. 60 of them were woman. and 11 men and their mean age was 6.5 (3 months- 14 years). 3 of them had multifocal others unifocal involvement.

Bone scans of all cases were performed using Technetium-99m MDP during the first ten days of admission. In addition, plain radiography was taken in patients whose lesion can be seen by us when required. On the other hand, blood count, ESR, blood albumin levels were also determined and blood culture was antibiotic sensitivity test of material obtained from cases with clinical abscess were accomplished. Median follow-up period was 11.5 months (7-20 months).

Results

Acute osteomyelitis in 17 cases was suspected by daily physical examination of patients with staphylococcal septicemia. Although all of the laboratory finding are favor of osteomyelitis., they may be considered to occur secondary to septicemia. Therefore, diagnosis was scintigraphically confirmed Finding that was interpreted in favor of osteomyelitis were observed by scintigraphic assay in 27 cases, they were on follow-up because the findings of examination were not indicative of osteomyelitis. Antibiotics that were previously for septicemia were maintained. These are the drugs that show proved activity against the organism isolated by blood culture. Also involved extremity was in strict follow-up by virtue of bed rest. Antibiotics were parenterally given for 3 weeks Following this, 12

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patients showed desired clinical course but in other 5 cases disease progressed and abscess formation took place. Additional oral antibiotic was given to 12 patients for 3 weeks, and therapy was completed in total of 6 weeks. Surgical drainage was performed in patients having clinically diagnosed abscess. Material collected was sent for culture and sensitivity testing, but no grew. Parenteral antibiotic therapy of this 5 cases was maintained for 4 weeks all antibiotic were ceased after the completion of this 4-weeks period. As a results, infection healed in 3 cases, but became chronic in cases. Satisfactory results was obtained by conservative therapy in 12 of 17 cases, but by conservative therapy plus surgical intervention in 3 cases only.

Discussion

Amount of bacteria, resistance of host, the superficial tissue's being traumatized, presence of foreign body and necrotic tissues in affected area are among the factors that facilitate the development of osteomyelitis in bone. It is not erroneous to say that septicemia is a group of predispositional factors that meet all criteria responsible for bone infection. Therefore, it may be expected that acute osteomyelitis occurs more frequently than those observed in septicemic patients. Scintigraphic finding were consistent with those seen in clinical conditions. But scintigraphic data obtained after regular follow-up and examination was not supported by clinical findings. This type of cases whose scintigraphic findings were in favor of osteomyelitis only were described as rudimentary osteomyelitis. The cause of this type is perhaps the antibiotic therapy that is in early period of disease due to septicemia.

Some disputable topics about the therapy of acute hematogenous osteomyelitis are continuing currently. Surgical intervention being performed and, if any, its time are the most important of them. Tachdjian (1), considered the stage of disease and patient's age as two important factors in the treatment of disease and he divided it into the two stages:early, nonabscessed ; and late, abscessed stages. He claimed that systemic antibiotics could heal the local and systemic symptoms in first 24-48 hours of therapy in patients showing high resistance and having mild form of disease that diagnosed in early period. Gillespie (3) and Cole(4) reported that the success rate of nonoperative therapy in this disease was 80 and 78 percent, respectively. Many authors agreed that satisfactory results might be achieved by early diagnosis and therapy (5,6,7,8). Contrary to this some authors consider surgery as a primary mode of therapy in patients with established diagnosis of acute osteomyelitis, whether abscess develops or not (9,10). On the other hand it is well known that if any abscess develops in a tissue its mode of therapy is surgical drainage. Main difficulty encountered in acute osteomyelitis is the presence, localization and operation time of it. Difficulties in presence and localization of an abscess are overcamed by ultrasonographic studies of recent years (11,12,13).

The topics not completely determined and sufficient studies were not focused on was the stages of abscess that surgical drainage will be performed according to the Trueta's staging. Some authors defined the extend of surgical intervention when the symptoms of infection did not subsided during the first 48-72nd hours antibiotic therapy in patients with acute osteomyelitis, but others determined the same extent by presence of metaphysial cavity or by demonstration of abscess with aspiration (5,14). It is also accepted by several authors that more satisfactory results can be attained with the prevention of death of cortical bone by surgical decompression of affected area, by reducing the intraosseous pressure, by preventing the spread of infection, and by isolating the causative agent (9,10,15,16,17,18,). Emslie(19) proposed that drillisation of bone, and cartilage of medullary canal caused vascular damage and necrosis of this canal, but bacteria were not completely eradicated in this area. He also noticed that effective and continuos drainage can not be accomplished due to obstruction of drillised foramina by clot plug. In light of this finding, we performed a relevant therapy based on an approach not considering the surgical intervention as a first line. While we early diagnosed our patients' disease and performed required therapy, we couldn't prevent progression of pathologic entity in 5 cases; and in spite of adding the surgical therapy for some of our cases, we didn't ceased the progression of chronic stage.

Another controversy exist in duration of antibiotic therapy. If it is shorter than 3 weeks, becoming chronic or recurrent is much more likely (20). There are consensus among the authors that this period must be at least for 3 weeks or more (3,4,6,9,21,22). Six weeks period is enough to obtain satisfactory results, but we had to practically adjust this period according to general and local symptoms as well as laboratory results.

In conclusion, early diagnosis and antibiotic therapy alone or coupled with surgical intervention may enhance the change of success in treatment of acute osteomyelitis, but they didn't completely heal it. In addition, we observed that osteomyelitis didn't occur in any septicemic patients given immunglobulin. It seems difficult to agree with the concept that its treatment consist of antibiotic therapy alone or coupled with surgical interventions and other supplementary therapeutic facilities. We are of the opinion that contemporary advancement may be gained when, in addition to therapies, the natural immune system of host showed relevant response, or when this system is stimulated to elicit desired response.

Table 1. Distribution of cases according to the age, sex and site of involvement

Cases	Age (Years)	Sex	Unifocal involvement	Multifocal involvement
1	2.5	F	+	
2	3	M	+	
3	3	M	+	
4	12	F	+	
5	9	M	+	
6	8	F	+	
7	5	M	+	
8	3/12	M		+
9	12	M	+	
10	1	F	+	
11	5	M	+	
12	1.5	F	+	
13	11	M		+
14	14	F	+	
15	10	M	+	
16	7	M		+
17	7	M		+

Table 2. Localization of osteomyelitis and results of therapy

Cases	Localization	Treatment	Follow-up (month)	Outcome
1	R-Femur	PenG+ AG+Cef	14	Good
2	R- Tibia	PenG+AG+Cef	16	Good
3	R-Humerus	PenG+AG+Cef	12	Good
4	L-Humerus	PenG+AG+Van+Drainage	18	Good
5	L-Calcaneus	PenG+AG+Cef	8	Good
6	L-Tibia	PenG+AG+Cef	10	Good
7	L-Tibia	PenG+AG+Van+Drainage	8	Good
8	R-Tibia+Femur	PenG+AG+Van+Drainage	12	Chr Ost.
9	L-Femur	PenG+AG+Cef	20	Good
10	R-Femur	PenG+AG+Cef	8	Good
11	R-Tibia	PenG+AG+Cef	8	Good
12	R-Tibia	PenG+AG+Cef	11	Good
13	L-Tibia,FemurR-Humerus	PenG+AG+Van+Drainage	7	Good
14	R-Femur	PenG+AG+Cef	8	Good
15	L-Tibia	PenG+AG+Cef	14	Good
16	L-Tibia+Femur	PenG+AG+Van+Drainage	13	Chr Ost
17	R-Tibia+Femur	PenG+AG+Cef	8	Good

AG: Aminoglycosid, **Cef:** Cefazolin, **Van:** Vancomycin,
Chr Ost: Chronic Ostomyelitis, **Pen G:** Penicilline G

References

1. Tachdjian O.M.: Pediatric orthopedic. Sec. ed. WB Saunders Co. Vol. 2. pp. 1093, 1990.
2. Trueta J.: The three type of acute osteomyelitis; a clinical and vascular study. J Bone Joint Surg (Br). 41-B: 671-80, 1959.
3. Gillespie W.J.: The management of acute hematogenous osteomyelitis in the antibiotic area; a study of outcome. J. Bone J joint Surg. (Br); 63-B. 126-31, 1981.
4. Cole W.G.: Treatment of acute osteomyelitis in children. J Bone Joint Surg. (Br): 64-B; 218-223, 1982.
5. Bamberger D.M.: Osteomyelitis, a commence approach to antibiotic and surgical treatment. Postgrad. Med. 94(5); 177-82, 1993.
6. Nade S.: Acute hematogenous osteomyelitis in infancy and childhood. J. Bone Joint Surg. 65-B; 109-119, 1983.
7. Scott R.J: Acute osteomyelitis in children; a review of 116 cases. J Pediatr Orthop. 10(5); 649-52, 1990.
8. Vaughan P.A.: Acute hematogenous osteomyelitis in children. J Pediatr Orthop. 7(6); 652-5, 1987.
9. Meller I.: Acute hematogenous osteomyelitis in children. Orthop Review. XVIII. 824-31, 1989.
10. Mollan R.A.B.: Piggot J.: Acute osteomyelitis in children. J. Bone Joint Surg. 59-B; 2-7, 1975.

11. Howard C.B.: Ultrasound in diagnosis and management of acute hematogenous osteomyelitis. in children. J Bone Joint Surg. 75-B: 79-82, 1993.
12. Howard C.B: Ultrasound in the detection of subperiosteal abscess. J. Bone Joint Surg. 73-B; 175-6, 1991.
13. Malsyhec E.S.: Complex special examination of children with hematogenous osteomyelitis. Khurirgia Mosk. 11; 94-7, 1989.
14. LeMont R.L.: Acute hematogenous osteomyelitis in children. J Pediatr Orthop. 7 (5); 579-83, 1987.
15. Blockey N.J.: Acute osteomyelitis in children. J Bone Joint Surg. 52-B; 77-87, 1970.
16. Kutin A.A.: Prognosis and prevention of postoperative suppurative-septic complication of hematogenous osteomyelitis. Khurirgia Mosk.; 12; 110-6, 1991.
17. Nade S.: Acute hematogenous osteomyelitis in infancy and childhood. J Bone Joint Surg.; 65-B; 109-119, 1983.
18. Rusak P.S.: Treatment of acute hematogenous osteomyelitis in children Khirurgia Mosk.; 8; 136-8, 1991.
19. Emslie K.R., Nade S.: Acute hematogenous staphylococcal osteomyelitis; The effects of surgical drilling and curettage in an animal model. Pathology; 18(2); 227-33, 1986.
20. Dich V.O.: Osteomyelitis in infancy and childhood. A review of 168 cases. Am. J. Dis. Child.; 129; 632, 1975.
21. Jones N.S.: Osteomyelitis in a general hospital. J Bone Joint Surg. 69-B;779-81, 1987.
22. Kolyvas E.: Oral antibiotic therapy of skeleton infections in children. Pediatrics. 65; 867, 1980.

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