Short- Versus Long-term Antimicrobial Treatment for Acute Hematogenous Osteomyelitis of Childhood

Prospective, Randomized Trial on 131 Culture-positive Cases

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Background: Considerable uncertainty exists on the optimal duration of antimicrobials for acute hematogenous osteomyelitis (AHOM) in children. Often they are administered for 1 to 2 months, the first 1 to 2 weeks intravenously, and decompressive surgery is usually added. No prospective, randomized, sufficiently powered comparative trial has been available.

Methods: Children aged 3 months to 15 years with culture-positive AHOM were randomly assigned to receive clindamycin or a first-generation cephalosporin for 20 or 30 days, including an intravenous phase for the first 2 to 4 days. Surgery was kept at minimum. Illness was monitored with preset criteria. Antimicrobial was discontinued once most signs had subsided and serum C-reactive protein decreased ≤20 mg/L. The primary end point was full recovery without need for further antimicrobial therapy because of an osteoarticular indication during the 12 months after the primary therapy.

Results: Of the 131 cases, 18% also involved the adjacent joint. *Staphylococcus aureus* caused 89% of cases, and all strains were methicillin susceptible. The median duration of treatment was 20 days for 67 children, and 30 days for 64 children. Most children underwent only the diagnostic percutaneous aspiration or drilling, and 24% had no surgery. Except for 1 mild sequela in both treatment groups, all patients recovered entirely.

Conclusions: Most cases of childhood AHOM can be treated for 20 days, including a short period intravenously, with large doses of a well-absorbed antimicrobial such as clindamycin or a first-generation cephalosporin, provided the clinical response is good and C-reactive protein normalizes within 7 to 10 days. Extensive surgery is rarely needed.

Key Words: osteomyelitis, osteoarticular infection, CRP, ESR, *Staphylococcus aureus*

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Acute hematogenous osteomyelitis of childhood (AHOM), previously a devastating disease,[1–3] is traditionally treated with long courses of antimicrobials, commenced intravenously for at least 1 to 2 weeks. Bone drilling (trepanation) to drain subperiosteal pus and to obtain a sample for bacteriology is done before the institution of antimicrobial, and if adjacent joint is involved, capsulotomy and lavage are often performed.[4–8] Usually, antimicrobial is discontinued only after the symptoms and signs have abated and the erythrocyte sedimentation rate (ESR) has normalized.[4–8] The true need for all these treatments in everyday practice has never been examined in a sufficiently powered, prospective, randomized trial. Since no consensus on therapy exists, clinical pathways are based on results of case series, expert recommendations, and personal experience.[9–16]

Realizing the need for a prospective, randomized, equivalence trial,[14] we conducted a prospective randomized trial on childhood AHOM in Finland. The aim was to examine the relevance of the current treatment policy by shortening the medication and tightening the indications for surgery. We learned that the treatment of this potentially serious condition can often be simplified.

PARTICIPANTS AND METHODS

Setting

We conducted a prospective, randomized, and controlled study of AHOM in Finland (first 50 cases caused by *Staphylococcus aureus* have been published earlier).[17] Osteomyelitis formed a part of a comprehensive study on acute pediatric osteoarticular infections carried out in 7 referral hospitals (listed in Appendix) in 1983 to 2005; the data on septic arthritis are presented elsewhere.[18] The study protocol was approved by the relevant ethical committees, and the child was included only if consent was obtained from the legal guardian. Only previously healthy children without major trauma, a skin ulcer, or pretreatment antimicrobials were included. The trial was designed, conducted, and analyzed independently of pharmaceutical companies.

When AHOM—fever, painful, and swollen limb without trauma; restriction of motion; often tender and warm area—was suspected in children aged between 3 months and 15 years, the clinician contacted a special ward of the Children's Hospital, Helsinki, 24 h/d. Each patient obtained a computer-generated number that randomized him or her to receive antimicrobial treatment for 20 or 30 days; the information was immediately recorded in the chart.

Treatment

Since AHOM in industrialized countries is mostly caused by Gram-positive agents, clindamycin[19,20] (40 mg/kg per day every 6 hours), or a first-generation cephalosporin (mentioned later in the text; 150 mg/kg per day every 6 hours) was used. This randomization was done by birthday (odd or even). Of cephalosporins, cephradine[21–23] was our first choice, because it was the only first-generation agent available for parenteral and oral use. Later, withdrawal of cephradine from Scandinavia forced a change to intravenous cephalothin and oral cephalexin or cefadroxil (all administered as cephradine). The switch was not considered crit-

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ical for the study, because these cephalosporins perform similarly.[24] Since, in the first study years, *Haemophilus influenzae* type b (Hib) was a common cause of septic arthritis in young children,[25] ampicillin or amoxicillin (both 200 mg/kg per day every 6 hours) was administered at the age of 0 to 4 years until the agent was isolated. The course was completed with only 1 antimicrobial).

Once vaccination had eliminated Hib, the ampicillin/amoxicillin was abandoned in 1997.[26]

Antimicrobial treatment was instituted intravenously for 2 to 4 days and completed orally with similar dosages. Serum antimicrobial concentrations were not assayed. In case of allergy, an alternative drug was used. Nonsteroidal anti-inflammatory drugs were given at the discretion of the physician (a pediatrician or a pediatric or orthopedic surgeon).

Identification of the Causative Agent, Role of Surgery, and Monitoring of Patients

Blood cultures were taken in all cases. Except diagnostic drilling, aiming mainly to obtain a representative sample for bacterial culture, surgery was kept as minimum. All further operations were performed by an experienced orthopedic or pediatric surgeon.

The present laboratory and radiographic investigations comprised plain radiograph on admission, and on day 10 and 19; basic blood analysis at presentation, and on day 5 and 10. As shown in Figure 1, the serum C-reactive protein level (CRP)[27,28] and ESR[4–8] were measured sequentially throughout illness. All CRP values exceeding 20 mg/L[29] and the ESRs over 20 mm/h[4] were deemed increased. Scintigraphy was performed in most cases, whereas computerized tomography and magnetic resonance imagining were performed only on demand. The data were recorded in special forms, and computerized and analyzed in Helsinki with use of Statview (SAS Institute). A researchers' meeting was held once a year.

Discontinuation of Antimicrobial Therapy, and Control Visits

The antimicrobial treatment was discontinued when most (though not necessarily all) symptoms and signs of AHOM had subsided and the CRP value was <20 mg/L,[29] no matter how high

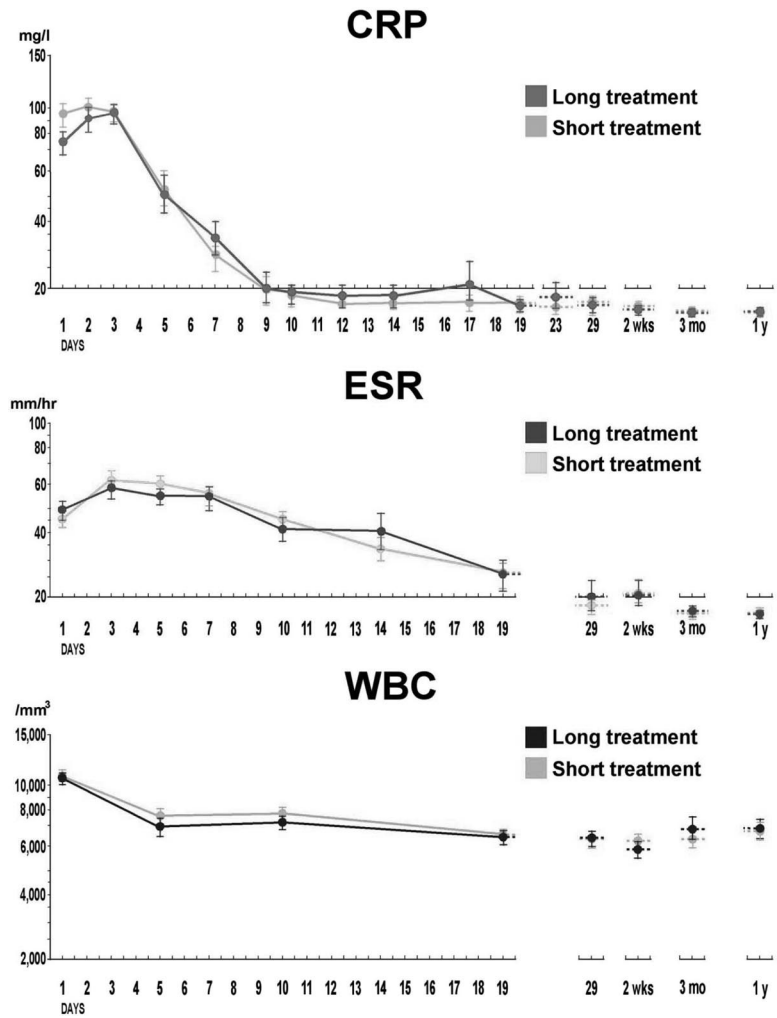

FIGURE 1. C-reactive protein level (CRP), erythrocyte sedimentation rate (ESR), and blood leukocyte count (WBC) of the 67 cases in the short-term and 64 cases in the long-term treatment groups. Curves depicted with standard error of mean (SEM).

the ESR. If the CRP level remained elevated or reincreased notably, or clinical signs persisted, medication was continued until 2 normal CRP values were obtained. In cases of likely drug allergy, the agent was switched to the other agent recommended by the protocol.

Because osteoarticular infections have some tendency to reoccur[10,30] and long-term sequelae may develop slowly,[31,32] follow-up visits were scheduled at 2 weeks, and 3 and ≥12 months post hospitalization, with extra visits if needed. The liaison person executed all investigations, paying special attention to all potential sequelae, no matter how mild. Radiographs were performed, the CRP level, and ESRs were checked at each follow-up visit.

Outcome Measures, Sample Size, and Statistical Analysis

To avoid discussion on the accuracy of diagnosis,[33] only culture positive cases were included. The primary end point was full recovery (having no symptoms or signs of AHOM at the end of the follow-up period, with no readministration of antimicrobial for an osteoarticular indication since the primary treatment). Secondary outcomes included all potential sequelae and the absence of disease after discontinuation of antimicrobial therapy.

The 95% confidence interval for the difference in success rates was calculated on the basis of normal approximation to the binomial distribution. This noninferiority test was based on the lower bound of the confidence intervals being within prespecified noninferiority margin of 15% and the upper bounds containing 0%. Assuming a 90% efficacy in both groups, a 80% power, and a 1-sided significance level of $P = 0.025$, 63 patients in each group were needed to test the null hypothesis (at least 15% difference in treatment results).

RESULTS

Participants

AHOM was diagnosed clinically in 183 cases of which 131 (72%) were culture-positive. Of these, 67 and 64 patients comprised the short- and long-treatment groups, respectively. The patient characteristics are summarized in Table, Supplemental Digital Content 1, http://links.lww.com/INF/A593. Bone and blood grew bacteria in 35 cases, bone alone in 44 cases, and blood alone in 52 cases. Methicillin-susceptible *S. aureus* was the most common agent being responsible for 89% (n = 117) of cases, the remaining 11% (14) cases being caused by various agents. The extent of inflammation was comparable in the treatment groups as judged by slightly higher CRP values in the short-term but higher ESR in the long-term treatment group.

All age groups with a slight preponderance at school age were affected. The median age was 9.0 years in the short-term and 9.3 years in the long-term treatment group. Medical attention was sought within 3 days and 7 days in 47% (N = 61) and 84% (N = 110), respectively. Usually long bones of the lower extremity or pelvis were affected: the femur in 27%, tibia in 24%, pelvic girdle in 15%, calcaneum in 11%, and fibula in 10%.

An adjacent joint was involved in 13 and 11 cases in the short- and long-term treatment groups, respectively, the agents being *S. aureus* (N = 10 and 9), Hib (1 and 1), and *Streptococcus pyogenes* (2 and 1). Combined AHOM-septic arthritis induced greater changes in the laboratory indices than did plain AHOM; the initial CRP values and ESR's were 99 mg/L and 62 mm/h, and 81 mg/L and 44 mm/h, respectively. For ESR, the difference was significant ($P = 0.0031$).

Treatment

The short- and long-term treatment groups comprised 67 and 64 children, respectively. In all, 75 (57%) children received clindamycin alone, combined with amoxicillin in 5 cases. Cephalosporin alone was used for 37 patients, combined with amoxicillin in 5 cases.Table 1 summarizes the 9 patients whose antimicrobials were modified, or medication was prolonged for more than a week. Likely allergy indicated a change to the alternative in 5 cases.

Antimicrobials were administered intravenously for 3.7 (median) and 4.1 days in the short- or long-term treatment groups, respectively. The overall range was 0 to 14 days, and 8 children were on intravenous medication for 7 days. The entire duration of antimicrobials in the short-term group was 20.0 days (no deviation in interquartile range, 90% range: 10–21 days), the shortest course (of cephalosporin) being only 9 days for *S. aureus* AHOM in the proximal femur of a 10-year-old boy. The long-term treatment group received antimicrobials for 30 days (no deviation in interquartile range, 90% range: 30–43 days). The extreme prolongations in antimicrobial treatment were 108 days in the short-term, and 91 days in the long-term treatment group (Table 1).

Surgery

Corticotomy was performed in 62 cases, combined with arthrocentesis in 14 cases. Percutaneous bone aspiration was performed in 34 cases. When seeking arthritis, 8 children underwent joint aspiration; subperiosteal abscess was drained in 4 cases. The need for surgical intervention did not differ between the groups. Thirty-one (24%) children did not require surgery.

Outcomes

Most patients recovered rapidly without significant difference between the groups (Fig. 1). Importantly, after discontinuation of antibiotic therapy, no laboratory or clinical marker in the 20-day group deviated from the longer treatment group. Radiographic changes (periosteal reaction, osteolysis, or sclerosis) were, in all, first found with an increasing frequency, in 21% on day 1, 40% on day 10, and 41% on day 19. Thereafter, changes were seen in 35% on day 29. At 1 year, radiographic changes were observed in 15% of cases (16% of the short-term and 14% of the long-term treatment group). Initial bone-scan was positive in 74 (56%) cases.

Two weeks after hospitalization, 16 children in the short-term and 19 in the long-term treatment group had local pain, swelling, or tenderness. The presence or absence of symptoms or signs were not associated with the length of treatment, but with the time elapsed from the onset of disease to the institution of antimicrobial. If length of history (average) had been 7 or 5 days ($P = 0.035$), the differences between children with and without symptoms at 2 weeks post hospitalization were as follows: on admission, CRP value was 116 versus 76 mg/L ($P = 0.006$); ESR, 56 versus 45 mm/h ($P = 0.046$); normalization of CRP level in 14 versus 8 days ($P = 0.0008$); and normalization of ESR in 27 versus 17 days ($P = 0.0005$), respectively.

At 3 months, only 5 children had complaints. In the short-term treatment group, one 9-year-old boy had slight heel tenderness following calcaneal AHOM; the lesion healed in 6 months. In the long-term treatment group, there were 4 patients, all boys, aged 14, 13, 6, and 1 year(s). The first 3 complained of tenderness in the fibular, vertebral, or metatarsal region, respectively. The youngest, who developed AHOM at 1.6 years (No. 2 in Table 1), showed slight asymptomatic varus deformity following postvaricella tibial AHOM and pathologic fracture. Due to suspected sequestrum and chronic granulomatous disease (both later unconfirmed), antimicrobials were given for 108 days. The minor deformity was healing 2.3 years later.

Final follow-up was ≥12 months post hospitalization for all patients with the exception of 5 children (3 short-term and 2 long-term groups) who were lost to follow-up. However, all these patients had been found recovered at earlier stages, therefore the

TABLE 1. Patients for Whom Antimicrobial Treatment Was Modified or Prolonged for More Than a Week From Scheduled, in Order of Age

Number	Sex	Age in Years	Localization	Reason for Prolongation	Antibiotics Used	Surgery	Agent	Outcome When Last Checked
Short (20 d) treatment group								
1	F	0.7	Ilium, hip joint	Slow recovery	CLI +AMP 6 D iv, CLI 43 D orally	Arthrocentesis	*Staphylococcus aureus*	Full recovery
2	M	1.6	Tibia	Slow recovery*	CLI 3 D iv, 105 D orally, initially w CXM 10 D iv	Abscess drainage	*S. aureus*	Asymptomatic 8 degree varus deformity
3	M	6.6	Naviculare	Slow recovery and CRP descent	CLI for 20 D, CDR 6 D iv, 21 D orally	Biopsy	*S. aureus*	Full recovery
4	F	11.0	Femorotibial osteomyelitis, hip arthritis	Persisting symptoms, reactive arthritis	CTH 3 D iv, CDR 8 D orally, then variable combinations for 39 D	Arthrotomy	*S. aureus*	Full recovery†
5	F	13.0	Sacroilium	Slow recovery and CRP descent	CLI 3 D iv, 36 D orally	Arthrotomy	*S. aureus*	Full recovery
Long (30 d) treatment group								
6	M	4.0	Humerus, shoulder	Slow recovery, CRP re-elevation	DIC+TOB D 9 iv, CXM 13 D iv, ERY 38 D orally	Arthrotomy × 2	*Haemophilus influenzae* b	Full recovery
7	F	6.3	Femur	Slow recovery	CXM 5 D iv, PEN-V 85 D orally	Trepanation, arthrocentesis	*S. aureus*	Full recovery
8	M	11.4	Fibula, tibiotalar arthritis	Slow recovery	CLI 8 D iv, CDR 23 D orally	Arthrocentesis, abscess drainage	*S. aureus*	Full recovery
9	M	12.5	Tibia, tibiotalar arthritis	Slow recovery	CLI 3 D iv, PEN-V 77 D orally	Arthrocentesis	*Streptolococcus pyogenes*	Slight pain in exercise due to arthrosis

*Sequestrum in distal tibia was suspected (not later confirmed), but as father and grandfather, the boy was prone to multiple abscess formation. Chronic granulomatous disease was searched for but not diagnosed. The mother was HIV positive and the child was HIV negative.

†One year from osteoarticular infection, the contralateral foot was overdriven by bus leading to Lisfranc fracture luxation. Three years later, the patient complained mild foot pain in extensive exertion on this side; osteoarticular infection was fully healed.

AMP indicates ampicillin; CDR, cephadroxil; CLI, clindamycin; CTH, cephalothin; CXM, cefuroxime; DIC, dicloxacillin; ERY, erythromycin; PEN-V, penicillin V; TOB, tobramycin; D, days.

parents refused further checkups. Of the 126 attendees, following 2 minor sequelae were detected (Table 1): asymptomatic 8 degree varus deformity following tibia AHOM at age 1.6 years, and pain during exercise after ankle AHOM-arthritis at age 12 years. In this case, arthrosis of the tibiotalar joint was seen in radiograph. No patient required corrective osteotomy.

DISCUSSION

The main lesson learned from this study was that antimicrobials for 20 days, administered mainly orally, usually suffice in childhood AHOM without an obvious risk of reoccurrence or sequelae, provided the clinical response is good and the CRP concentrations normalize quickly. Our length of treatment was half that in a retrospective series of 146 cases from Canada.[6] However, the antimicrobial should be chosen carefully, and large doses and the 4-times daily regimen with these time-dependent agents are probably necessary.

The initial intravenous period can be a few days only. Then, the course is completed orally with a well-absorbed agent, such as clindamycin or a first-generation cephalosporin. No serum assays are needed in our opinion. All this simplifies treatment, avoids complications,[34] decreases costs, and allows discharge earlier.

Substantial regional differences prevail in the manifestations and severity of AHOM. However, a review of a number of reports from elsewhere does not support the view that our patients would not have been representative of those in industrialized countries. In the United States, the situation might be a little different since methicillin-resistant *S. aureus* and other earlier rare or unknown agents have become an issue.[35,36] An important finding from this study was that prolonged history did not play a major role for the final outcome, but of course, treatment should be started without delay.

No major difference in clinical effectiveness between clindamycin and the cephalosporins was observed. Clindamycin penetrates slightly better into bone than β-lactams,[37] but our intentional use of large doses for both agents (as recommended decades ago),[4] probably concealed any special findings in this regard. Of note was the finding that two-thirds (87/131, 66%) of our patients grew bacteria, usually *S. aureus*, from blood. Thus, little question remained whether or not bacteremic staphylococcal infections can be treated (mostly) orally with first generation cephalosporins of clindamycin if large enough doses are used.

The failure to understand the pivotal difference between infection and inflammation[38] is one reason why antimicrobials for AHOM (and many other bacterial infections) are given for long periods. Normalizing CRP values give good guidance when the antibacterial can be discontinued. To maximize the informative value of CRP measurements, sequential determinations are needed, and to best serve the patient, the results should arrive on the same day. One should be acquainted with the dynamics of this

valuable yardstick: even when osteomyelitis heals uneventfully, the CRP level increases for 1 to 2 days, but then begins to decline and reaches 20 mg/L in 7 to 10 days.[27,28,39] If the value continues to rise or remains high on the fourth day, the clinician should suspect a complication.[28]

Minimal surgery (percutaneous aspiration or drilling) aiming primarily at obtaining a representative sample for bacteriology, sufficed in most cases; 24% of our patients escaped all surgery and recovered uneventfully. However, surgery has a role in a few selected cases of AHOM, but in the every-day practice, its need is less than thought. Some new thinking is warranted in this important issue.

We realize a few limitations in our study. Collecting 131 culture-positive cases took many years, because AHOM in Finland is rare; the annual incidence at age 0 to 14 years is only 4.5 per 100,000.[25] However, yearly researchers' meetings kept the protocol active and consistent. Not all children received solely the recommended agents nor was the treatment always exactly 20 or 30 days.

This said, we do not think we missed any recurrence of disease or sequela, although 5 (4%) patients did not return for the ≥1-year checkup. All had recovered in the earlier check-ups, and after the first months, recrudescences are very unlikely.[40]

We do not claim that our simplified treatment will heal 100% of childhood AHOM, but we believe that for most children who respond quickly and whose CRP values normalize within 10 days, large doses of clindamycin or a first-generation cephalosporin 4 times daily for about 20 days (intravenous for first 3–4 days) suffice. Extensive surgery is rarely needed. Further, randomized trials are warranted to confirm our results.

APPENDIX

Members of the Osteomyelitis-Septic Arthritis (OM-SA) Study Group

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INVITED COMMENTARY

Acute Hematogenous Osteomyelitis in Children

Differences in Clinical Manifestations and Management

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Peltola et al from Finland are to be congratulated for their persistence in conducting a prospective randomized trial from 1983 to 2005 of short-(20 days) versus long-term (30 days) antimicrobial treatment (clindamycin or a first-generation cephalosporin) of acute hematogenous osteomyelitis (AHOM) in children.[1] *Staphylococcus aureus* was the most common organism isolated (117/131, 89%); all *S. aureus* isolates were methicillin-susceptible. Magnetic resonance imaging or computed tomography was performed "on demand." Surgery was used minimally with drilling of bone used primarily for diagnostic purposes. The median age of the children was 9 years and the lower extremities were most commonly affected. An adjacent joint was involved in 24 (19 with *S. aureus* infections) children. The authors did indicate that there are substantial regional differences in the manifestations and severity of the AHOM. However, their review of several reports from elsewhere was consistent with the view that their patients in Finland were similar to those reported in industrialized countries. They did not cite these reports but the studies included in their references were predominantly published before 2000. They also stated that the situation in the United States might be a little different related to community-acquired methicillin-resistant *Staphylococcus aureus* infections (CA-MRSA). My comments focus on AHOM caused by *S. aureus* only, as this is by far the most common organism causing this infection in children.

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The patients that Peltola et al report are actually very different in several ways from many of the children with *S. aureus* AHOM seen in areas of the United States as well as many other regions of the world including Greece, United Kingdom, and Australia. Some of these differences are likely related to the various clones of CA-MRSA isolates being reported in many countries, most of which carry the genes encoding Panton Valentine leukocidin (*pvl*+), a toxin which has been associated with enhanced tissue inflammation and abscess development in osteomyelitis in children as well as in an experimental rabbit model.[2–5] Some differences also could be related to as yet unrecognized variations in genetic host defense factors between Finnish and other populations of children.

First, in many of the CA-MRSA reports, a substantial number of children have disseminated *S. aureus* infection in association with AHOM requiring intensive care.[6–8] Similar clinical courses can be seen with methicillin-susceptible *S. aureus* (MSSA) isolates within the common USA300 clone or other MSSA isolates carrying the *pvl* genes.[4,9,10] Often these children have bacteremia for several days despite the recommended antibiotic therapy and adequate drainage procedures; multiple sites of bone infection are common.[6,11–13] There is no mention in the study from Finland if any children were admitted to the intensive care unit, had persistent bacteremia, or had more than one bone infected.

Although the duration of fever was not reported for the children in the Finnish study, the average duration of fever in most of the studies for the children with CA-MRSA osteomyelitis was about 5 days, significantly longer than that for children with CA-MSSA osteomyelitis in these same studies.[11,12,14] In addition, in some studies the time until the C-reactive protein (CRP) reached normal values was significantly longer in the CA-MRSA (median of 25 days in 1 study and average of 19 days in another study) than the CA-MSSA group.[12,15]

Peltola et al did not perform magnetic resonance imaging (MRI) as a routine imaging study for evaluating their patients. Because the outcomes of these patients were uniformly excellent, undetected and undrained important abscesses were unlikely. Several studies have found that MRI is now the imaging study of

choice for evaluating children with osteomyelitis.[13,16] Extraosseous findings such as subperiosteal abscesses or pyomyositis, both of which generally require surgical drainage, are readily detected. Subperiosteal abscesses and areas of pyomyositis were reported in a high percentage of children with CA-MRSA or *pvl*+ MSSA AHOM in several studies.[3,4,11–13] Children with venous thrombosis adjacent to a site of osteomyelitis caused by CA-MRSA or *pvl*+ MSSA isolates now have been reported from many areas around the world and also can be detected by MRI.[4,10,11,17–19] Often these children have septic pulmonary emboli. Typically anticoagulation or even placement of a vena cava filter is recommended for these patients. None of the patients that were reported by Peltola et al apparently had venous thrombosis.

In this Finnish trial, about half of the children underwent corticotomy and 34 children had percutaneous bone aspiration. A subperiosteal abscess was drained in 4 children. Thirty-one (24%) children did not have surgery. In the large retrospective series of osteomyelitis from around the world which included cases of CA-MRSA or *pvl*+ *S. aureus* CA-MSSA osteomyelitis, more than 75% of children underwent surgical procedures and in many children more than 1 surgical drainage procedure was performed. These data again suggest that the infectious process is different between the children in Finland and children in other areas of the world. Is drainage of all abscesses associated with *S. aureus* AHOM by a surgeon or interventional radiologist necessary? Possibly not, but there are no randomized prospective studies evaluating the effectiveness of surgically draining subperiosteal abscesses or other purulent collections associated with acute osteomyelitis and it is doubtful any will be performed. Nevertheless, it is consistent with everything that is known about treating an abscess that draining subperiosteal abscesses or areas of pyomyositis is optimal for management.

Finally, only 2 children in the Finnish study developed minor sequelae after their AHOM. In contrast, major sequelae have been reported in up to one-third of children with AHOM caused by CA-MRSA or *pvl*+ isolates of *S. aureus*.[4,13,14,19] Major sequelae included chronic osteomyelitis, growth disturbances, and pathologic fractures among others.

Peltola et al concluded by stating that for most children with AHOM who respond quickly to treatment and whose CRP values normalize within 10 days, intravenous followed by oral therapy for a total of 20 days will be adequate duration of therapy and that extensive surgery is rarely needed. Their conclusions are reasonable for the selected patients they describe, but do not apply for a large percentage of the children with AHOM caused by CA-MRSA or *pvl*+ *S. aureus* isolates. Clinicians have to rely on their best judgment based on their experience and knowledge for the management of each individual child with acute osteomyelitis with respect to duration of antibiotic administration and need for surgical interventions.

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