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Predicting the presence of adjacent septic arthritis in children with acute hematogenous osteomyelitis

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Abstract

Introduction This study conducted statistical analysis of clinical data from cases of acute hematogenous osteomyelitis (AHO) with or without concomitant septic arthritis, with the objective of identifying factors that are indicative of concomitant septic arthritis. Predictive models will be developed to predict coexisting infections, with one that is independent of MR findings and another that incorporates MRI data.

Methods A retrospective review of 127 children (132 cases of AHO) treated for AHO was performed. All patients underwent MRI. The data encompassed various demographic, clinical, and diagnostic factors. Graphical and logistical regression analysis was used to determine variables independently predictive of adjacent infection. Optimal cutoff values were determined for each variable and a prediction model was created. Finally, the model was applied to our patient database and each patient with isolated AHO, or concomitant infection was stratified based upon the number of positive predictive factors.

Results The overall incidence of coexisting septic arthritis in patients with AHO was 52.2% (69/132). Four risk factors (age below 4 years, a history of preceding infection, platelet count > 390.5 × 10^9/L, and absolute neutrophil count < 5.45 × 10^3 cells/ml) were found to be predictive of concomitant infection and were included in the algorithm. Patients with ≥ 2 risk factors were classified as high risk for AHO with concomitant infection (Sensitivity: 79.41% (95% CI: [64.10%, 94.71%]), Specificity: 76.56% (95% CI: [58.61%, 94.51%]), Positive Predictive Value (PPV): 78.26% (95% CI: [63.43%, 93.09%]), and Negative Predictive Value (NPV): 77.78% (95% CI: [61.02%, 94.54%]). In MRI, joint effusion was the primary indicator of concomitant septic arthritis in patients with AHO, followed by the absence of subperiosteal abscess. The presence of subperiosteal abscess in the absence of joint effusion was highly correlated with isolated AHO, showing a 100% occurrence rate (39/39).

Conclusions Our study successfully identified several risk factors and radiologic signs associated with concomitant septic arthritis in patients with AHO. These findings can assist clinicians in early recognition and management of coexisting infections, especially in situations where MRI is not readily available or when its findings are inconclusive. Timely identification of these factors is crucial for appropriate treatment planning and improved patient outcomes.

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Keywords Acute hematogenous osteomyelitis, Septic arthritis, Adjacent infection, MRI

Introduction

Acute hematogenous osteomyelitis (AHO) affects 0.2 to 1.6 per 1,000 children annually, with an increasing trend in recent years [1, 2]. Due to the unique anatomical features of pediatric bones, AHO typically affects the metaphysis of long bones [3]. In some cases, infection in the metaphysis can spread to adjacent joints, resulting in septic arthritis [4]. AHO associated with septic arthritis poses a diagnostic challenge, as its clinical presentation closely resembles that of isolated AHO [5]. Failure to recognize adjacent joint involvement during initial evaluation increases the risk of inadequate treatment, the necessity for additional surgical interventions, and prolonged hospital stays [1, 6–8]. Some studies have identified adjacent septic arthritis as an independent risk factor for poor prognosis [9, 10].

Pre-operative magnetic resonance imaging (MRI) can facilitate the detection of concomitant septic arthritis [11]. To optimize MRI usage, it is crucial to identify the AHO patients that are most likely to have concomitant septic arthritis and would therefore benefit from this diagnostic tool. However, it is hard to distinguish concurrent septic arthritis from reactive joint effusion in the presence of AHO [12]. Rosenfeld's [12] study suggests that all joint effusions associated with metaphyseal osteomyelitis should be presumed as septic arthritis. However, 25.5% (14/55) of patients in the study were demosntrated to have reactive effusions.

AHO, especially those with concomitant septic arthritis, progresses rapidly and requires timely diagnosis and treatment, but in most institutions MR is time-consuming and may be of limited diagnostic value for concomitant septic arthritis. Therefore it is essential to develop a model to predict the presence of concomitant septic arthritis in AHO patients that do not solely rely on MR findings.

This study aims to conduct a statistical analysis of clinical data from cases of AHO complicated by adjacent septic arthritis, with the objective of developing predictive models to identify concomitant septic arthritis, Models with and without MR would be developed separately, in order to provide valuable references for diagnosis and treatment in different clinical settings.

Materials and methods

Patient selection

After approval from the ethics committee, a retrospective review was conducted on all patients aged 0–14 years who were treated for musculoskeletal infection and underwent preoperative MRI at a tertiary children's hospital between January 2014 and January 2022. Detailed information of the patients were obtained from the hospital's medical record system. The inclusion criteria were as follows: (1) Preoperative MRI examination was performed. (2) The infection involved the metaphysis or epiphysis of long bones. (3) No history of immunodeficiency or direct inoculation of infection into the bone. (4) The diagnosis of acute infection was confirmed through a combination of clinical symptoms, laboratory tests, microbiology, and validated in surgery.

Clinical data collection

Demographic data included age, gender, duration of illness, site of involvement, potential triggers, clinical signs, laboratory results, and imaging findings. Clinical symptoms included pain, swelling, erythema, fever (temperature ≥ 38.0 °C), and fever lasting more than 48 h. Laboratory tests were performed at the time of admission, which comprised white blood cell count (WBC), absolute neutrophil count (ANC), procalcitonin (PCT), C-reactive protein (CRP), platelet count (PLT), erythrocyte sedimentation rate (ESR) and bacterial cultures using blood samples and local tissue samples. Patients were classified into the following age groups: 0–12 months (infancy), > 12 months to 4 years (toddler), and > 4 years to 14 years (preschool to early adolescence).

AHO affecting the proximal femur, proximal radius, distal fibula, and proximal humerus are classified as intra-articular AHO due to its proximity to joints, while the remaining cases are classified as extra-articular [12]. Possible triggers a history of local sprains or falls or preceding infection such as systemic infection, urinary tract infection, respiratory infection.

Imaging review and data collection

MRI was performed using a 3.0 T Philips Achieve system (Best, The Netherlands) with routine sequences: SE T1WI (TR/TE = 480/10.00 ms), T2WI (TR/TE = 4150/130.00 ms), and TSE-SPAIR T2WI (TR/TE = 3260/60.00 ms). Imaging parameters included a matrix of 640 × 640, a field of view (FOV) ranging from 240 to 420 mm, a section width of 4 mm to 7 mm, and three acquisitions. The Picture Archiving and Communication System (PACS; Neosoft Company, Shenyang, China) was used to analyze all MRI data and measure relevant parameters.

The MRI scans were independently reviewed by two pediatric orthopedic surgeons (NP, LST). AHO was identified based on an increase in fluid-sensitive signal and a corresponding decrease in T1-weighted imaging (T1WI) signal. Additional supporting evidence included the presence of bone or soft tissue abscess and subperiosteal abscess. The site of involvement was categorized

as metaphyseal osteomyelitis, transphyseal osteomyelitis, or primary epiphyseal osteomyelitis. Subperiosteal abscess typically presented as a rounded or oval fluid signal beneath the periosteum, showing low signal intensity on T1-weighted imaging (T1WI) and high signal intensity on T2-weighted imaging (T2WI), sometimes with heterogeneous contents. In some cases, periosteal elevation with rupture was observed where the infection had spread into adjacent soft tissues. It was considered part of the subperiosteal abscess. (Fig. 1)

Subjective assessment of joint effusion was based on MRI findings and recorded as either present or absent. If evaluation was uncertain, the contralateral joint was used for comparison; if unavailable, an age-matched normal joint were used as the reference. Any discrepancies in readings were resolved through consensus to ensure consistency in diagnosis. The diagnosis of concomitant septic arthritis was made if any of the following criteria were met: 1. Positive bacterial culture from synovial fluid; 2. high white blood cell count (synovial fluid WBC count exceeding 20,000 cells/μL) in synovial fluid; 3. histopathological evidence of inflammatory response from surgical biopsy. 4. Presence of purulence within the joint.

91 patients underwent surgery and 36 received conservative treatment. Surgical intervention was indicated for cases with concomitant septic arthritis, soft tissue abscess, severe systemic septic symptoms or inadequate response to antibiotic therapy. The procedures mainly involved drainage of purulence, local debridement and irrigation of the nearby involved joint. Local tissue samples were collected for culture and antimicrobial susceptibility tests. The choice of antibiotics was empirical before operation (first-generation cephalosporin) and necessary adjustment would be made according to the results of the culture (e.g. vacomycin for MRSA).

Statistics analysis

Patients were divided into two groups: the Isolated group and the concomitant infection group. Differences between the groups were assessed using the χ^2 test, Fisher's exact test, and either the t-test or non-parametric tests, depending on the data distribution. For continuous variables with statistically significant differences, the optimal cut-off point was selected using the Youden index. Multivariate logistic regression analysis was performed to identify independent significant predictors of concomitant septic arthritis, both with and without MRI findings. The original patient database was then analyzed using this algorithm, and each patient was stratified based on the number of predictive factors identified. This approach allowed us to determine the threshold number of predictive factors that needed to be met to classify a patient as "high risk" for concomitant infection. *P*-value of <0.05 was considered statistically significant. All statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS) software version 29.

Results

A total of 158 patients were included in the clinical database. 132 cases were confirmed as AHO. Among these, 2 cases lacked preoperative MRI, and 3 cases presented with adjacent joint effusion but lacked sample verification for septic arthritis. Ultimately, 127 patients (132 cases of AHO) were included in the study. The average age of the patients was 56.81 (± 50.83) months. The median age was 45 months (range: 1-166 months). 62% were male, and 38% were female. The overall incidence of concomitant septic arthritis in patients with AHO was 52.3% (69/132).

Concomitant infection was more common in infants (77.8%) and toddlers (61.5%) compared to adolescents (29.5%) ($P<0.001$). Infections involving intra-articular metaphyses had a high rate of concomitant septic arthritis (73.6%) ($P<0.001$). A preceding infection history was strongly associated with concomitant infection (82.4%) ($P<0.001$). Patients with concomitant septic arthritis required a longer time for CRP normalization ($P=0.007$). Univariate analysis identified age, symptom duration, ANC, joint effusion, physeal plate involvement, and intra-articular involvement as indicators for concomitant septic arthritis ($P<0.001$). Lower platelet counts, the presence of subperiosteal abscess, and *Staphylococcus aureus* infection (MSSA/MRSA) were more common in isolated AHO cases ($P<0.001$). (Table 1).

In the absence of MRI, forward variable selection identified 4 significant variables (Table 2). ROC curve analysis yielded a c-statistic of 0.834. The final model included the following 4 factors: age < 4 years, a history of preceding infection, PLT > 390.5×10^9/L, and ANC < 5.45×10^3 cells/mL (Table 3). To determine the appropriate threshold for differentiating high and low risk of adjacent infection, ROC curve analysis was performed again. Among patients with ≤ 1 risk factor, 49/64 (76.6%) had isolated AHO, classifying them as low risk. Conversely, those with ≥ 2 factors were considered high risk for developing AHO with adjacent infections. Using this threshold resulted in a sensitivity of 79.41% (95% CI: 64.10–94.71%) and a specificity of 76.56% (95% CI: 58.61–94.51%). Most false positives occurred in patients who met exactly 2 predictive factors. The positive predictive value (PPV) was 78.26% (95% CI: 63.43–93.09%), and the negative predictive value (NPV) was 77.78% (95% CI: 61.02–94.54%).

When MRI was performed, forward variable selection identified 4 significant independent risk factors (Table 4). Based on odds ratio (OR) analysis, joint effusion (OR = 183.182; 95% CI: 22.848–1468.625) emerged as the primary predictor of septic arthritis among patients with AHO, followed by the absence of subperiosteal abscess (OR = 22.780; 95% CI: 4.377–118.555). Although

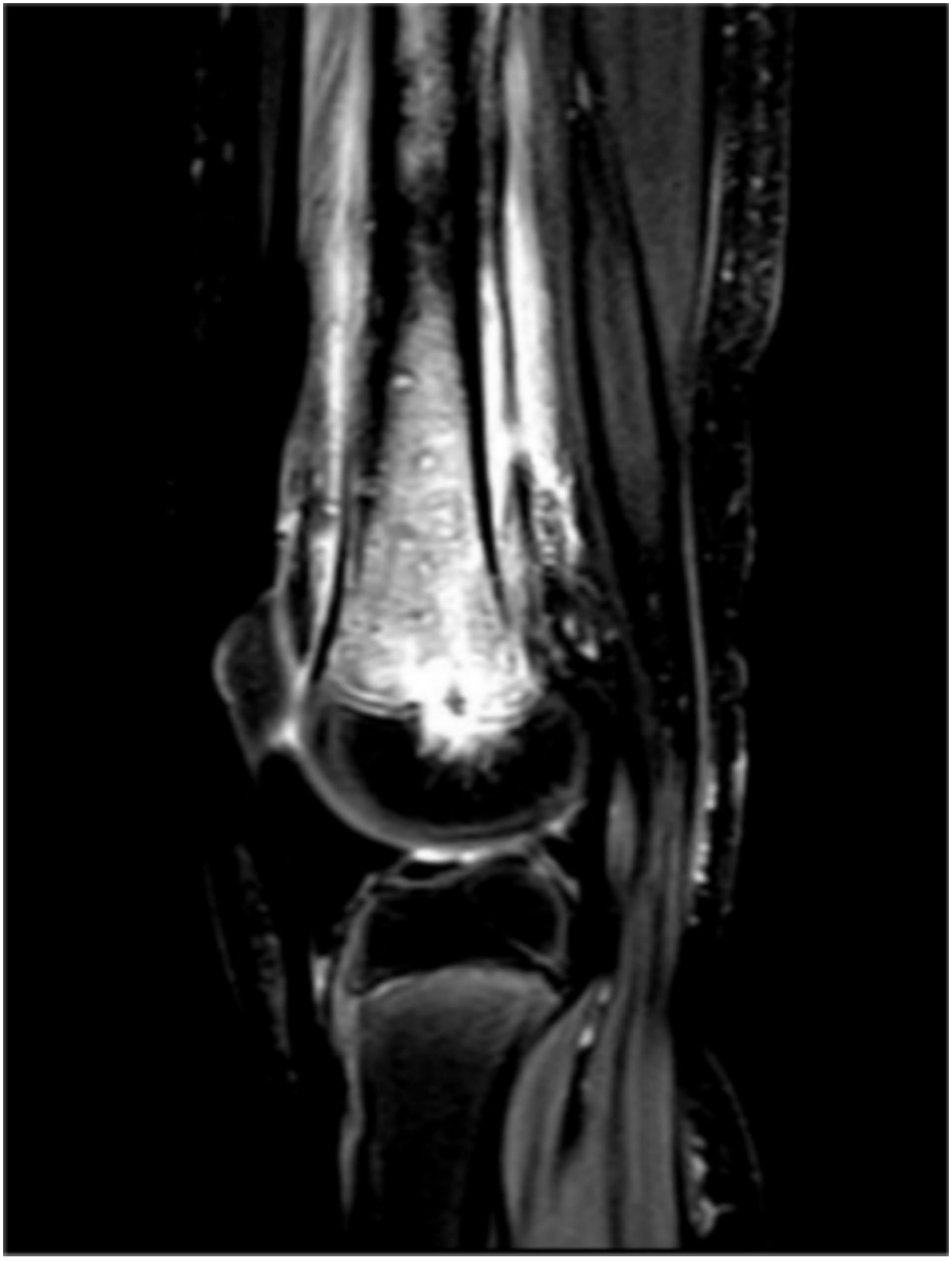

Fig. 1 An 8-year-old girl presented with a 10-day history of distal femur pain and fever. MRI revealed distal left femoral osteomyelitis with periosteal elevation and rupture. Intraoperative knee aspiration yielded clear, pale-red fluid without pus, suggesting a reactive effusion. Beneath the periosteum of the distal left femur, a large amount of thick, yellowish-white pus was discovered, with an infectious perforation allowing the pus to flow into the subcutaneous tissue. The final diagnosis was left femur osteomyelitis with a periosteal abscess

Table 1 Systematic comparison of differences in demographic characteristics, clinical manifestations, and laboratory tests between patients

Demographics		Isolate group ($n=63$)	Adjacent infection group ($n=69$)	*P* value
Age(m), median(IQR)		77.00(36.00-115.75)	15.00(7.00-49.5)	**$P<0.001$**
Age group	≤ 48	20(31.7%)	51(73.9%)	**$P<0.001$**
	> 48	43(68.3%)	18(26.1%)	
Duration from onset to diagnosis(d), median(IQR)		7.00(5.00–10.00)	10.00(6.00–20.00)	**$P<0.001$**
Site	Intra-articular	14(22.2%)	39(56.5%)	**$P<0.001$**
	Extra-articular	49(77.8%)	30(43.5%)	
Gender	Male	37(58.7%)	45(65.2%)	$P=0.476$
	Female	26(41.3%)	24(34.8%)	
CRP normalization, median(IQR)		10.00(6.75–15.25)	14.00(10.00–18.00)	**$P=0.007$**
Clinical characteristics				
Potential triggers	Without an obvious cause	32(50.8%)	17(24.6%)	**$P<0.001$**
	History of trauma	25(39.7%)	16(23.2%)	
	Preceding infection	6(9.5%)	36(52.2%)	
Fever(T > 38.0 °C)		53(84.1%)	57(82.6%)	$P=1.00$
Fever > 48 h		45(71.4%)	45(65.2%)	$P=0.461$
Pain		63(100%)	67(97.1%)	$P=0.496$
Erythema		25(39.7%)	15(21.7%)	**$P=0.036$**
Swelling		62(98.4%)	58(84.1%)	**$P=0.005$**
Activity limitation		55(87.3%)	69(100%)	**$P=0.002$**
Culture result	None	15(23.8%)	27(39.1%)	**$P<0.001$**
	Staphylococcus aureus	41(65.1%)	25(36.2%)	
	MRSA	5(7.9%)	4(5.8%)	
	Other	2(3.2%)	13(18.8%)	
Laboratory examination				
Leukocyte(10^9/L), median(IQR)		12.03(9.05–15.90)	12.50(9.25–14.60)	$P=0.394$
Procalcitonin(ng/ml), median(IQR)		0.26(0.11–1.22)	0.14(0.09–0.46)	$P=0.106$
C-reaction protein(mg/L), median(IQR)		81.95(36.18–162.00)	81.30(33.95–102.50)	$P=0.201$
Erythrocyte sedimentation rate (mm/h), median(IQR)		65.00(34.00–80.00)	66.00(54.50–81.00)	$P=0.946$
Absolute neutrophil count (10^3 cells/ml), median(IQR)		8.40(5.58–13.25)	5.20(3.75–9.30)	**$P<0.001$**
Absolute neutrophil count group	≤ 5.45	14(22.2%)	40(58.0%)	**$P<0.001$**
	> 5.45	49(77.8%)	29(42.0%)	
Platelet count(10^9/L), median(IQR)		337.50(235.25–441.50)	501.00(346.00-690.00)	**$P<0.001$**
Platelet count group	≤ 390	42(66.7%)	21(30.4%)	**$P<0.001$**
	> 390	21(33.3%)	48(69.6%)	
Subperiosteal abscess	Yes	51(81.0%)	18(26.1%)	**$P<0.001$**
	No	12(19.0%)	51(73.9%)	
Disseminated infection		32(50.8%)	25(36.2%)	$P=0.11$
Joint effusion	Yes	14(22.2%)	63(91.3%)	**$P<0.001$**
	No	49(77.8%)	6(8.7%)	
Physeal plate involvement	Yes	12(19.0%)	33(47.8%)	**$P<0.001$**
	No	51(81.0%)	36(52.2%)	

Table 2 Multivariable analyses of associations with adjacent infection (Without MRI)

Clinical Characteristics	*P* value	Odds Ratio	95% Confidence Interval
Age ≤ 4 years	0.018	2.879	1.198–6.919
Platelet count > 390.5 × 10^9/L	0.018	2.826	1.199–6.660
Absolute neutrophil count < 5.45 × 10^3 cells/ml	0.009	3.297	1.348–8.064
A history of preceding infection	0.002	2.340	1.351–4.054

age (OR = 11.551; 95% CI: 2.161–61.744) and reasons (OR = 2.434; 95% CI: 1.036–5.716) initially appeared as correlates, their effects were minimal, leading to their exclusion from further analysis. ROC curve analysis yielded a c-statistic of 0.930. As shown in Table 5, when joint effusion was present, 81.8% (63/77) of patients had septic arthritis. In the absence of subperiosteal abscess, this rate rose to 95.7% (45/47). Conversely, when a subperiosteal abscess was present but no joint effusion was detected, 100% (39/39) of cases were isolated AHO.

Table 3 Predictive model results for isolated vs. Adjacent infection groups

No. Factors met †	Isolate group ($n=63$)	Adjacent infection group ($n=69$)	Correctly classify (%)*
0	19(30.2%)	6(8.7%)	75
1	30(47.6%)	9(13.0%)	76.9
2	12(19.0%)	16(23.2%)	57.1
3	1(1.6%)	18(26.1%)	94.7
4	1(1.6%)	20(29.0%)	95.2

†The predictive factors included: (1) Age ≤ 4 years, (2) Platelet count > 390.5×10^9/L, (3) Absolute neutrophil count < 5.45×10^3 cells/ml, and (4) A history of preceding infection.

*Correctly classified using ≥ 2 factors met, indicating a positive test. With 0 and 1 factors, the negative predictive rates are 75% and 76.9%, respectively; with 2, 3, and 4 factors, the positive predictive rates are 57.1%, 94.7%, and 95.2%, respectively

Table 4 Multivariable analyses of associations with adjacent infection (With MRI)

Clinical Characteristics	*P* value	Odds Ratio	95% Confidence Interval
Age ≤ 4 years	0.004	11.551	2.161–61.744
Joint effusion	< 0.001	183.182	22.848-1468.625
No subperiosteal abscess	< 0.001	22.780	4.377-118.555
A history of preceding infection	0.041	2.434	1.036–5.716

Discussion

AHO with concomitant septic arthritis presents a diagnostic challenge due to its clinical similarity to isolated AHO. Failure to identify adjacent foci during initial evaluation increases the risk of inadequate treatment, repeated surgical interventions, prolonged hospital stays, and incidence of complications [13–15]. Although MRI has been demonstrated effective in the diagnosis of AHO with concomitant septic arthritis, it is not always easy to perform an MR scan in a timely manner [16, 17]. In MRI, distinguishing joint infection from reactive effusion remains challenging, as the two conditions share overlapping imaging features. Previous studies have shown no significant statistical difference between septic and reactive effusions in terms of effusion size, synovial thickening, or peri-synovial edema [17–19]. Rosenfeld [12] reported that 75% of metaphyseal osteomyelitis with concomitant joint effusion was septic arthritis. Joint fluid culture may aid in differentiating septic arthritis from reactive arthritis, but definitive diagnosis can be achieved in only 34–82% of cases [20, 21].

In this study, we found that genenrally 52.2% (69/132) of the AHO patients had concomitant septic arthritis, with the incidence higher in young children. The distinctive transphyseal vascular distribution in infants has long been considered one of the primary factors contributing to the higher incidence of concomitant septic arthritis [22–24]. In older children, the physeal plate serves as a barrier that prevents bacteria from spreading from the metaphysis to the epiphysis [25]. However, in younger infants, transphyseal vessels are present, and the physeal plate barrier is not fully established, allowing pathogens to cross the growth plate and spread to the epiphysis [5, 23–25]. Additionally, in infants, the periosteum is thinner and more prone to rupture, further facilitating the spread of infection into the joint. This may also help to explain the higher rate of concomitant infection in this age group [23, 24]. McCarthy et al. [14] reported a 76% incidence of septic arthritis accompanying neonatal AHO, and more recent data from Montgomery et al. [6] indicated an incidence of 78%. In our study, patients with concurrent infection were generally younger, with a 77.8% incidence (35/45) of concomitant infection in infants under one year old, which is more consistent with the traditional hypothesis [24].

By analyzing the demographic, laboratory and clinical data of the AHO patients, this study established a set of diagnostic criteria independent of MRI, encompassing age of onset < 4 years, a history of preceding infection, platelet count > 390.5×10^9/L, and ANC < 5.45×10^3 cells/mL. For an AHO patient, if three of the four conditions are met, the presence of adjacent septic arthritis can be 94%. This is highly indicative of joint irrigation and drainage when performing surgeries for AHO.

In Rosenfeld's [26] study, septic arthritis patients with concomitant AHO had higher ANC and lower PLT than those with isolated septic arthritis, which was attributed to exacerbated inflammatory response and consumptive coagulopathy. However, our study revealed an opposite trend. AHO patients with concomitant septic arthritis had lower ANC and higher PLT counts compared to those with isolated AHO. Additionally, although inflammatory markers such as CRP and PCT showed no statistically differences, they trended lower in the concomitant infection group. This finding suggests that the inflammatory response in patients with concomitant septic arthritis may be weaker, possibly due to the infection being in a more advanced stage or early interventions that had

Table 5 Comparison of joint effusion and subperiosteal abscess in isolated vs. Adjacent infection groups

Classify	Isolate group ($n=63$)	Adjacent infection group ($n=69$)	Positive rate
No joint effusion with subperiosteal abscess	39(61.9%)	0(0%)	0
No joint effusion and no subperiosteal abscess	10(15.9%)	6(8.7%)	37.5
Joint effusion with subperiosteal abscess	12(19.0%)	18(26.1%)	60
Joint effusion and no subperiosteal abscess	2(3.1%)	45(65.2%)	95.7

somehow mitigated the inflammatory response. Furthermore, children with a history of preceding infection were more likely to develop concomitant septic arthritis, possibly due to the hematogenous origin of the infection.

Instead of using the length of hospital stay, we used the time required for CRP levels to normalize as a measure of inflammation severity [9, 27–29], because the length of hospital stay is prone to non-medical influences and thus unreliable as an indicator of inflammation severity. We observed that children with AHO complicated by concomitant septic arthritis had a significantly longer duration from symptom onset to diagnosis, along with a prolonged CRP normalization time. This suggests that delayed treatment may contribute to sustained inflammatory response and increased infection severity. As reported in the literature, a shorter duration of symptoms (< 4 days) is associated with a higher likelihood of favorable outcomes, whereas prolonged symptoms (> 4 days) significantly reduce this probability [30, 31]. Moreover, delayed treatment has been linked to an increased risk of joint deformities on radiographic evaluation [30]. Our findings reinforce this perspective, underscoring the critical role of early intervention in pediatric osteoarticular infections.

As shown in our study and reported in literature, MRI is sometimes unable to distinguish septic from reactive joint effusions [17–19]. We developed a predictive model that integrates demographic data with MRI findings to aid in diagnosing acute hematogenous osteomyelitis (AHO) with concomitant septic arthritis. This model considers factors such as age of onset under 4 years, a history of preceding infection, and the presence of joint effusion and subperiosteal abscess. Interestingly, there is a negative correlation between subperiosteal abscess and septic arthritis: when joint effusion is present without a subperiosteal abscess, the positive predictive value is 95.7%; in those who had subperiosteal abscess but no joint effusion, none were confirmed as septic arthritis (100% accuracy). This enables better utility of MR information and allows for fast diagnosis when laboratory test results are unavailable.

The limitations of this study include the retrospective nature of the study design. In some cases, preoperative MRI did not show significant increase in joint effusion, yet intraoperative evaluation revealed the presence of septic arthritis through joint aspiration. However, routine joint aspiration is not performed on all pediatric patients at our institution. This may have led to the underdiagnosis of septic arthritis in some patients who did not exhibit joint effusion on preoperative imaging. We performed postoperative MRI in most patients during hospitalization to monitor changes in joint effusion, thus reducing the likelihood of missed diagnoses.

Conclusion

Our study identified several risk factors and novel radiologic signs associated with concomitant septic arthritis in patients with AHO. Notably, younger children are more susceptible to developing concomitant septic arthritis when diagnosed with AHO. Conversely, the presence of subperiosteal abscesses on imaging may suggest a lower likelihood of concurrent septic arthritis. These insights can assist clinicians in making timely diagnoses and surgical decisions, thereby optimizing patient management, reducing unnecessary imaging procedures, lowering healthcare costs, and preventing treatment delays.

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Author contributions
Tianjing Liu designed the overall study; Shuting Lin, Peng Ning and Donghao Gu performed a systematic literature search and drafted the manuscript of the article. Shuting Lin, Jingyu WU and Zhixin Yang prepared data collection, data analysis and figures. All authors revised the manuscript critically and approved final manuscript.

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Data availability
The data that support the findings of this study are available from Shengjing Hospital of China Medical University, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Shengjing Hospital of China Medical University.

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Committee at Shengjing Hospital of China Medical University, with approval number 2023PS1296K. Written informed consent was obtained from individual or guardian participants. The study followed the ethical standards set by the Declaration of Helsinki and other relevant guidelines.

Consent for publication
We confirm that written informed consent for publication of the original research titled "Predicting the Presence of Adjacent Septic Arthritis in Children with Acute Hematogenous Osteomyelitis" has been obtained from the parents or legal guardians of the children involved. This consent covers the inclusion of any individual details, images, and other relevant data presented in the manuscript.

Competing interests
The authors declare no competing interests.

Clinical trial number
Not applicable.

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