

Original Article



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Beware The Negative Ultrasound: Two Cases Of Septic Arthritis Without Ultrasonographic Findings

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Abstract

Septic arthritis is a clinical diagnosis but ultrasound has long been used as an adjunct, with a lack of effusion on ultrasound examination being viewed as a reassuring sign. This report describes two cases of children with clinical features suggestive of septic arthritis in whom initial ultrasound failed to demonstrate a joint effusion but subsequent arthrotomy confirmed septic arthritis. We discuss some potential reasons behind this and caution that wherever clinical suspicion exists, a negative ultrasound should not be viewed as ruling out septic arthritis.

Keywords: Septic arthritis; Ultrasound; Joint effusion.

Introduction

The diagnosis of septic arthritis is essentially clinical and a normal ultrasound in child displaying clinical features of septic arthritis may lead to a delay in this important diagnosis.

Ultrasound is a readily available and commonly used adjunct in the diagnosis of septic arthritis in children with high specificity for the identification of a joint effusion.

A normal ultrasound examination has a strong negative predictive value for septic arthritis and is therefore viewed as a reassuring sign. Zawin et al reported a series of ninety-six children with a suspected irritable hip: forty had normal ultrasounds with none of these being later shown to have septic arthritis [1].

We describe two cases of children with clinical features suggestive of septic arthritis in whom ultrasound at initial presentation was normal but subsequent arthrotomy confirmed intra-articular pus.

Case One

A previously well, 14-month female presented to the children's Emergency Department with acute onset right leg pain, non-weight bearing since that morning with no preceding injury. There was a warm, swollen right ankle with painful restriction of joint movement. Plain radiographs of the right tibia and fibula were normal and routine blood tests included C-reactive protein (CRP) 116, erythrocyte sedimentation rate (ESR) 45 and white cell count (WCC) 13.59.

An ultrasound, performed by an experienced Paediatric radiologist, showed no signs of joint effusion, synovial thickening or increased vascularity.

Despite this report, the clinical picture was compelling and an immediate MRI performed under general anaesthesia demonstrated ankle and subtalar joint effusions with synovial enhancement, in keeping with septic arthritis.

An arthrotomy was performed under the same anaesthetic, intraarticular pus was identified (although the amount is not specified on the operation note), a PICC line was inserted and broad-spectrum antibiotics were started. Immediate clinical improvement was seen with CRP 59/35 and WCC 10.25/8.21 at 24/72 hours.

Blood cultures taken on admission grew *Kingella kingae*, no organisms were isolated from the pus obtained at surgery. She was discharged a short time afterwards with a prolonged course of antibiotics in the community and made a good eventual recovery.

Case Two

An 8-week male with a 2 week history of bronchiolitis presented to the Children's Emergency Department with 1 day history of irritability and not using his right arm. There was no known injury, he was afebrile and there was no local swelling or bruising.

Radiographs demonstrated a lucency in the proximal humeral metaphysis and routine blood tests included CRP 81, ESR 32 and WCC 11.04.

An ultrasound of the shoulder, elbow and wrist did not demonstrate an effusion, synovial thickening or hyperaemia and the working diagnosis was osteomyelitis. MRI of the right shoulder under general anaesthetic demonstrated a joint effusion, in keeping with septic arthritis.

An arthrotomy was performed under the same anaesthetic. 2ml of intraarticular frank pus was drained and broad spectrum antibiotics were subsequently started.

Immediate clinical improvement, including early

spontaneous arm movement, and CRP of 47 was seen at 24 hours. There had been no growth from initial blood cultures or intra-operative pus samples. He was discharged at 48 hours with arrangements for community IV antibiotics via a peripheral cannula. Two days later he attended for outpatient appointment, CRP increased to 107 and he was re-admitted. Ultrasound of the right shoulder at that time demonstrated a joint effusion with echogenic contents and increased synovial vascularity. He underwent further washout, a femoral line was placed and IV antibiotics were continued for several weeks. The operation note does not specify the quantity of pus obtained on this occasion.

Discussion

Ultrasonography remains a good first line investigation with a positive predictive value for diagnosis of septic hip at 87.9% [2]. If an effusion is demonstrated in the presence of compelling clinical signs, further imaging is not usually required.

Previous authors have described joint effusion as the "hallmark of septic arthritis" and comment that this early abnormality on an ultrasound scan allow diagnosis before significant cartilage lysis occurs [3]. However, these cases show that typical ultrasonographic features are not universal and over-reliance on imaging may lead to error. There are many possible reasons for this. Pus is hyperechoic and may be difficult to distinguish from surrounding tissues, particularly by those with less experience: ultrasound is an operator-dependent imaging modality and it might be expected that scans performed by inexperienced operators would be less reliable when assessing for subtle early change. However, both ultrasound scans described above were performed by a specialist paediatric radiologist, suggesting that negative reports should be interpreted with caution no matter what the experience of the operator.

The size of effusion and site affected both contribute to ease of detection. It may be technically more straightforward to identify an effusion in large joints, unlike the ankle and eight-week-old shoulder described above. Previous studies have demonstrated ultrasonography can only detect upwards of 2ml fluid within an adult ankle joint, with MRI being more sensitive, revealing effusions of 1ml in the same joints [4]. Our second case was recorded as having 2ml of fluid drained at arthrotomy; this may be at the limit of the detectable amount. It would be helpful to know the amount drained in the first case; unfortunately this information

was not recorded at the time of the operation. Perhaps due to small initial effusions, scanning children who present early may lead to error. Both cases described above presented with a short history, which supports previous work that suggests negative ultrasound results must be interpreted with caution when symptoms have been present for less than 24 hours [5].

Conclusion

These two cases show that a normal ultrasound scan cannot rule out a septic joint and if there is clinical suspicion of infection either further imaging or surgical drainage must be performed.

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