

ULTRASONOGRAPHY DIAGNOSIS OF PURULENT ARTHRITIS AND OSTEOMYELITIS IN INFANTS

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Received after revision September 2004

Abstract

Early detection of changes in the case of suspected purulent arthritis and osteomyelitis in infants can be difficult. Ultrasonography is the right imaging modality for making the final diagnosis early. The authors report on X-ray and ultrasonography findings of joints in 9 infants hospitalised in 1996–2000 with purulent arthritis and osteomyelitis (6 boys and 3 girls, average age 6.9 months). X-ray and ultrasonography was made at the same time, directly after the hospitalisation. Acuson 128 with a 7 MHz linear transducer was used for ultrasonography examination. In 5 joints and 2 long bones x-ray photographs were negative. Ultrasonography demonstrated purulent effusion in 8 joints (elbow 2x, knee 2x, hip joint 3x, shoulder 1x), subperiosteal abscess in 2 long bones (femur and tibia), in 2 long bones with osteomyelitis; ultrasonography was positive, too. Ultrasonography demonstrates cartilaginous non-ossified portions of skeleton, soft tissue swelling, intra-articular and /or extra-articular pathological findings.

Ultrasonography is a fast, easily available, sensitive appropriate examination method particularly in a non-ossified skeleton. No additional imaging method of examination is necessary besides plain radiography. The treatment, including surgical treatment, is possible with no delay.

Key words

Purulent arthritis, Infants, Early diagnosis, Ultrasonography

INTRODUCTION

Purulent arthritis is a rare and serious illness. To make the final diagnosis as soon as possible is very important for the prognosis (healing and growth). It is very often of haematogenous origin. The changes are apparent on plain radiograph within 10–14 days (*1*); at first, swelling of the soft tissue is present and later the destruction of the bone and periosteal reaction occur. In small infants, due to the communicating vessels between the epiphysis and the metaphysis, the infection very often and very quickly extends to the adjacent bone or joint. Early assignment of the final diagnosis is important for early treatment. To assess plain radiographs

in a non-ossified skeleton is very difficult. At the beginning of the disease plain radiographs can be negative. The authors have found ultrasonography to be a very quick, reliable, and easily available examination method.

MATERIALS AND METHODS

Nine infants with purulent arthritis and osteomyelitis were hospitalised in our hospital from 1996 to 2000 (boys aged: 8.5 months, 3.5 months, 3 weeks, 1 month, 17 months, 4 months; girls aged: 8 weeks, 2 months, 24 months). Eight big joints and 2 long bones (femur, tibia) were affected, 2x subperiosteal abscess was detected (femur, tibia). Preliminary x-ray and ultrasound examination was done immediately after hospitalisation. Acuson 128 with a 7 MHz linear transducer was used. The method of ultrasound examination is standard (2), supplemented with non-standard plains to detect all pathological changes. Hard copies and recording on video serve as documentation.

RESULTS

Plain radiographs were done in all patients immediately after hospitalisation. In 5 joints and in 2 subperiosteal abscesses, with 1-2 days ongoing clinical symptoms, the plain radiographs were negative. These patients were sent off to exclude fractures of the femur, tibia and/or fibula, with swelling of the elbow, with suspicion of the plexus brachialis syndrome, etc. Clinical information was embarrassing; at the time of ultrasonography examination no laboratory results (inflammatory markers) were available. In 4 patients with a duration of clinical symptoms longer than 2 days (5.2 days on average) plain radiographs were positive, clinical diagnosis was purulent arthritis of the relevant joint. On plain radiographs the findings were: hip joint dislocation; decalcification of the femur; periosteal reaction of the tibia; decalcification of the knee region and swelling of the soft tissue; periosteal reaction of the femur. It was possible to make the final diagnosis from X-rays. At the time of hospitalisation the ultrasonography examination demonstrated a joint effusion in 12 joints: 2x the knee, 2x the elbow, 3x the hip joint, 1x subperiosteal abscess of the proximal end of the femur, 1x subperiosteal abscess of the proximal end of the tibia (*Fig. 1*), 1x osteomyelitis of the femur (*Fig. 2*), 1x the shoulder with pus effusion was present (*Tab. 1*).

DISCUSSION

At present the number of publications concerning ultrasonography of musculoskeletal system (2, 3), including non-ossified skeleton, is on the increase. Normal anatomy and pathological findings are well described. Plain radiography skiagrams are still the gold standard in suspicion of skeletal changes in small children (4). The interpretation of plain radiographs in infants with non-ossified skeleton is very difficult. It is said to be fecund in 18% in purulent arthritis according to some authors (5). Purulent arthritis is a serious disease with subsequent destruction of the bone and disturbance of the growth plate, provided that the duration is longer than

3-4 days. *Lim* (6) reports 12 small children (average age 5.2 years) with purulent arthritis of the elbow and emphasises the advantage of ultrasonography examination. *Parsch* (7) was interested in septic arthritis of the hip joint in neonates and small children. He highlights that ultrasound examination yields early information about capsular swelling and joint effusion. *Grill* (8) monitored 37 patients who had septic arthritis of the hip joint during infancy or childhood. He found poor anatomical appearance radiographically (although activity restriction was limited). *Wandl* (9) established early diagnosis of acute haematogenous osteomyelitis to be very important for the prognosis. Plain radiographs and ultrasonography examination represent the basic imaging modality. The acute haematogenous osteomyelitis in childhood affects most commonly the lower extremities (10). The metaphyses of the femur and humerus are intracapsular and therefore the risk of septic arthritis of these joints is higher (10). Ultrasonography examination cannot differentiate the origin of joint effusion (11). Magnetic resonance imaging (MRI) and scintigraphy can be performed for further imaging. Computerised tomography (CT) is of limited value and is more suitable in chronic osteomyelitis (9). However, *Stoller* (12) presents an infant with femoral osteomyelitis with negative x-ray and scintigraphy findings but positive MRI finding.

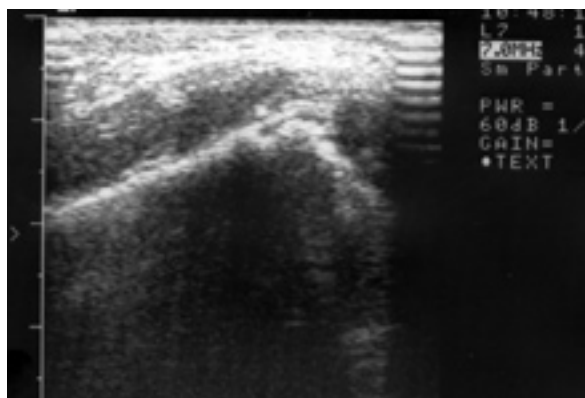


Fig. 1

Subperiosteal abscess of the proximal end of the tibia (dorsal approach)

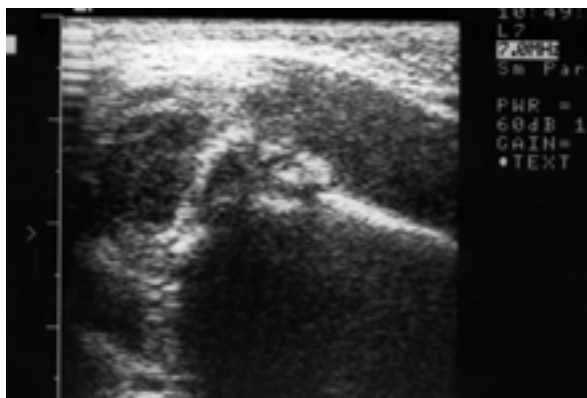


Fig. 2

Osteomyelitis of the distal end of the femur, and joint effusion (anterior longitudinal approach)

Table 1

Localisation of the process, investigating method and the numer of the findings

Method of the examination	Localisation of process							
	elbow	knee	hip joint	tibia	femur	tibia	femur	shoulder
				fracture?	fracture?	OM	OM	
X-ray +		2	1			1	1	
X-ray -	2		2	1	1			1
SG +	2	2	3	1 SPA	1 SPA	1	1	1
SG -								

SG = sonography; + = positive findings; - = negative findings; ? = suspicion of fracture; SPA = subperiosteal abscess; OM = osteomyelitis

In conclusion we would like to emphasise the importance of ultrasonography examination in the case of suspected purulent arthritis in infants. It is a quick, non-invasive, and accurate imaging modality, easily available; no general anaesthesia is required. An early diagnosis is important for the treatment to prevent complications and damage of bones and joints.

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ULTRASONOGRAFICKÁ DIAGNOSTIKA PURULENTNÍ ARTRITIDY A OSTEOMYELITIDY U MALÝCH DĚTÍ

Souhrn

Časná diagnostika purulentní artritidy u malých dětí může být obtížná. Ultrasonografické vyšetření (USG) je vhodná vyšetřovací metoda k časnému stanovení správné diagnózy. V letech 1996-2000 bylo v naší nemocnici hospitalizováno 9 dětí s purulentní artritidou nebo osteomyelitidou (6 chlapců, 3 dívky, průměrný věk: 6,9 měsíců). USG a nativní skiagramy se dělaly bezprostředně po přijetí. USG se dělalo na přístroji Acuson 128 s použitím 7 MHz sondy. U 5 kloubů a 2 dlouhých kostí byly nativní skiagramy negativní. Pomocí USG se prokázal purulentní výpotek u 8 kloubů (v loketním kloubu 2x, v kolenním kloubu 2x, v kyčelním kloubu 3x, v ramenním kloubu 1x), na 2 dlouhých kostech subperiostální absces (femur, tibia). V případě 2 dlouhých kostí postižených osteomyelitidou byl ultrasonografický nález také pozitivní. USG je rychlé, dostupné, citlivé vyšetření zejména při hodnocení neosifikovaného skeletu. Kromě nativních snímků není nutná žádná další vyšetřovací metoda. Léčba, včetně chirurgické, se může zahájit bez prodlevy.

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