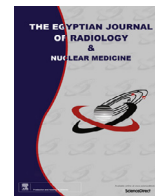




Contents lists available at ScienceDirect

The Egyptian Journal of Radiology and Nuclear Medicine

journal homepage: www.sciencedirect.com/locate/ejrn

Original Article

Role of high resolution ultrasonography in diagnosing septic hip arthritis in premature neonates admitted to the neonatal intensive care unit

Manar A. Bessar^{a,*}, Hanan A. Hassan^a, Wesam A. Mokhtar^b^a Radiodiagnosis Department, Faculty of Medicine, Zagazig University, Egypt^b Pediatric Department, Faculty of Medicine, Zagazig University, Egypt

ARTICLE INFO

Article history:

Received 9 November 2016

Accepted 3 June 2017

Available online xxx

Keywords:

Septic arthritis

Neonatal ICU

Premature

High resolution US

ABSTRACT

Aim: The aim of this study is to evaluate the role of high resolution ultrasonography (HRUS) of the hip in premature neonates admitted to the neonatal intensive care unit (NICU) in diagnosis of septic hip arthritis.

Patients and methods: This prospective study was done for twenty premature neonates having clinical and laboratory findings compatible with the diagnosis of acute septic arthritis. They were subjected to HRUS of the hip as well as US-guided aspiration and analysis of synovial fluid.

Results: Hip ultrasonography showed synovial fluid containing echoes in twelve patients and was clear in six patients. Joint capsule was thickened in fourteen patients. Seventeen patients had sonographic features of septic arthritis. The sensitivity of HRUS was 93.8%, specificity 50%, positive predictive value 88.2%, negative predictive value 66.7% and the accuracy was 85%.

Conclusion: HRUS is beneficial in early diagnosis of septic hip arthritis in premature neonates admitted to the NICU. It is an easy, available and rapid procedure.

© 2017 The Egyptian Society of Radiology and Nuclear Medicine. Production and hosting by Elsevier. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Septic arthritis (SA) is considered bacterial infection of synovium leading to destruction of the articular cartilage. It is caused by a variety of microorganisms, most commonly gram-positive (*Staphylococcus aureus*), followed by gram-negative bacteria and fungi. It is considered a serious disorder in neonates, especially those admitted to NICU, which is defined as: An intensive care unit designed for premature and ill newborn babies who are more susceptible to septic arthritis [1,2].

The newborn infant is less capable of responding to infection due to immunologic deficiencies involving the reticuloendothelial system, cytokines, polymorphonuclear leukocytes, antibody or cell-mediated immunity [1,3]. The most common route by which microorganisms enter a joint in neonates is by hematogenous spread to the synovium [4].

Abbreviations: SA, septic arthritis; NICU, neonatal intensive care unit; HRUS, high resolution ultrasonography.

Peer review under responsibility of The Egyptian Society of Radiology and Nuclear Medicine.

* Corresponding author.

E-mail address: norabessar@hotmail.com (M.A. Bessar).

Prematurity is a known risk factor for SA. Premature neonates are relatively immunocompromised because they have low levels of passively transferred maternal immunoglobulins and immaturity of all immune mechanisms [1–3]. Premature neonates admitted to NICU are more predisposed to multifocal musculoskeletal infections with nosocomial organisms, such as methicillin-resistant *Staphylococcus aureus* and *Candida albicans* (due to frequent use of instrumentation and lines/ catheters). In addition, they have a thin skin that may be injured easily [3].

Time to diagnosis is the most important prognostic factor in SA. Early institution of therapy helps to prevent degenerative arthritis [5]. Because it is considered a rare condition in neonates and due to paucity of signs and symptoms, the diagnosis of SA in newborns is more difficult than in older children [4,5].

Neonates are relatively immunocompromised and their growth plate is pierced by blood vessels, so they have the most severe involvement and the worst prognosis. In many studies, the management of septic arthritis included, besides antibiotic therapy, an arthrotomy. Prompt open surgical drainage at the time of presentation is indicated to reduce intra-articular pressure, ischemia of the epiphysis and the changes of permanent joint damage [2,4].

The hip is considered a classic ball-and-socket joint. Its joint surfaces are covered with articular cartilage, with a synovial

<https://doi.org/10.1016/j.ejrn.2017.06.003>

0378-603X/© 2017 The Egyptian Society of Radiology and Nuclear Medicine. Production and hosting by Elsevier.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

membrane, producing synovial fluid, and surrounded by ligamentous capsule. Blood vessels that connect the metaphysis and epiphysis serve as a conduit by which bony infection may easily reach the joint space [6,7].

High resolution Ultrasonography (HRUS) of the hip joint is proven to be a helpful technique in the assessment of tendons, ligaments, muscles, nerves, synovial recesses, articular cartilage, bone surfaces and joint capsule [8,9].

The purpose of this study is to evaluate the role of HRUS of the hip in premature neonates admitted to the NICU and suspected to have septic hip arthritis.

2. Patients and methods

2.1. Study design and population

This is a prospective study of 20 premature (33 to less than 37 weeks gestation) neonates admitted to the NICU of Zagazig University Children Hospital from March 2015 to January 2016. These patients had been primarily admitted for their prematurity and associated clinical conditions such as respiratory distress syndrome, sepsis, perinatal asphyxia and necrotizing enterocolitis. All patients had clinical features and laboratory findings compatible with the diagnosis of acute septic arthritis.

The study was approved by our Institute Ethical Committee. A written informed consent was obtained from all parents of neonates who participated in the study after explaining the procedure and purpose of the study. All patients underwent a full detailed history taking from parents, complete clinical examination, complete blood count, C-reactive protein, erythrocyte sedimentation rate, HRUS of the hip joint as well as US-guided aspiration and analysis of synovial fluid.

2.2. Inclusion criteria

Any premature neonate (32 to less than 37 weeks gestation) admitted at NICU and had clinical signs and laboratory investigations suggesting septic hip arthritis.

2.3. Exclusion criteria

- Gestational age less than 32 and more than 37 weeks.
- Chromosomal disorder.
- Developmental dysplasia of hip.
- Neuromuscular disorders.

2.4. Technique of examination

All US examinations were done using high frequency real time ultrasound scanning of 10 MHz linear array transducer (PLM-1204AT Toshiba Medical Systems, Tokyo, Japan). The patient was placed in the supine position with the hip in the neutral position or in 15–20° internal rotation. At first, the scan was done in the sagittal oblique plane parallel to the long axis of the femoral neck. This allows showing the acetabular brim, femoral head, femoral neck and the ilio-femoral ligament. Then, the oblique transverse view was obtained by placing the probe transverse to the long axis of the femoral neck. The width of the anterior synovial fluid recess (which displays the clear space between the capsule and bony surface), the capsular thickness and the thickness of linear echogenic band from the anterior concavity of the femoral neck to the posterior surface of the iliopsoas muscle were all measured. In both views, the probe was moved from proximal to distal and from lateral to medial regions to scan the entire hip recess. Both hips were assessed for comparison. After providing an aseptic environment, a

21 gauge needle was used for synovial fluid aspiration from anterior synovial recess. When no or little synovial fluid was obtained, a 3–5 ml of sterile saline was injected and reaspirated and synovial fluid was sent for analysis.

2.5. Imaging analysis and interpretation

- Thickening of the capsule more than 2 mm as well as loss of the normal concavity of the joint capsule (either flattening or convexity of the capsular surface) was suggestive of septic arthritis.
- Joint effusion was diagnosed when anterior synovial recess was more than 3 mm wide and/or if any asymmetry of at least 2 mm between two hips.
- The synovial fluid was defined as anechoic (clear fluid) or having multiple internal echoes (turbid fluid).
- Hypoechoogenicity of iliopsoas muscle with loss of normal muscular fibrillar pattern was suggestive of early muscle affection.

2.6. Statistical analysis

All data were collected, tabulated and statistically analyzed using SPSS 19.0 for windows (SPSS Inc., Chicago, IL, USA) & MedCalc 13 for windows (MedCalc Software bvba, Ostend, Belgium). Quantitative data were expressed as the mean \pm SD and qualitative data were expressed as absolute frequencies (number) and relative frequencies (percentage). Validity of ultrasonography in diagnosis of septic arthritis was calculated using diagnostic performance depending on sample 2×2 contingency tables generation using the synovial fluid analysis as the reference (gold) standard. The sensitivity, specificity, positive predictive values (PPVs), negative predictive values (NPVs) and accuracy with their respective 95% confidence intervals were calculated.

3. Results

This study included 20 premature neonates admitted to NICU. They were 13 males and 7 females with an age range between 4 and 31 days (mean 14.7 ± 7). The mean body weight was 2810 ± 565 g at the time of examination.

Clinical presentations of the study patients are represented in Table 1. Laboratory investigations showed elevated ESR, CRP and WBCs (Table 2).

Hip ultrasonography showed synovial fluid collection with internal echoes in 12 patients and was clear in 6 patients. No fluid collection was found in 2 patients. Joint capsule was thickened (greater than 2 mm) in 14 patients and was of normal thickness in 6 patients (examples for these findings are demonstrated in Figs. 1–4).

Among 20 patients, 17 patients had sonographic features of septic arthritis. US-guided synovial fluid aspiration and analysis confirmed ultrasonographic findings in 15 patients, while in the remaining 2 patients it was negative for septic arthritis. For the 3 patients who had no sonographic features of septic arthritis, 2 patients showed normal synovial fluid analysis while one patient

Table 1
Clinical features associated with hip arthritis in study patients.

Clinical signs	No. of cases	%
Decreased range of motion	15	75
Fever	2	10
Swelling & erythema	1	5
Poor feeding	2	10
Total	20	100

Download English Version:

<https://daneshyari.com/en/article/8822091>

Download Persian Version:

<https://daneshyari.com/article/8822091>

[Daneshyari.com](https://daneshyari.com)