Role of ultrasonography in diagnosis of septic arthritis of hip in infants

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Abstract

The Septic arthritis of the hip requires urgent attention and it is not only Medical emergency, it is also surgical emergency. Even minimal delay in diagnosis and treatment causes permanent disability, Crippling and lifelong hip deformity. The Ultrasonography of the hip is one of the basic and initial imaging modality with very good sensitivity to diagnose joint effusion and ultrasonography referred as the orthopedic stethoscope. This study is to evaluate the role of ultrasonography in the diagnosis and clinical management of suspected cases of septic arthritis of hip in neonates and infants. This study was prospective collection of data and analysis involving 60 infants admitted to hospital with suspected septic arthritis of hip. There were 36 Male and 24 Female infants. The Age group ranged from 2 days to 6 months old infants the mean age being 45 days. All the infants were undergone laboratory investigations and hip ultrasonography. Clinically patients had Fever and Excessive cry on effected limb movement. Laboratory investigation yielded Elevated C - Reactive Protein, Elevated WBC counts and Elevated ESR. The ultrasound of hip showed joint effusion with quantity of effusion from 0.5 cc – 3.5 cc, the fluid was echogenic in 41 patients and in 8 patients there were dependent debris. The joint capsule was elevated and in 6 patients there was synovial thickening. Among 54 hip joints in 46 patients diagnosed as septic arthritis by ultrasonography, 5 hip joints did not show septic arthritis by surgery. The specificity 80 %, sensitivity of 96.3%, positive predictive value 94.6% and negative predictive value 85.7 %. One patients among the surgically treated septic arthritis developed septic dislocation of the hip. To conclude Ultrasonography is an effective primary imaging modality in early detection of septic arthritis of hip in infants. Line of clinical management can be confidently decided on sonographic diagnosis.

1. Introduction

The Septic arthritis (SA) of the hip requires urgent attention and it is not only Medical emergency, it is surgical emergency also. If not diagnosed and treated promptly or even minimal delay in diagnosis and treatment causes permanent disability, Crippling and lifelong hip deformity. Early diagnosis of hip SA in infants is usually difficult; several conditions mimic SA by clinical pictures.

Transient synovitis (TS) is the most common differential diagnosis. The clinical manifestations of SA and TS overlap, which prevents or delays determination of a clinical diagnosis in many children [1]. The Ultrasonography of the hip is one of the basic and initial imaging modality with very good sensitivity to diagnose joint effusion, joint capsule elevation and synovial thickening[2]. Orthopedic ultrasound is often referred to as the “orthopedic surgeon’s stethoscope” [3]. Ultrasound (US) can be used to guide fine-needle aspiration of the joint to confirm the infectious nature of a fluid collection[4]. Using US guidance repeated aspiration of the joint effusion can be performed which may preven unnecessary surgery to treat SA [5]. Other imaging modality such as bone scintigraphy, computed tomography and magnetic resonance imaging (MRI), are not routinely used for primary evaluation of septic arthritis of hip because of their higher cost, limited availability and sometimes requires sedation or general anesthesia to immobile the pediatric patient. The aims and objectives of this study were to evaluate the role of ultrasonography in the diagnosis and clinical management of suspected cases of septic arthritis of hip in neonates and infants.
This study was prospective collection of data and analysis involving 60 infants admitted to hospital with suspected septic arthritis of hip. Among 60 infants there were 36 male and 24 female infants. The age group ranged from 2 days to 6 months old infants the mean age being 45 days. The study carried out over the duration of 18 months from June 2007 to Nov 2008. The study was approved by Institute Ethical Committee and procedures followed in this study are in accordance with the ethical standard laid down by ICMR’s ethical guidelines for biomedical research on human subjects (2006). A written informed consent was obtained from all the patients who participated in the study after explaining the patient’s diagnosis, the nature and purpose of the study.

The lab investigations performed were routine hematology, C-Reactive, Protein Blood culture and Ultra sonography. Clinically patients had Fever and Excessive cry on effected limb movement. All U/S examinations were performed by two senior radiologists with good experience in musculoskeletal radiology, using a machine of General Electric GE Logic 500. The linear probe used was 10 MHz. These standardized measures reduced the operator and equipment-dependent fallacies known for U/S examination. The technique followed for the hip sonography as follows, images were taken anterior sagittal view when the child held in neutral and supine and lateral coronal view by flexing the hip joint while the child is in lateral decubitus position.

Arthrocentesis was performed for patients who presented with clear manifestations of SA. Hip aspiration was followed by hip arthrotomy if pus or turbid fluid was aspirated. Antibiotics were given based on specimen culture and sensitivity. The obtained data were studied statistically using the chi square test and Fisher’s exact test for univariant analysis where P<0.05 was considered significant. The specificity 80 %, sensitivity of 96.3%, positive predictive value 94.6% and negative predictive value 85.7 %. In our study, the ability of ultrasound to diagnose infant septic hip over other parameters like clinical, laboratory and plain radiography found to be statistically significant with P<0.05. One patient among the surgically treated septic arthritis developed septic dislocation of the hip.

<table>
<thead>
<tr>
<th>Sonography (Total N-60 patients)</th>
<th>Final diagnosis (After surgery and follow up)</th>
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<tbody>
<tr>
<td>46 patients (54 hip joints)</td>
<td>45 patients (53 hip joints)</td>
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<td>14 patients (14 hip joints)</td>
<td>15 patients</td>
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<td>2 patients (2 hip joints)</td>
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N- 60 patients

Figure 1

Ultrasonographic image of both hips joint sagittal view showing echogenic joint effusion in the left hip joint.
4. Discussion

Septic arthritis patients if left untreated can develop severe long term disability. The Premature babies, neonates and infants are very much prone for infection. The ultrasonography can diagnose both intra- and extra-articular abnormalities [6] and proven to be highly accurate and sensitive in detecting the presence of joint effusions. It provides the most rapid and efficient way to evaluate a patient with suspected hip infection [7,8,9]. Even small collections of fluid (1 to 2 ml) can be accurately detected [10]. Hyperechoic fluid and thickening and elevation of joint capsule are most characteristic finding. Synovial hypertrophy, adjacent intramuscular collection may be seen [11]. Difficulties are encountered for accurate intra-articular needle placement even for large joints, when the procedure is performed without ultrasound guidance. The ultrasound helps to place a needle tip accurately within a small joint and has significant advantage over palpation-guided approaches [12]. In our study 70.4% infants undergone Ultrasound (US) guided arthrocentesis after ultrasonographic diagnosis of septic hip. The ultrasonography is a noninvasive, inexpensive, easy to use and free from ionizing radiation. The role of other imaging modalities such as the plain radiography has less sensitive, specific and has no significant role on the decision-making in primary evaluation of septic hip. The Nuclear Imaging Cannot detect joint effusion, extremely sensitive but nonspecific. Both plain radiography and nuclear Imaging are very much prone for infection. The ultrasonography can diagnose both intra- and extra-articular abnormalities [13]. The CT scan gives more ionizing radiation which is harmful for developing infants. If a septic hip is suspected, US can be used to confirm a hip effusion. If a hip effusion is present, subsequent US guided aspiration will help to exclude those with septic arthritis, leading to selection of a smaller high-risk group for operative drainage. Further imaging studies such as bone scintigraphy and MR imaging may be needed for those children who are at risk for osteomyelitis, since normal results at US allow exclusion of septic arthritis but not of osteomyelitis [14]. In our series ultrasound diagnosis of septic arthritis of hip was confirmed per-operatively in all 46 patients and proved that it is a very useful tool for investigation and management of septic arthritis of hip in infants. False negative US examination for septic arthritis of hip is known, this happens when symptoms have been present for <24 hours or when bilateral disease exists [15].

5. Conclusion

Ultrasonography is an effective, non-invasive, primary imaging modality in early detection and follow up of septic arthritis of hip in infants. Ultrasonography not only helps in diagnosis, it can be used guide the surgical intervention. Line of clinical management can be confidently decided on sonographic diagnosis.

6. Acknowledgement

Department of Imaging and Radio-diagnosis M S Ramaiah Medical College and Hospital, Bangalore.

7. References