COMPARATIVE STUDY BETWEEN THE DIAGNOSTIC VALUE OF ULTRASONOGRAPHY AND CLINICAL EXAMINATION IN THE EVALUATION OF THE HIP JOINT IN JUVENILE RHEUMATOID ARTHRITIS

Thesis

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ABSTRACT

This study aimed to compare between the diagnostic value of ultrasonography, conventional radiography and clinical examination in the evaluation of the hip joint in JIA patients.

Thirty JIA patients fulfilling the ILAR criteria for classification of JIA were enrolled in this study. All patients included in this study were subjected to full history taking, clinical examination, laboratory investigations as well as plain radiography and ultrasonography of the hip joints.

There is significant correlation between conventional radiography and ultrasonography in detecting hip joint affection. The sensitivity and specificity of conventional radiography in detection of hip joint affection in relation to ultrasonography were 38.1% and 100% respectively. Ultrasonography detected hip joint pathology was significantly related to the functional capacity of the patient.

Key Words:

(Juvenile idiopathic Arthritis - conventional radiology - ultrasound -Hip joints).

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LIST OF ABBREVIATIONS

ACR	American College of Rheumatology
ANA	Antinuclear antibody
C7	Cervical vertebra (7th)
CBC	Complete blood count
CHAQ	Child Health Assessment Questionnaire
cm	Centimeter
CR	Conventional radiography
ERA	Enthesitis-related arthritis
ESR	Erythrocyte sedimentation rate
EULAR	European League Against Rheumatism
gm	gram
Hb	Hemoglobin
HLA-B27	Human leucocytic antigen
IBD	Inflammatory bowel disease
IL-1	Interleukin-1
IL-6	Interleukin-6
ILAR	International League of Associations for Rheumatology
ILGF-1	Insulin-like growth factor 1
JAS	Juvenile ankylosing spondylitis
JCA	Juvenile chronic arthritis
JIA	Juvenile idiopathic arthritis
JPsA	Juvenile psoriatic arthritis
JRA	Juvenile rheumatoid arthritis

Max	**Maximum**
MHz	**Megahertz**
Min	**Minimum**
mm	**Millimeter**
MRI	**Magnetic resonant imaging**
NSAIDs	**Nonsteroidal anti-inflammatory drugs**
RA	**Rheumatoid arthritis**
RAI	**Ritchie articular index**
RF	**Rheumatoid factor**
S2	**Sacral vertebra (2nd)**
SD	**Standard deviation**
TNF-α	**Tumor necrosis factor-α**
US	**Ultrasound**
USA	**United States of America**
VAS	**Visual analogue scale**
WBC	**White blood cells**

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INTRODUCTION

Juvenile Idiopathic Arthritis (JIA) is the most common chronic arthropathy of childhood ***(Prahalad and Glass, 2008).*** Its incidence ranges from 1 to 22 per 100,000 ***(Wiess and Ilowite, 2005).***

Clinically diagnosed JIA is a chronic inflammatory arthritis that begins in patients younger than 16 years and that persists for longer than 6 weeks. All other diseases that can cause arthritis need to be considered and excluded before the diagnosis of JIA is made ***(Babyn and Doria, 2005).***

The hip joint is often involved in JIA ***(Friedman and Gruber, 2002).*** Hip involvement has been found to result in poor functional capacity in JIA ***(Jacobsen et al., 1992) (Flato et al., 2003).*** Hip involvement occurs in 40% with erosions often present within the first year of disease. After only 10 years of active disease up to 20% require total hip replacements and 7% require total knee replacements ***(White, 2003).***

The development of hip arthritis (coxitis) is likely to be an indication for treatment with disease modifying agents, such as methotrexate and anti-tumour necrosis factor (TNF) agents ***(Nistala et al., 2007)***. The challenges for the clinician are to prevent significant hip involvement, to halt further damage when hip disease is noted, and in the event that conservative treatment fails, to guide the child and family through hip arthroplasty and rehabilitation ***(Spencer and Bernstien, 2002).***

Unlike other joints commonly affected, such as the knee, the presence of hip joint effusion is particularly difficult to detect. As a result, subclinical coxitis can lead to joint damage ***(Nistala et al., 2007)***. Since hip effusion is difficult to palpate, objective means of detection may facilitate the diagnosis of hip joint involvement in JIA and be useful in assessing follow up ***(Friedman and Gruber, 2002).***

Musculoskeletal ultrasound is a rapidly evolving and powerful diagnostic modality, which is gaining popularity for the evaluation and management of joint damage and soft tissue diseases in children with JIA ***(Heuck et al., 2008).***

Most joints can be easily explored using ultrasound, including those that are difficult to examine clinically; i.e. hip and shoulder ***(Hermann et al., 2003).***

US and MRI favor conventional radiography in detecting early inflammatory changes in younger children with JIA. Although detailed information is given by MRI, the use of MRI is limited to one anatomical region and for the younger children it cannot be performed without general anesthesia. Thus, US seems most helpful in detecting early inflammatory changes in JIA ***(Spannow and Herlin, 2008).***

US has evolved from a diagnostic tool used in a small minority of patients to a virtually indispensable clinical instrument which has been likened to the rheumatologist's stethoscope ***(Meenagh et al., 2007).***

AIM OF THE WORK

The aim of this study is to compare between the diagnostic value of ultrasonography, clinical examination and conventional radiography in the evaluation of the hip joint in JIA patients.

ANATOMY OF THE HIP JOINT

The hip joint is a multiaxial synovial joint of the ball and socket variety, between the acetabulum of the hip bone and the head of femur ***(Sinnatamby, 1999).***

A) Articular surfaces:

The femoral head is covered by articular cartilage, except for a rough pit for the ligamentum teres. The acetabular articular surface is an incomplete ring, the lunate surface, broadest above where the pressure of body weight falls in the erect posture, and narrowest in its pubic region.

Acetabular depth is increased by the acetabular labrum; a fibro cartilaginous rim attached to the acetabular margin. It bridges the acetabular notch as the transverse acetabular ligament ***(Standring et al., 2005)***

B) The capsule:

The capsule of the joint is attached circumferentially around the labrum and transverse ligament; here it passes laterally, like a sleeve, to be attached to the neck of the femur.

In front it is attached to the intertrochanteric line, but at the back it extends for only half this distance. The capsule is loose but extremely strong ***(Standring et al., 2005).***

C) Ligaments:

The iliofemoral ligament is a strong, inverted Y-shaped ligament (Fig.1). Its base is attached to the anterior inferior iliac spine above; below, the two limbs of the Y are attached to the upper and lower parts of the intertrochanteric line of the femur. This strong ligament prevents overextension during standing.

The pubofemoral ligament is triangular. The base of the ligament is attached to the superior ramus of the pubis, and the apex is attached below to the lower part of the intertrochanteric line. This ligament limits extension and abduction.

The ischiofemoral ligament is spiral shaped and is attached to the body of the ischium near the acetabular margin. The fibers pass upward and laterally and are attached to the greater trochanter. This ligament limits extension (Fig.2).

The transverse acetabular ligament is formed by the acetabular labrum as it bridges the acetabular notch. The ligament converts the notch into the tunnel through which the blood vessels and the nerves enter the joint.

The ligamentum teres is flat and triangular. It is attached by its apex to the pit on the head of the femur and by its base to the transverse ligament and the margins of the acetabular notch. It lies within the joint and is ensheathed by synovial membrane (Fig.3) ***(Snell, 2004).***