

Longitudinal Musculoskeletal Ultrasound in Juvenile Idiopathic Arthritis

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Background: Musculoskeletal (MSK) ultrasound (US) is a non-invasive technique that detects joint inflammation. Inflammation detected by ultrasound has been shown to predict disease course in adults with rheumatoid arthritis.[1] Preliminary definitions for MSK US in healthy joints and synovitis have been established for children.[2, 3] Currently, there is no unified approach for identifying early or subclinical joint inflammation in Juvenile Idiopathic Arthritis (JIA). The objective of this study is to determine the diagnostic value of MSK US in JIA.

Methods: Aim 1 will distinguish features of MSK US in JIA patients from normal findings in healthy children. We will perform clinical examinations as well as MSK US assessments in JIA and age-gender matched controls (Table 1). We will compare MSK US findings JIA patients and controls using a semi-quantitative scale[4], depth of pathology (mm), and volume (mm³). Aim 2 will discern the features of active disease from inactive disease by following newly diagnosed JIA patients prospectively over a 1-year period with serial MSK US and clinical assessments. Utilizing a linear mixed models approach, we will determine if a MSK US joint severity score of inflammation distinguishes JIA patients with persistent clinical disease activity from those with clinically inactive disease.[5]

Results: Over the past year we have successfully enrolled 18 newly diagnosed JIA patients in a prospective observational study using MSK US to assess selected joints at four month intervals. Our preliminary data indicates that 35% of joints in newly diagnosed JIA reveal inflammation by MSK US not detected by clinical exam. The clinical significance of this discrepancy is unknown.

Conclusions: This will be the first study of its kind in patients with JIA. This project has the potential to improve the diagnosis and management of JIA patients by identifying objective measures of disease activity supporting early aggressive treatment to decrease long-term disability.

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Table 1. Anatomical Recesses Evaluated by MSK US	
Dorsal Wrist	Midcarpal recess Radiocarpal recess
Knee	Suprapatellar recess Medial recess Lateral recess