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Knee Effusion: Sensitivity and Specificity Of Ultrasound For The Identification Of Calcium Pyrophosphate Crystals

Program Book Publication:

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These authors will be published in a supplement of the [Arthritis & Rheumatism](#) journal (on-line only) as well as the abstracts section of the My Annual Meeting website ([www.ACRannualmeeting.org](#)). **Erika Catay**¹, Santiago Ruta¹, Javier Rosa¹, David A. Navarta¹, Marina Scolnik², Ricardo Garcia-Monaco³ and Enrique R. Soriano⁴, ¹Rheumatology Unit, Internal Medical Services, Hospital Italiano de Buenos Aires, ²Rheumatology Section, Hospital Italiano de Buenos Aires, ³Radiology and Imagenology Department, Hospital Italiano de Buenos Aires, ⁴Rheumatology Unit, Internal Medical Services, Hospital Italiano de Buenos Aires, Instituto Universitario Hospital Italiano de Buenos Aires, and Fundacion PM Catoggio

Abstract Text

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Background/Purpose: Calcium pyrophosphate deposition disease (CPPD) is an important cause of arthritis mainly in elderly people. The final diagnosis is based on the identification of calcium pyrophosphate (CPP) crystals in the synovial fluid (SF). Our objective was to evaluate the sensitivity and the specificity of ultrasound (US) and conventional radiography for the detection of CPP crystals in patients with knee effusion.

Methods: Consecutive patients > 50 years old with knee effusion on clinical examination seen at the out-patient Rheumatology Unit who underwent aspiration of SF including microscopic investigation of SF samples, were included. In all patients, US and conventional radiography (CR) of the involved knee were performed after arthrocentesis. US examinations were carried out by a rheumatologist trained in this imaging technique who was blinded to all clinical and CR data. A MyLab 70 XV (Esaote Biomedica, Genoa, Italy) machine equipped with a broadband 4-13 MHz linear probe was used. US scanning technique was performed according to standard methods, including suprapatellar views (transverse and longitudinal) with knee in maximal possible flexion to assess femoral hyaline cartilage and lateral and medial longitudinal views with knee extended (as possible) to evaluate lateral and medial meniscal fibrocartilage, respectively. The following US abnormal findings were considered indicative of CPPD: 1) hyperechoic bands within the femoral hyaline cartilage layer; 2) hyperechoic sparkling spots in meniscal fibrocartilage. CR were read by an experienced rheumatologist blinded to all clinical and US data searching for radiological evidence of chondrocalcinosis. SF was analyzed by an experienced biochemist, blinded to clinical and imaging data, using plain light and polarizing light microscopy.

Results: A total of 75 knees were evaluated in the same number of patients [39 male; mean age (SD): 66.6 years (15.7)]. Twenty-four patients had previous diagnosis of primary knee osteoarthritis (OA), 15 rheumatoid arthritis, 10 CPPD (McCarthy criteria), 8 psoriatic arthritis and 5 systemic lupus erythematosus. Thirteen patients had knee effusion without definitive diagnosis of any rheumatic condition. Analysis of synovial fluid revealed CPP crystals in 15 out of 75 (20%) examined knees from 9 patients with previous diagnosis of CPPD, 3 patients with previous diagnosis of primary knee OA and 3 patients without previous definitive diagnosis of a rheumatic condition.

Table shows the US and CR diagnostic test properties for the detection of CPP crystals using SF findings as the gold standard.

		Synovial fluid analysis		Sensitivity (95% CI)	Specificity (95% CI)	Positive predictive value (95% CI)	Negative predictive value (95% CI)
		Positive	Negative				
Ultrasound	Positive	9	2	60% (32.33-83.57)	96.67% (88.45-99.50)	81.82 % (48.24-97.18)	90.62 % (80.69-96.46)
	Negative	6	58				
Conventional radiology	Positive	6	10	40% (16.43-67.67)	83.3% (71.47-91.69)	37.5% (15.29-64.53)	84.75 % (73-92.76)
	Negative	9	50				

Conclusion: US showed high specificity with good sensitivity to detect CPP crystals in patients with knee effusion. Compared with CR, US had better specificity and sensitivity. US may be used in daily rheumatologic practice when CPPD is suspected.

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