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## INTRODUCTION AND OBJECTIVES

Recently, the International Prophylaxis Study Group (IPSG) proposed a scale for interpretation of MRI findings in hemophilic joints. MRI acquisition of joints should be tailored to the scale that will be used for data interpretation. So far, no consensus MRI protocol is available for imaging of hemophilic arthropathy. In order to obtain that, we should investigate the reliability of the IPSG MRI scale when different protocols are used for data acquisition. In this study we assessed the inter-reader reliability of the IPSG MRI scale (Table 1) using minimum (MP) or full (FP) protocols obtained with different technology capabilities (2001-2006 and 2007-2009 cohorts).

## MATERIALS AND METHODS

Patients' joints were scanned using either the MP (gradient-echo [GRE] sequences in axial, sagittal and coronal planes) or FP (coronal T1, GRE; sagittal proton-density or T1, T2, GRE; axial GRE). Two experienced radiologists reviewed all examinations using the IPSG MRI scale. Intraclass correlation coefficients (ICC) assessed the inter-reader reliability of the MRI scale for data acquired using the MP or FP. ICCs <0.40 indicated poor; >0.40 and <0.60 moderate; >0.60 and <0.80 substantial; and >0.80 excellent agreement.

## RESULTS

MRI scans of 71 joints (36 ankles, 16 elbows, 19 knees) were reviewed, of those 34 (48%) were scanned with MP and 37 (52%) with FP. The mean (range) Pettersson scores for ankles, elbows and knees were, respectively, 1.7 (0-9); 0.3 (0-6) and 1.8 (0-13). For 2001-2006 scans using the FP the ICC for ankles was 0.98 (CI 0.85,1.00); for elbows 0.74 (-0.11,0.96) and for knees 0.71 (0.05,0.94). Using the MP the ICC for ankles was 0.47 (-0.04,0.79); for elbows, 0.91 (0.77,0.97) and for knees 0.86 (0.55,0.96). For 2007-2009 scans, the ICC for the FP for ankles was 0.89 (0.75,0.95), and for knees 0.90 (0.64,0.98). MP and elbow joints were not examined in this cohort.

**TABLE 1 – IPSG SCALE**

SOFT TISSUE:		Score
Effusion/Hemarthrosis	small	1
	moderate	2
	large	3
Synovial hypertrophy	small	1
	moderate	2
	large	3
Hemosiderin	small	1
	moderate	2
	large	3
Soft Tissue Subscore (max. 9 points)		( )
OSTEOCHONDRAL:		Score
Surface erosions involving subchondral cortex or joint margins	any surface erosion	1
	half or more of the articular surface eroded in at least one bone	1
Subchondral cysts	at least one subchondral cyst	1
	subchondral cysts in at least two bones, or cystic changes involving a third or more of the articular surface in at least one bone	1
Cartilage degradation	any loss of joint cartilage height	1
	loss of half or more of the total volume of joint cartilage in at least one bone	1
	full-thickness loss of joint cartilage in at least some area in at least one bone	1
	full-thickness loss of joint cartilage including at least one half of the joint surface in at least one bone	1
Osteochondral Subscore (max. 8 points)		( )
<b>Total Score (max. 17 points)</b>		<b>( )</b>

## CONCLUSIONS

The inter-reader reliability of the IPSG MRI scale was variable according to the protocol type used and joint site investigated. For ankles it was excellent using the FP but it was moderate using the MP. For elbows and knees it was substantial to excellent using either the FP or MP.

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Fig 1. Eight-year-old boy with severe hemophilia A. **Minimum protocol** sagittal gradient-echo (GRE) MR image of his left ankle shows mild effusion (**large arrow**, =1), large synovial hypertrophy (=3), large hemosiderin deposition (=3), and no osteochondral change (=0, 0, 0). Final IPSG MRI score, 7 (soft tissues, [ST] 7; osteochondral tissues [OC], 0). Because of susceptibility ("blooming") artifacts from the GRE sequence (black arrows) one cannot distinguish synovium from hemosiderin using this protocol.

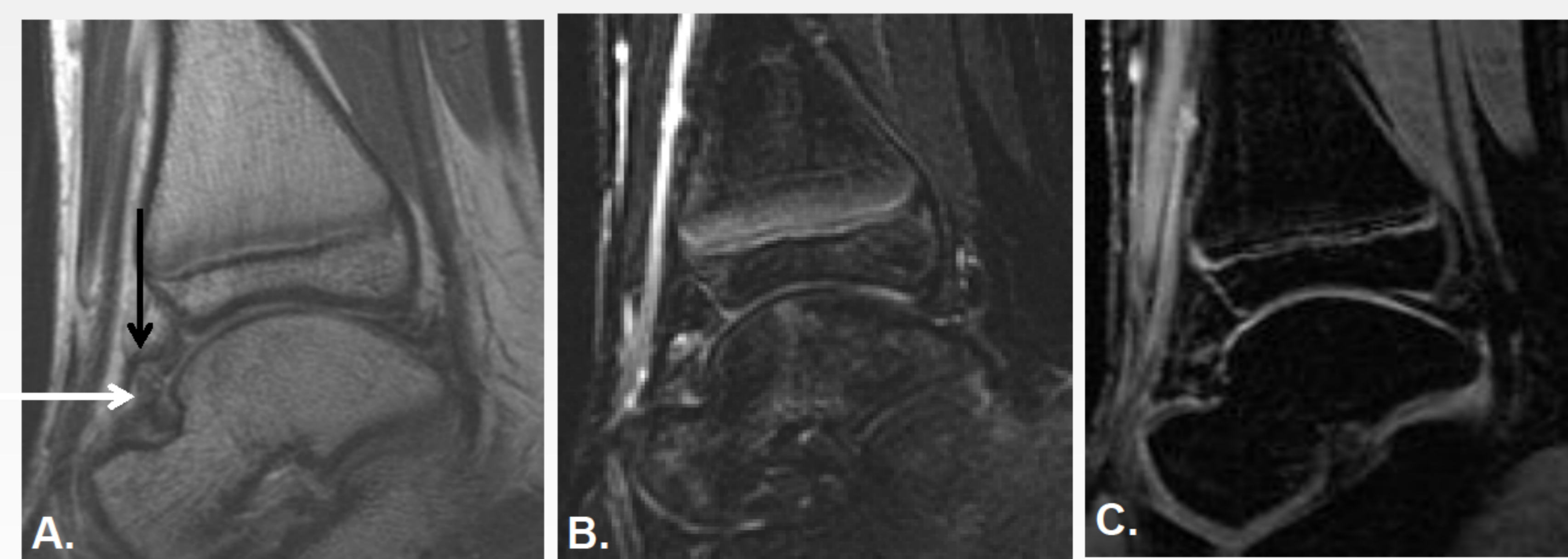


Fig 2. Fifteen-year-old boy with severe hemophilia A. **Full protocol** sagittal proton density [PD] (A), T2 (B) and gradient-echo [GRE] (C) MR images of his right ankle show mild synovial hypertrophy (=1), mild hemosiderin deposition (=1), no joint effusion/hemarthrosis (=0) or osteochondral damage (=0, 0, 0). Final IPSG MRI score, 2 (ST, 2; OC, 0). Because the PD sequence (A) does not produce susceptibility artifacts conversely to GRE (C) it enables better distinction between synovium (in grey, white arrow) and hemosiderin deposition (in black, black arrow) than the GRE sequence.