

Ultrasound Assessment of Heel Enteses in Spondyloarthritis Patients: A Comparative Study with Radiography and Magnetic Resonance Imaging

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Background/Purpose: enthesitis is one of the main hallmarks of Spondyloarthritis (SpA), being heel enteses frequently involved. Different imaging modalities, such as conventional radiography (CR), ultrasound (US) and magnetic resonance imaging (MRI) are commonly used for the detection of enthesopathy. The aim was to determine the agreement between US, CR and MRI for the detection of enthesopathy in SpA.

Methods: forty patients with a diagnosis of SpA (axial or peripheral ASAS criteria) were included. All patients underwent all imaging modalities in the same day, in order to assess bilaterally both Achilles tendon and plantar fascia insertions into the calcaneous bone.

US examinations were performed using a MyLab 60 machine (6-18 MHz multifrequency broad band linear transducer). The following US findings indicative of enthesopathy were dichotomously assessed: thickening, structural changes (hypoechoic areas with loss of the typical “fibrillar” echotexture), bursitis, abnormal vascularization by power Doppler (PD), bone erosions and enthesophytes.

MRI were performed with a Signa HDx 1.5 Tesla machine (General Electric) and read by a radiologist. The following MRI findings indicative of enthesopathy were dichotomously assessed: thickening, signal intensity changes of the entheses (structural changes), adjacent bone marrow edema, bursitis, bone erosions and enthesophytes.

CR were read by a rheumatologist in order to assess the presence of bone erosions and/or enthesophytes.

Both rheumatologists and the radiologist were blinded to clinical and to the others imaging data.

Results: a total of 160 heel entheses were examined. At least one sign indicative of enthesopathy was found in 68.1% (109/160), 65.6% (105/160) and 26.9% (43/160) entheses with MRI, US and CR, respectively. Tables 1 and 2 show a detailed description about the agreement between US and MRI and between CR, US and MRI, respectively. Among non-comparable findings, US detected abnormal vascularization by PD in 57 out of 160 (35,6%) entheses while MRI revealed adjacent bone marrow edema in 36 out of 160 (22,5%) entheses.

Table1.Agreement between US and MRI, unweighted kappa (k) values (95% coefficient interval) and absolute agreement (%).

Thickening		US		k= 0.80 (0.69-0.90), (91,8%)
		absence	presence	
MRI	absence	108	4	
	presence	9	39	
Structural changes		US		k= 0.66 (0.51-0.81), (90%)
		absence	presence	
MRI	absence	123	7	
	presence	9	21	
Bursitis		US		k= 0.68 (0.45-0.91), (92,5%)
		absence	presence	
MRI	absence	66	0	
	presence	6	8	

Bone erosions		US		k= 0.69 (0.57-0.82), (87,5%)
		absence	presence	
MRI	absence	103	10	
	presence	10	37	
Enthesophytes		US		k= 0.70 (0.58-0.82), (86,9%)
		absence	presence	
MRI	absence	96	10	
	presence	11	43	

Table 2.Agreement between CR with US and MRI, unweighted kappa (k) values (95% coefficient interval) and absolute agreement (%).

Bone erosions		CR		k= 0.45 (0.29-0.60), (79,5%)	
		absence	presence		
US	absence	104	9		
	presence	24	23		
Enthesophytes		CR			k= 0.78 (0.68-0.88), (90,6%)
		absence	presence		
US	absence	102	4		
	presence	11	43		
Bone erosions		CR		k= 0.38 (0.22-0.54), (76,9%)	
		absence	presence		
MRI	absence	102	11		
	presence	26	21		

Enthesophytes		CR		k= 0.76 (0.66-0.87), (91,2%)
		absence	presence	
MRI	absence	102	5	
	presence	11	42	

Conclusion: a good agreement between US and MRI was found for all abnormal comparable findings at heel entheses in SpA patients. Agreement was also good between the three imaging modalities concerning detection of enthesophytes, with a lower agreement in the recognition of bone erosions.