

Osteochondral Lesions of the Talus: Factors Predictive of Cartilage Integrity

S. Clifton Willimon, MD

Co-Authors: John Erickson, DO; Kiery Braithwaite, MD;

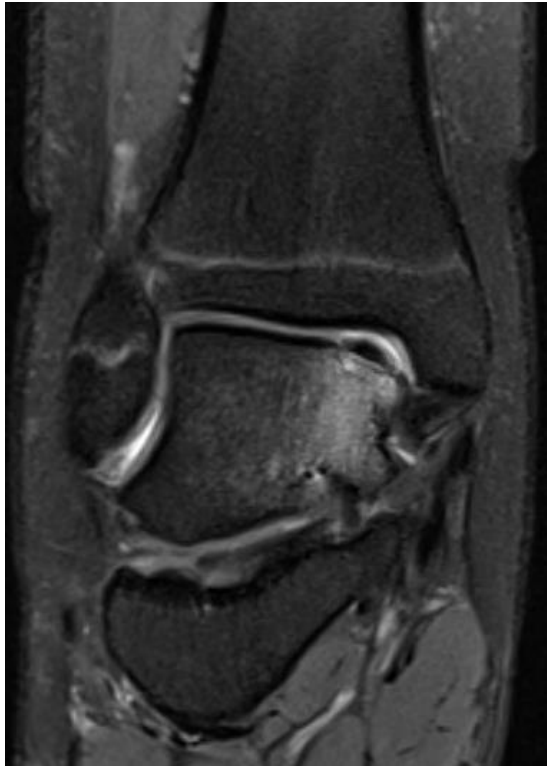
Asahi Murata, BS; Michael T. Busch, MD; Crystal A. Perkins, MD



**Disclosures are available on the AAOS website.
I have no disclosures pertinent to this research.**



Background

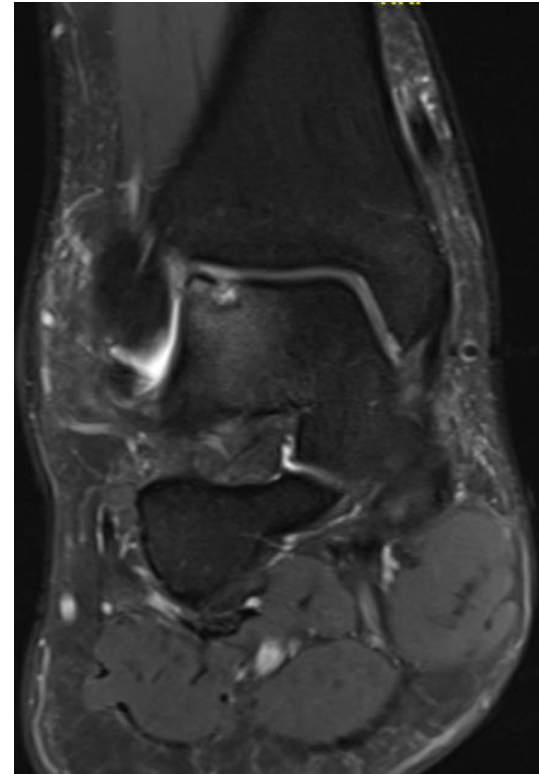


- The integrity of articular cartilage in patients with osteochondral lesions of the talus (OLTs) guides treatment
- The ability to accurately predict cartilage integrity in OLTs would be beneficial
- Prior work has identified that age and cartilage integrity on MRI are strong predictors of intra-operative cartilage integrity in OCD of the knee¹
- The purpose of this study was to evaluate the association of radiographic and MRI findings and articular cartilage integrity at the time of ankle arthroscopy for OLTs

¹Siegall et al *J Pediatr Orthop* 2018

Methods

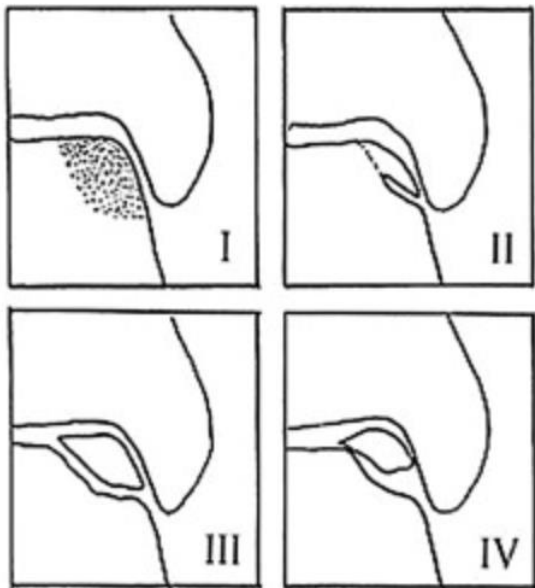
- Single institution retrospective review
- 2010 – 2017
- Inclusion criteria
 - Age less than 19 years at the time of surgery
 - Operative treatment of OLT
 - Pre-operative MRI
- Demographics and intra-operative findings



Methods

- Radiographic review

- Physeal status
- OLT location
- Berndt and Harty **stage**



- MRI review

- OLT location
- Cartilage status (intact or disrupted)
- Modified Kramer **grade**

Lesion	Modified Kramer
Grade I	Irregular subchondral bone area; hypointense on T1; cartilage intact
Grade II	Partial separation of a bony fragment with circumscribed cartilage disruption
Grade III	Complete separation of a non-displaced bony fragment with complete cartilage disruption
Grade IV	Loose body

Results - Demographics

Variable		N	Scope Finding			P-Value
			Overall N=54	Disrupted N=38	Intact N=16	
Age		54	13.6 (2.5)	13.8 (2.3)	12.9 (2.9)	0.197
Sex	F	54	38 (70.4%)	28 (73.7%)	10 (62.5%)	0.517
	M		16 (29.6%)	10 (26.3%)	6 (37.5%)	
Height		50	158.8 (9.5)	160.34 (8.2)	155.19 (11.6)	0.079
Weight		54	62.1 (20.8)	62.3 (19)	61.56 (25.1)	0.910
BMI		50	24.7 (6.4)	24.3 (5.5)	25.5 (8.4)	0.641
Physeal Status	closed	54	27 (50%)	22 (57.9%)	5 (31.3%)	0.018
	closing		5 (9.3%)	5 (13.2%)	0 (0.0%)	
	open		22 (40.7%)	11 (29.0%)	11 (68.8%)	

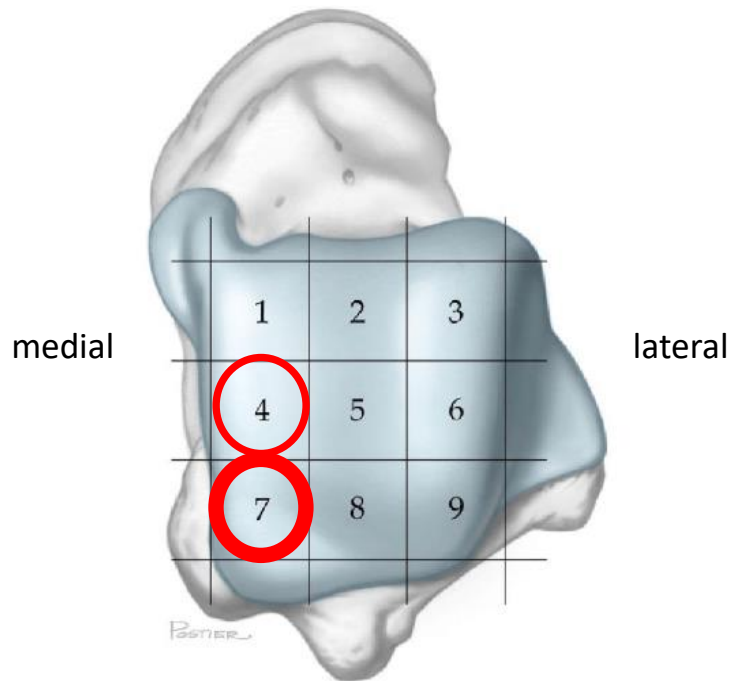
Results

- Location:

- Medial: 39 (72%)
- Lateral: 8 (15%)
- Central: 7 (13%)

- Zone 7: 27 (50%)
- Zone 4: 11 (20%)
- Zone 6: 8 (15%)
- Zone 5: 5 (9%)

- No difference between intact and disrupted OLTs at time of arthroscopy



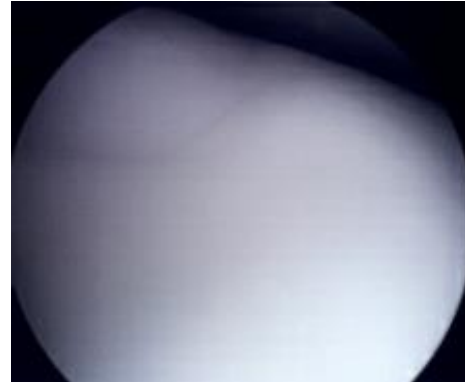
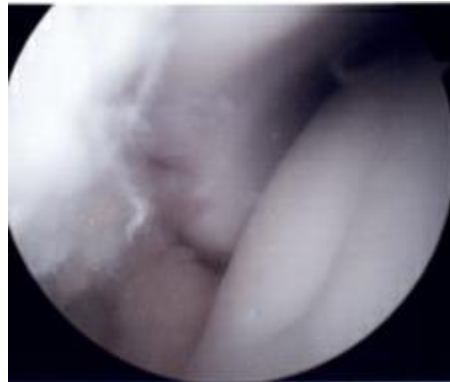
Results

Scope Finding

Variable		N	Overall N=54	Disrupted N=38	Intact N=16	P-Value
Mechanical Symptoms	N	54	46 (85.2%)	30 (79.0%)	16 (100%)	0.088
	Y		8 (14.8%)	8 (21.1%)	0 (0.0%)	
Radiographic Location	Central	54	7 (13.0%)	6 (15.8%)	1 (6.3%)	0.644
	Lateral		8 (14.8%)	5 (13.2%)	3 (18.8%)	
	Medial		39 (72.2%)	27 (71.1%)	12 (75%)	
Radiographic Stage	1	54	14 (25.9%)	4 (10.5%)	10 (62.5%)	<.001
	2		16 (29.6%)	11 (29%)	5 (31.3%)	
	3		20 (37.0%)	19 (50%)	1 (6.3%)	
	4		4 (7.4%)	4 (10.5%)	0 (0.0%)	
MRI Grade	1	54	14 (25.9%)	2 (5.3%)	12 (75%)	<.001
	2		25 (46.3%)	22 (57.9%)	3 (18.8%)	
	3		14 (25.9%)	13 (34.2%)	1 (6.3%)	
	4		1 (1.9%)	1 (2.6%)	0 (0.0%)	
Cartilage on MRI	Disrupted	54	40 (74.1%)	36 (94.7%)	4 (25%)	<.001
	Intact		14 (25.9%)	2 (5.3%)	12 (75%)	

Results

- MRI classification of cartilage integrity is:
 - 95% sensitive and 75% specific
 - 89% accuracy
 - 11% misclassification



- Among the 22 patients with open physes, MRI classification is:
 - 92% sensitive and 100% specific



Results

ROC Estimates of Arthroscopy Reading by MRI Reading of Cartilage Integrity

Model	AUC	95% CI
MRI Cartilage Integrity	0.849	(0.733-0.964)
+ Physeal Status	0.871	(0.750-0.992)
+ Radiographic Stage	0.953	(0.904-1.000)
+ MRI Grade	0.866	(0.751-0.981)



Conclusions

- The ability to accurately predict cartilage integrity of OLTs guides treatment and provides expectations for the patient and family
- Independent predictors of cartilage integrity at time of arthroscopy are
 - Physeal status
 - Radiographic stage
 - MRI grade
 - Cartilage integrity on MRI (intact/disrupted)
- MRI Classification + Radiographic Stage has the greatest diagnostic ability for correctly predicting cartilage integrity at the time of arthroscopy



Thank You

S. Clifton Willimon, MD
cliff.willimon@choa.org
919-323-5601

