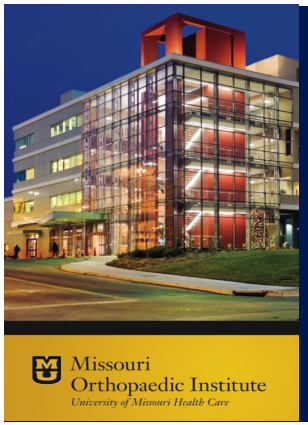

The value of MRI in detecting hidden bony injuries associated with tibial plateau fractures

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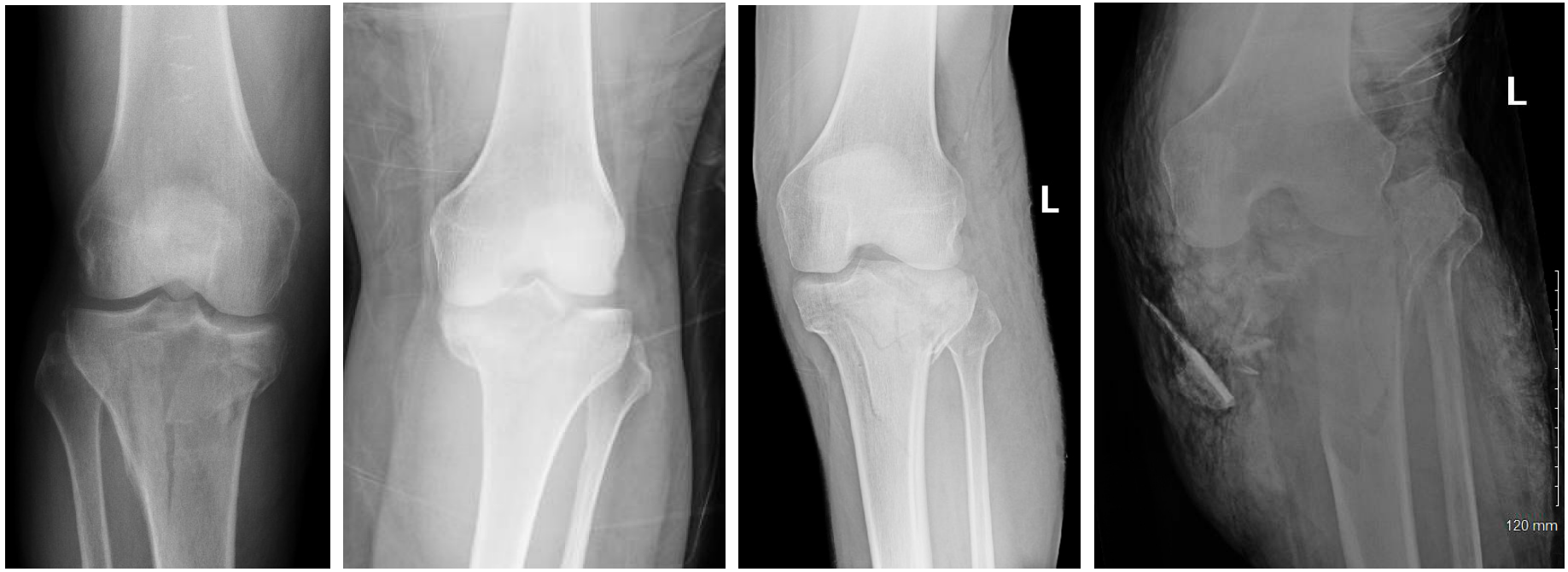
Declaration of Conflicts of Interest

- **None of the authors has financial relationships with commercial entities that produce healthcare-related products.**

Background

Tibial plateau fractures have a broad spectrum of clinical presentations
Depending on the mechanism and energy of trauma



Background

The higher the energy of trauma,
the higher the likelihood of soft tissue compromise

MRI has demonstrated a high incidence of meniscus and ligament injuries associated with highly displaced and comminuted tibial plateau fractures

Schatzker, 1974
Yacoubian et al, 2002
Gardner et al, 2005
Stannard et al, 2010
Kfuri and Schatzker, 2018
Schatzker and Kfuri, 2022

Hypothesis

Tibial plateau fractures may be associated with hidden bony injuries

MRI may help to identify associated bony injuries in the setting of tibial plateau fractures

Study Design

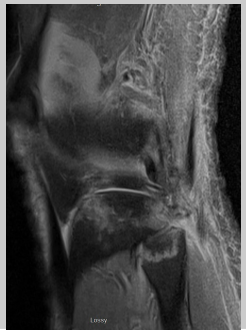
- **Retrospective Case Series**
- **Level of Evidence IV**
- **Evaluation of all tibial plateau fractures from Jan 2010 – Dec 2023**
- **Included just the cases that had Radiographs and MRI**
- **All fractures were evaluated using the Schatzker (1974) and Kfuri/Schatzker (2018) classification templates**
- **Fibular head and femoral condyle injuries were identified and classified**
- **Statistics methods included chi-square, t-test, and odd ratio (SPSS 29)**

Results

- **1020 patients were reviewed**
- **367 met the criteria to be included in the study (radiographs + MRI)**
- **Images independently evaluated by two individuals**
- **Proximal fibular and femoral condyle injuries were identified and classified based on their pattern**

Proximal Fibula Injuries by location and pattern

Location	Pattern
Head Neck Shaft	Bony contusion Avulsion Transverse Oblique Spiral Segmental Comminuted

Bony Contusion	Avulsion	Transverse	Comminuted
			

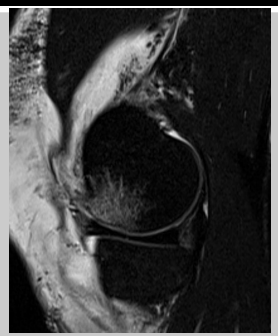
Proximal Fibular Injuries

Proximal Fibula Injuries (PFI)	
Number	**187 (51%)**
Occult (Negative radiographs with positive MRI)	**74 (39.6%)**
Location: - Fibular Head - Fibular Neck - Fibular Shaft	 **179 (95.7%)** 67 (35.8%) 13 (7.0%)

	PFI Present	PFI Absent	p-value
Number	187 (51.0%)	180 (49.0%)	
Age	49 (SD 15)	46 (SD 16)	0.06
BMI	29.7 (SD 7.3)	29.6 (SD 6.9)	0.89
Female	80 (42.8%)	86 (47.8%)	0.34
Smoker	78 (41.7%)	59 (32.8%)	0.08
Diabetes	19 (10.2%)	23 (12.8%)	0.43
Kidney disease	3 (1.6%)	2 (1.1%)	1.00
ASA 1	10 (5.3%)	16 (8.9%)	0.18
ASA 2	77 (41.2%)	89 (49.4%)	0.12
ASA 3	**91 (48.7%)**	66 (36.7%)	**<0.05**
ASA 4	9 (4.8%)	9 (5.0%)	0.93

Femoral Condyle Injuries by location and pattern

Condyle	Location in the Condyle	Patterns
Lateral Medial	Anterior third Middle third Posterior third	Bony contusion Subchondral impaction Subchondral fracture Impaction and fracture

Bony Contusion	Subchondral Impaction	Subchondral Fracture	Impaction and Fracture
			

Femoral Condyle Injuries

Femoral Condyle Injuries (FCI)	
Number	**208 (56.7%)**
Occult (Negative radiographs with positive MRI)	**195 (93.8%)**
Schatzker Classification	
- Type I	3 (1.4%)
- **Type II**	**90 (43.3%)**
- Type III	15 (7.2%)
- Type IV	25 (12.0%)
- Type V	17 (8.2%)
- Type VI	58 (27.9%)

	FCI Present	FCI Absent	p-value
Number	208 (56.7%)	159 (43.3%)	
Age	**46 (SD 16)**	50 (SD 15)	**<0.05**
BMI	29.4 (SD 7.2)	30.0 (SD 6.9)	0.42
Female	98 (47.1%)	68 (42.8%)	0.41
Low-injury mechanism	**170 (81.7%)**	121 (76.1%)	**<0.05**
Smoker	80 (38.5%)	57 (35.8%)	0.61
Diabetes	23 (11.1%)	19 (11.9%)	0.79
Kidney disease	3 (1.4%)	2 (1.3%)	0.88
ASA 1	16 (7.7%)	10 (6.3%)	0.60
ASA 2	98 (47.1%)	68 (42.8%)	0.41
ASA 3	83 (39.9%)	74 (46.5%)	0.20
ASA 4	11 (5.3%)	7 (4.4%)	0.70

Conclusion

- **Proximal fibular injuries were presented in 51% of all cases of tibial plateau fractures in this series.**
- **Femoral condyle injuries were present in 56.7% of all cases of tibial plateau fractures in this series.**
- **MRI was able to identify a significant number of associated hidden bony injuries in the setting of tibial plateau fractures.**
- **The clinical relevance of those associated injuries is to be determined by future studies**

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