



Tibial Spine Fractures Extend Beyond the Tibial Spine- An MRI Analysis of 54 Cases

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NO RELEVANT DISCLOSURES

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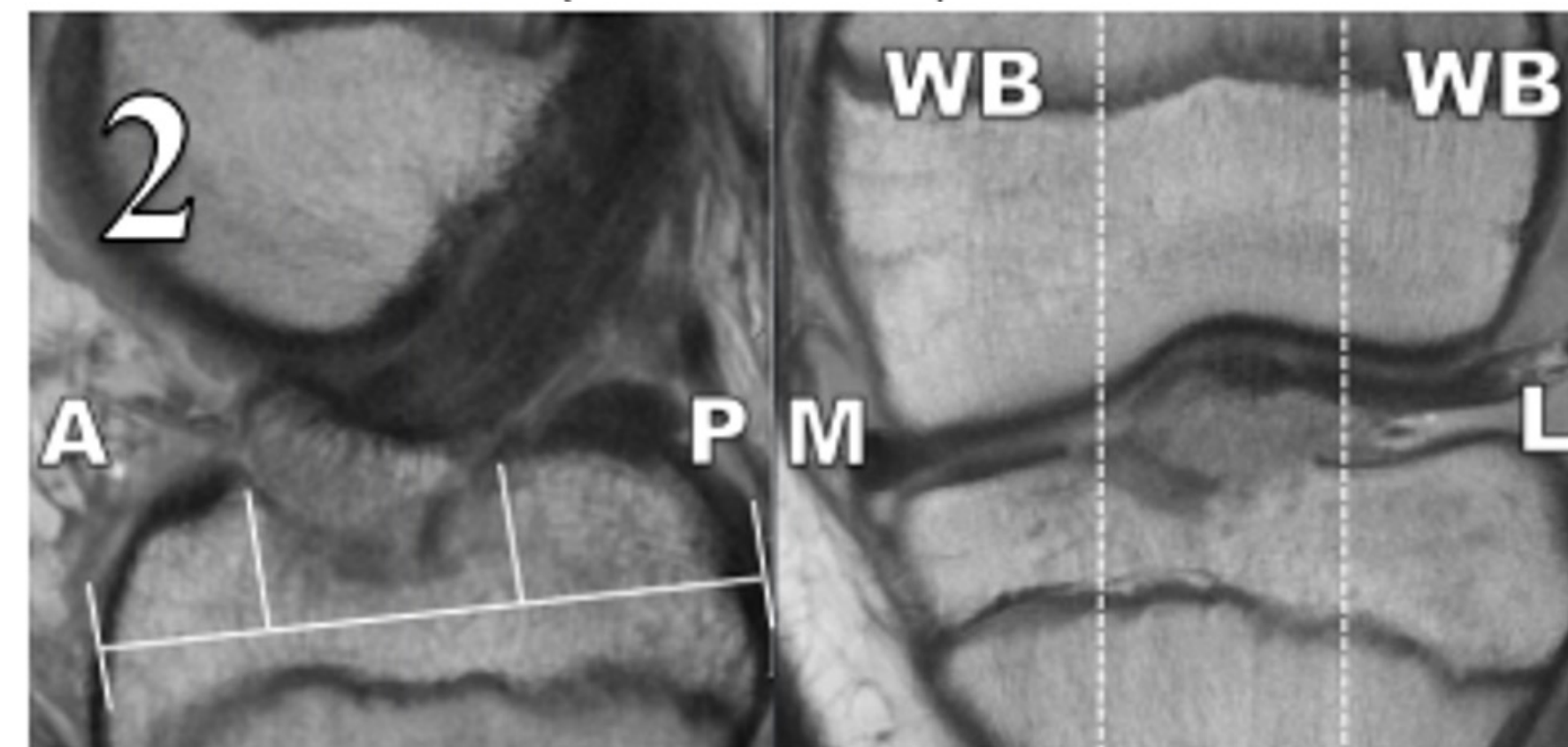
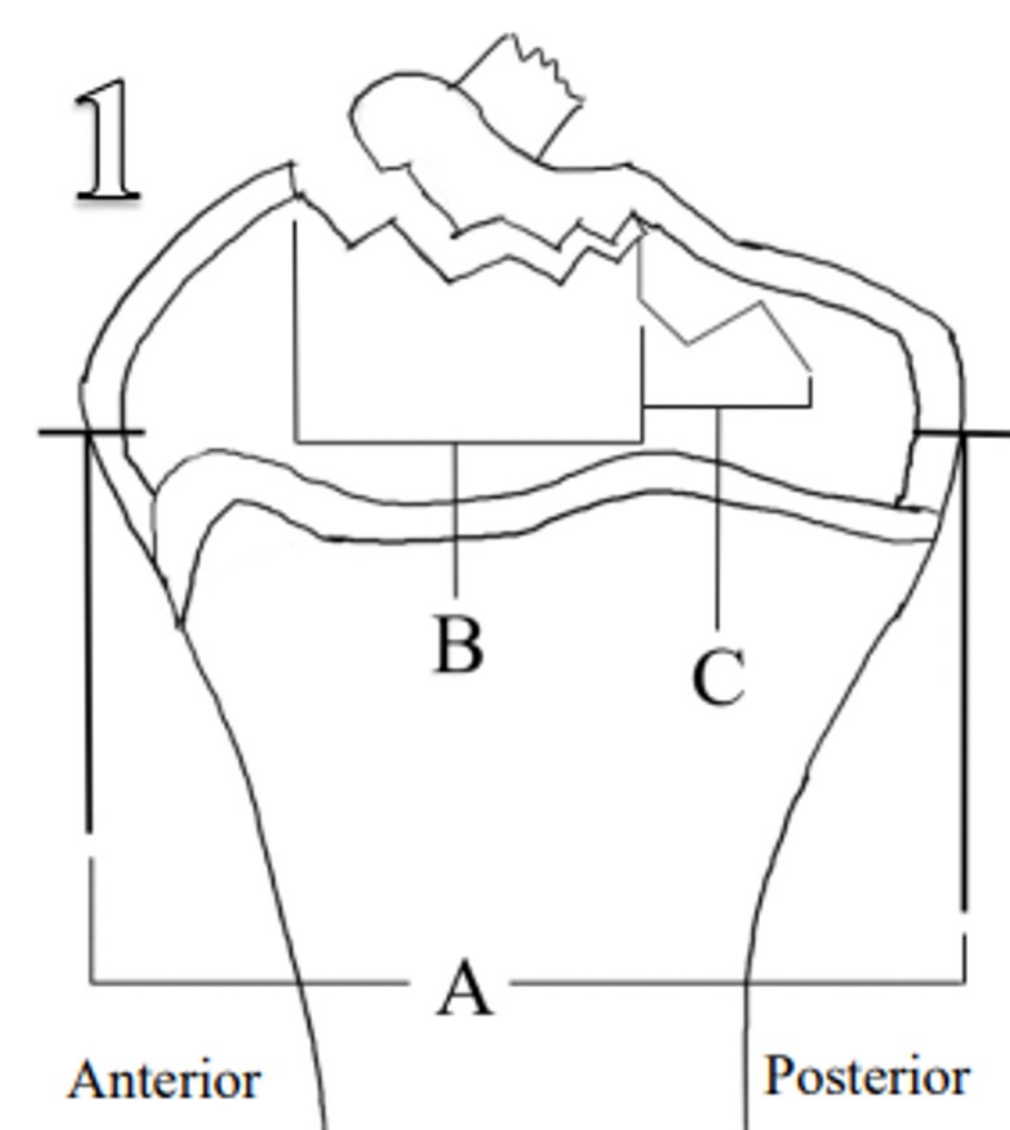
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- To our knowledge, no previous study has thoroughly described the anteroposterior dimensions of tibial spine fractures (TSFs) on 3D imaging
- TSFs extension into weight-bearing regions of the tibial plateau, posterior extension within the epiphysis, and the potential association between fracture size and patient age may also each have implications on treatment strategies and clinical outcomes
- **Hypothesis:** TSF fragments commonly involve weight-bearing regions of the tibial plateau, are larger in younger patients, and extend more posteriorly than the anatomic footprint of the tibial spine

Methods

- Consecutive MRIs from 2012 to 2020 in patients 5-18 years at the time of imaging for TSFs were included, measured, and classified via the Green and Tuca grading system
- Anteroposterior fracture dimensions were measured and normalized to anteroposterior mid-epiphyseal length, as was fracture height to epiphyseal height
- Extension into the weight-bearing surface of the tibial plateau was recorded
- ICC and kappa values were calculated
- Mean fracture bed size was compared with independent samples t-tests between older and younger patients based on median age and sex



Measurement Reliability

Table 1. ICC Values and percent agreement for the different measurements.

Measurement	ICC Value or Cohen's kappa
Mid epiphyseal length	0.965
Anterior bed dimension	0.833
Posterior bed dimension	0.866
Anterior line dimension	0.667
Posterior line dimension	0.862
Bed region height	0.726
Bed depth	0.762
Line region height	0.880
Line depth	0.646
Weight bearing regions affected (kappa)	0.529
Classification grade (kappa)	0.643

Results

- 54 TSFs
 - 1 (1.8%) grade 1
 - 28 (50.9%) grade 2
 - 25 (45.4%) grade 3
- Fracture beds spanned 45% of the anteroposterior mid-epiphysis
- 54% of the TSF beds extended to the posterior third of the epiphysis
- Younger and female patients, on average, had larger anteroposterior dimensions to TSF beds (P=0.018 and 0.006, respectively)
- The medial and lateral weight-bearing surfaces of the tibial plateau were affected 57% and 25% of the time, respectively

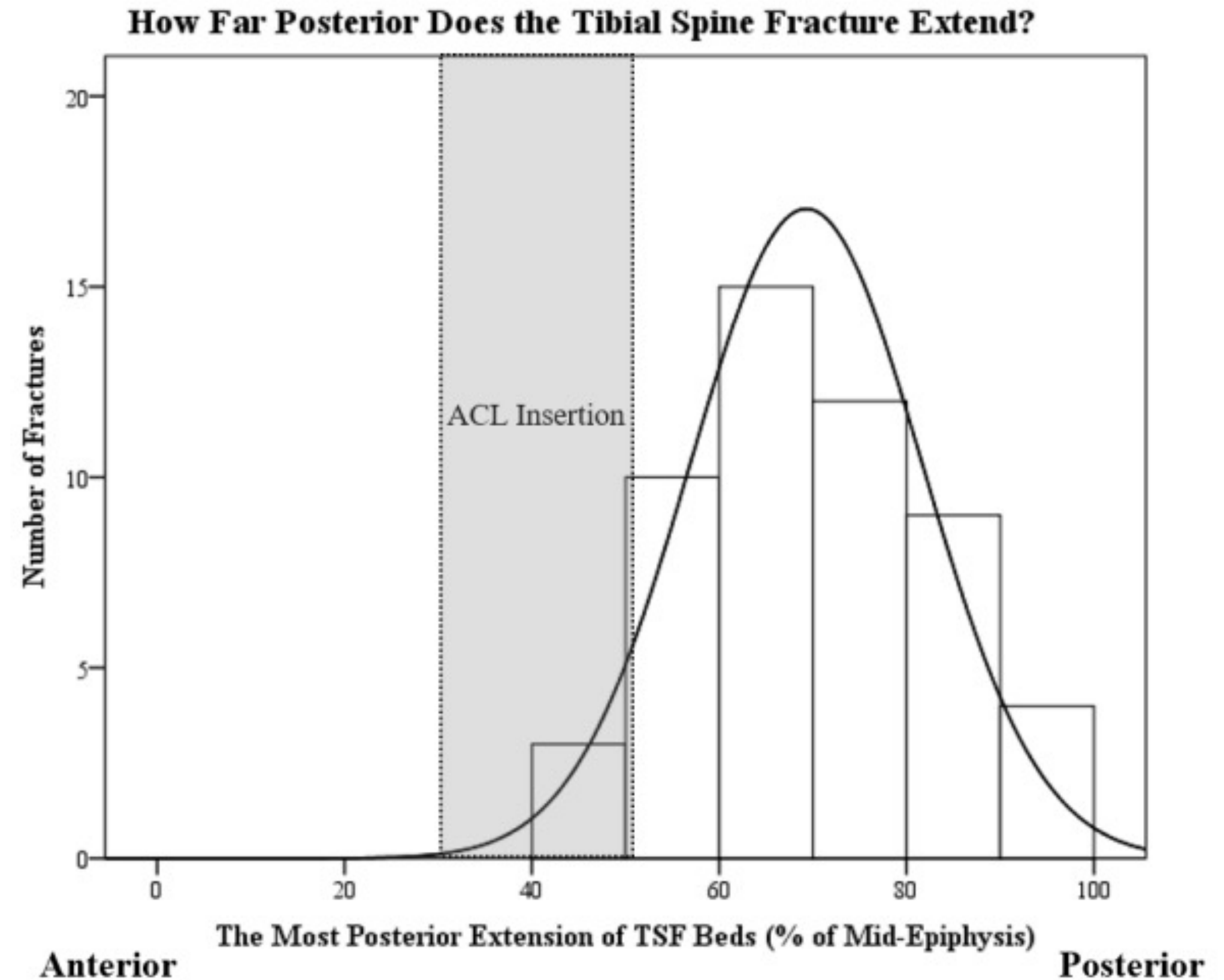


Figure 2. A histogram of the most posterior extension of TSF beds measured as a percent of the mid-epiphyseal anteroposterior length (mean=69.3, standard deviation=12.4, n=53) and a normally distributed line for reference. A box labeled “ACL Insertion” describes the average anterior and posterior borders of the ACL insertion amongst 9 controls. TSF: Tibial Spine Fracture

Example Fractures

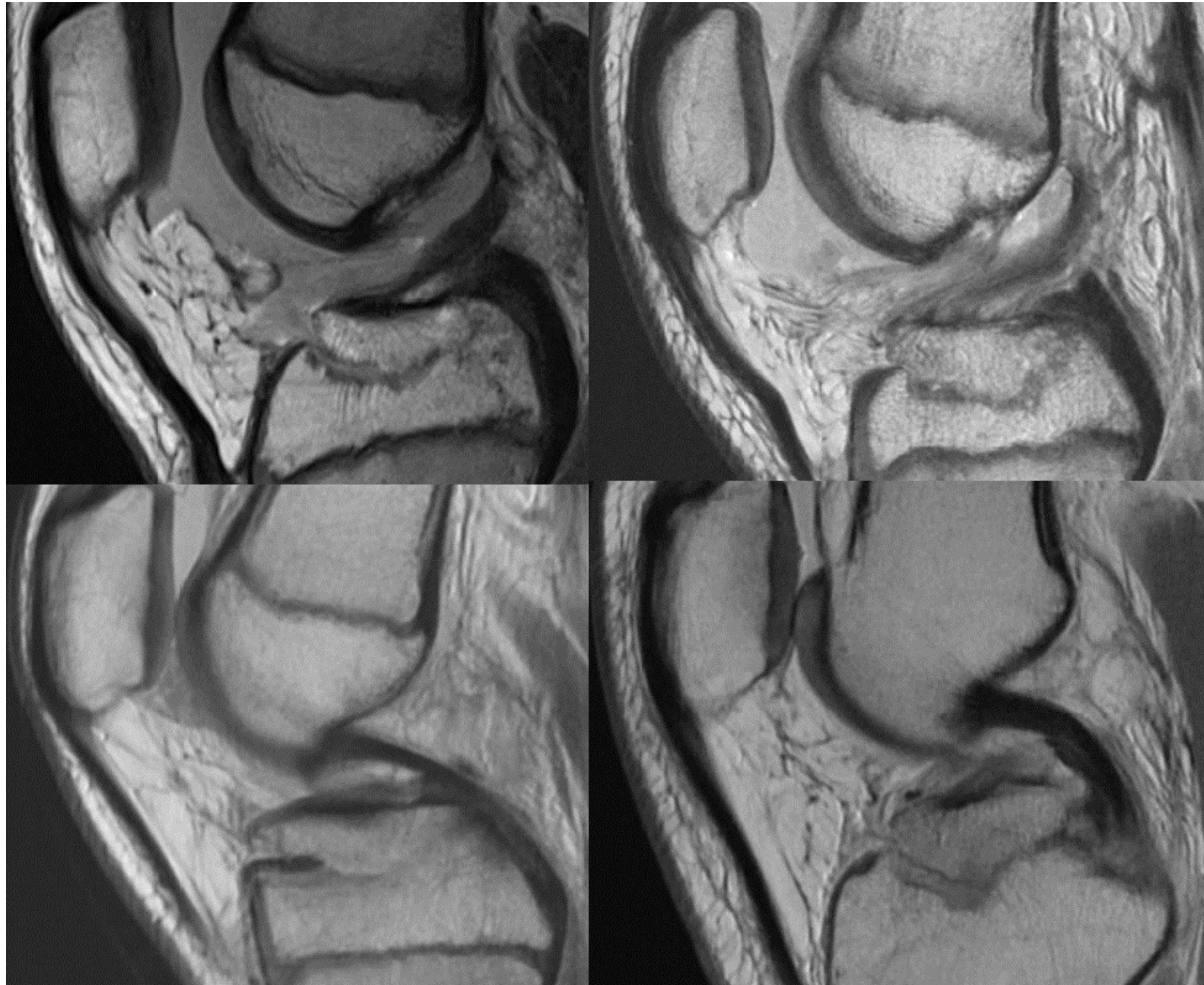


Figure 3. Four examples of posterior TSF extension.

Conclusion

- TSF beds should be carefully examined for extension into weight-bearing regions of the tibial plateau, are larger in younger patients, and extend to the posterior third of the epiphysis in 54% of cases
- In pediatric patients, the “tibial spine” fracture often involves more of the tibial plateau than the anatomic footprint of the tibial spine
- Clinicians should be aware of the potential for extension posteriorly and into the weight-bearing surfaces

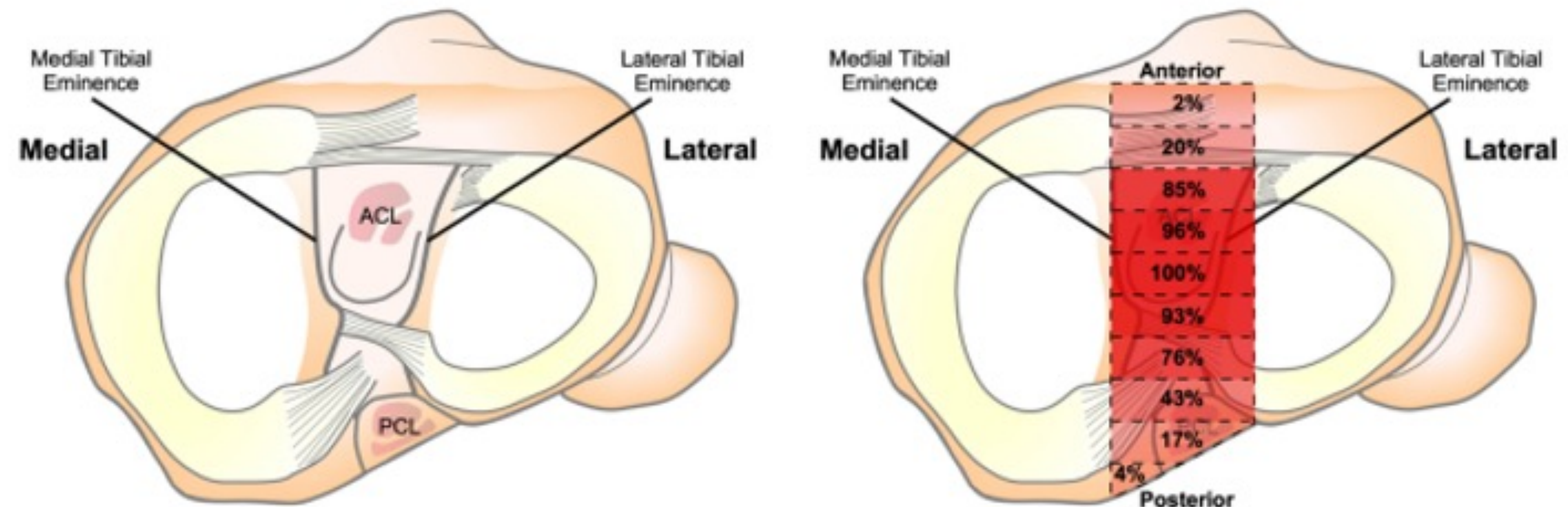


Figure 4. A diagram of the axial surface of the tibia (left) and the same diagram with an overlaid choropleth or “heat” map depicting the most commonly affected regions by TSFs.



Thank you!



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References

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