

Background:

Trampoline fractures are a peculiar type of pediatric trampoline-related injury. The fractures are transversely oriented impaction fractures of the proximal tibia sustained by young children jumping on a trampoline.¹ They occur when children jump on a trampoline with another, heavier person. It is thought that the upward bending of the trampoline mat after a jump of this person exerts increased axial force on the child’s proximal tibia when concomitantly jumping downward with the knee in (hyper)extension (Fig 5). The immature bone of the proximal tibia in young children is soft and less resistant to the kinetic energy of the increased axial load. Incidence peaks at childrens aged 2-5 years old. The diagnosis is easily missed, up to 24% of cases in a large cohort study. ²

We describe a young girl with bilateral trampoline fractures.

Patient information & clinical findings:

A 6-year-old Caucasian girl without medical history was referred to the emergency department because of acute bilateral knee pain and refusal to bear weight on both her legs. The girl came directly from an indoor playground where she had been jumping on a commercial trampoline together with another child. No fall or direct trauma had occurred. The girl only remembered falling down on her knees on the middle of the trampoline after an acute pain onset in both knees. Physical examination showed an extreme asthenic habitus, some small bruises on the ventral side of the knees, and pressure pain over both proximal tibiae.

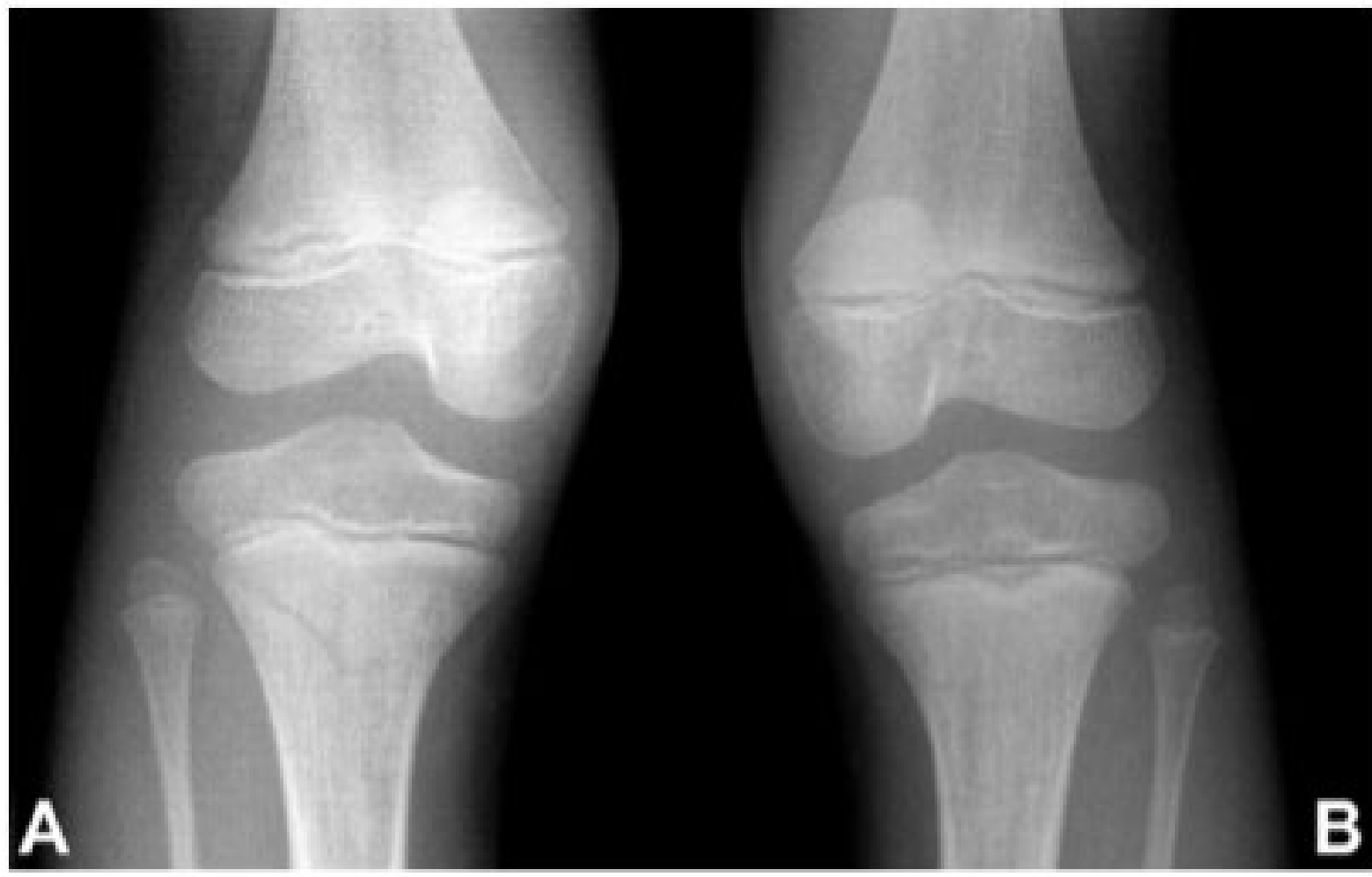


Fig. 1 – Baseline anteroposterior radiographs of the right (A) and the left (B) knees show bilateral minimally displaced fractures of the proximal tibial metaphysis (more evident on the right).

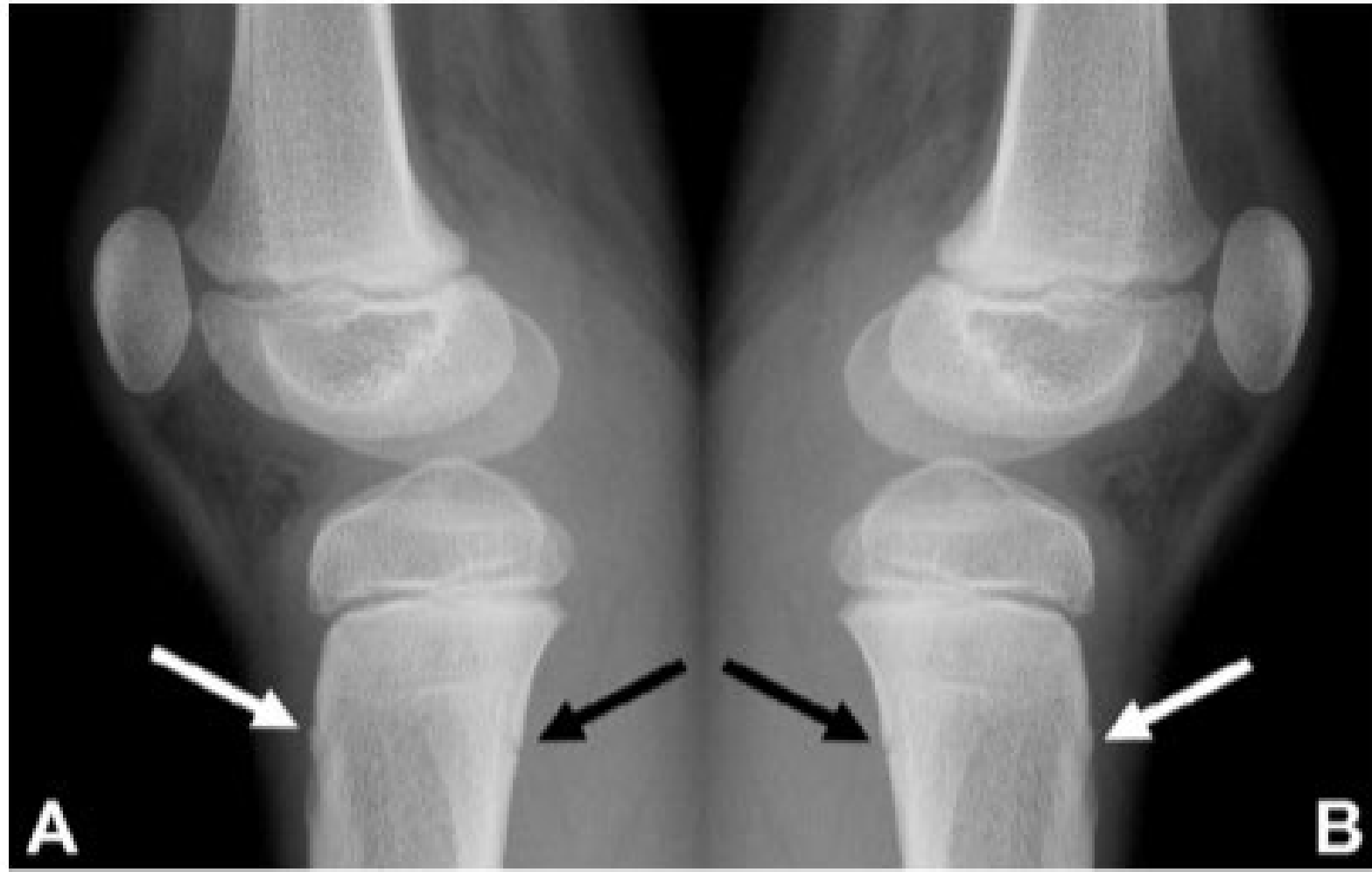


Fig. 2 – Baseline lateral radiographs of the right (A) and the left (B) knees show bilateral buckling of the upper anterior tibial cortex (white arrows) and a bilateral cortical breach at the upper posterior tibia (black arrows).

Diagnostic assessment:

Anteroposterior and lateral radiographs showed bilateral horizontal, linear, minimally displaced fractures of the metaphysis of the proximal tibia (Fig 1), with buckling of the upper anterior tibial cortex and a cortical breach at the upper posterior tibia (Fig 2).

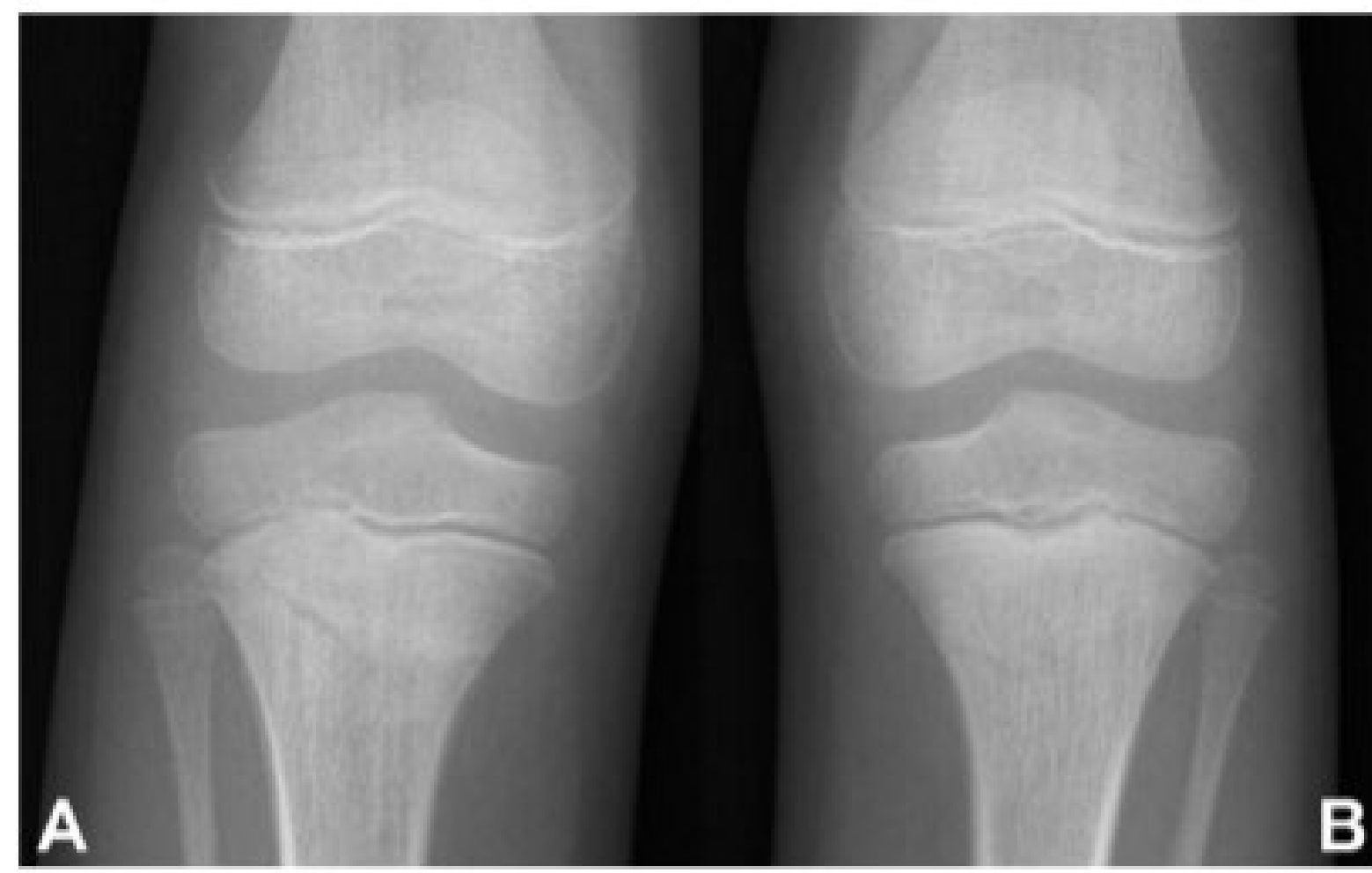


Fig. 3 – Anteroposterior radiographs of the right (A) and the left (B) knees at 5 weeks’ follow-up show linear sclerosis in both proximal metaphyses, with a significant blurring of the fracture lines.

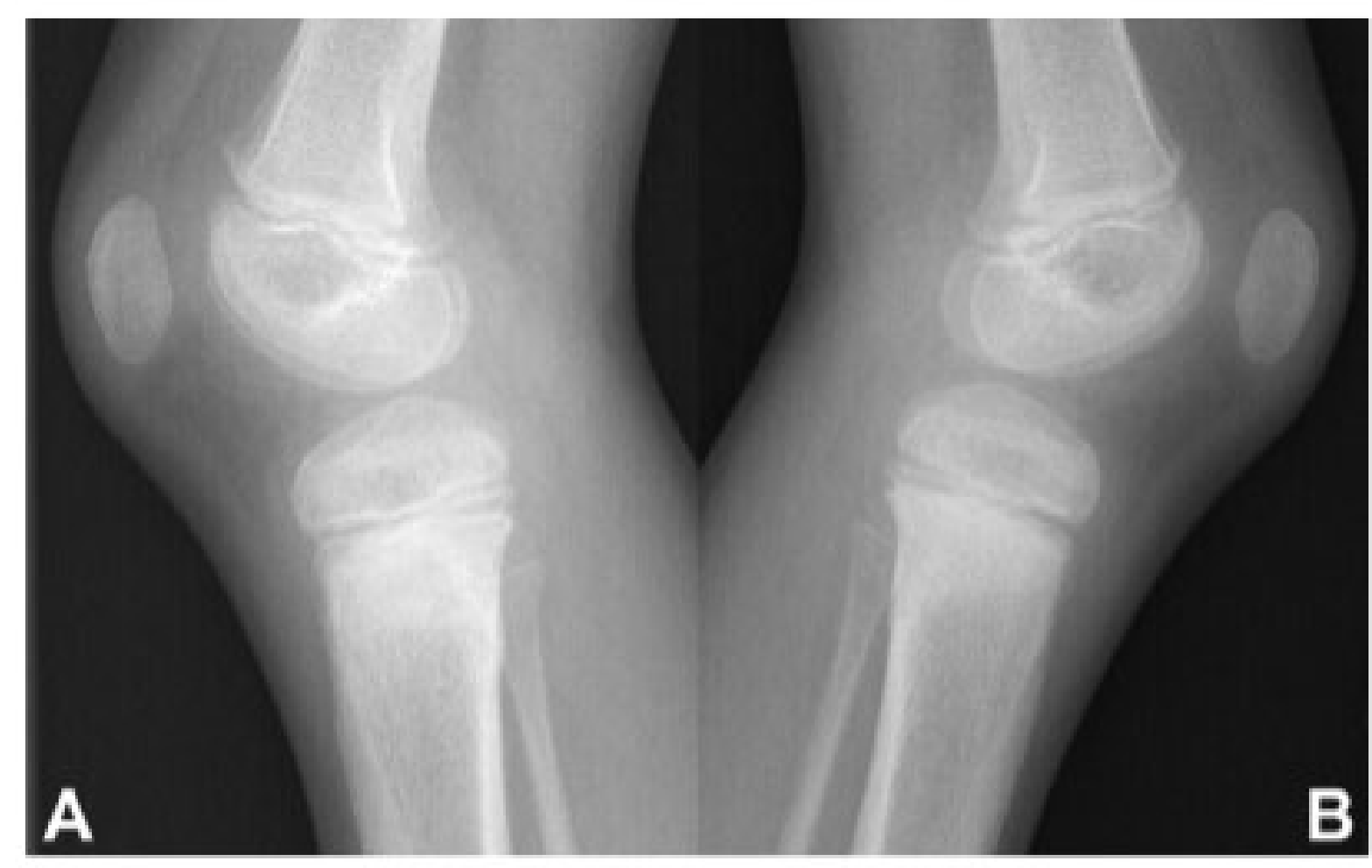


Fig. 4 – Lateral radiographs of the right (A) and the left (B) knees at 5 weeks’ follow-up show linear sclerosis in both proximal metaphyses, from anterior to posterior, without clearly visible residual fracture lines.

Therapeutic intervention, follow up & outcome :

The patient was treated conservatively with bilateral circular-split upper leg casting for 3 weeks. Repeated imaging after 5 weeks revealed reactive sclerosis and near-complete consolidation of both proximal tibial fractures fractures without deformities or premature closure of the epiphyseal growth plates (Fig 3 & 4).

Conclusion & discussion:

Bilateral fractures of the proximal tibiae are rare in children and tend to occur mostly in (overweight) male adolescents, often during growth spurt. ^{3, 4} Unilateral trampoline fractures have been described in the literature before. With the increasing recreational use of trampolines, the number of injuries related to this high-risk activity has risen correspondingly. ⁵ Physicians should be aware of the typical history, the mechanism of this specific non-traumatic fracture, and its associated radiological findings when children are admitted with pain and inability to stand or walk after trampoline use.



Fig. 5 – Mechanism of injury in the so-called trampoline fractures, leading to increased axial loading on the proximal tibia of the child. Dotted arrows indicate the direction of movement of both the child (downwards) and the heavier second person on the trampoline (upwards). Solid arrows indicate the upward bending of the trampoline mat, with the solid red arrows indicating the consequential increased axial force on the child’s proximal tibia.

References:
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4 Hurson C, Browne K, Callender Q, O'Donnell T, O'Neill A, Moore DP, et al. Pediatric trampoline injuries. J Pediatric Orthopedia 2007;27:729–32.
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