

Sticks and stones and broken bones

Distal radius fractures in children

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You are working in the emergency department at a small community hospital. William is a 6-year-old boy who presents with left wrist pain after a fall on the ice while playing hockey. On examination, his left wrist is swollen, but there is no deformity. He complains of pain when you press over the distal radius. There is no neurovascular compromise. You suspect a fracture and request an x-ray scan of his left wrist. On review of the radiographs there is a very obvious buckle fracture of the distal radius on the anteroposterior view (**Figure 1**). A buckle fracture is defined as a fracture in which the bony cortex is compressed on one side and the opposite cortex remains intact.

Buckle fractures

Fractures of the wrist and forearm account for almost half of all pediatric fractures. Eighty percent of forearm fractures involve the distal radius and ulna. Most forearm fractures are buckle fractures, also known as *torus fractures*.

The traditional treatment for a buckle fracture is to cast the injury for a short duration, usually about 3 weeks.¹ Plint et al² found that by using removable wrist immobilizers instead of casts there were significant differences in Activities Scales for Kids performance version scores, indicating better functioning in the splint group at 14 days postinjury ($P = .041$). Splinted children

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had significantly less difficulty with bathing ($P < .001$) and with writing ($P = .005$), and they also returned to sports sooner ($P = .031$ at 20 days, $P = .008$ at 28 days). There were no significant differences in pain between groups as measured by the visual analog scale, and there were no refractures. Furthermore, Plint et al found that while splints were prescribed for 3 weeks, by day 7 only 15% of children reported wearing them all day and night. Thus, for many children with wrist buckle fractures, 3 weeks of constant immobilization is not necessary. Plint and colleagues conclude that children treated with removable splinting have better physical functioning and less difficulty with activities than those treated with casts, with no difference in their levels of pain. The use of removable splinting might reduce the need for follow-up visits and, as a result, health care costs. Plint et al recommend the use of removable splints in the treatment of this common injury.²

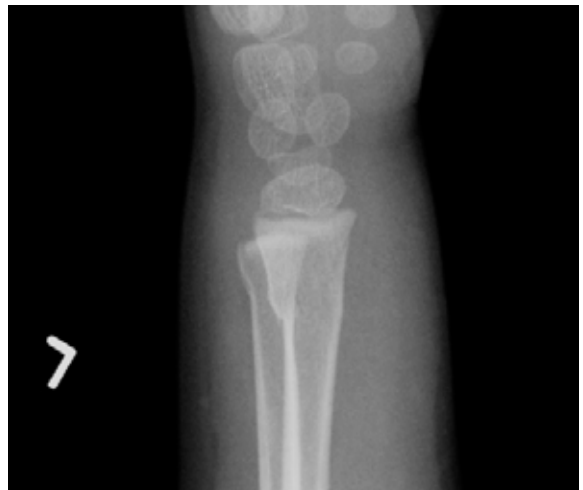
Metaphyseal fractures

On closer inspection of the lateral view of the radiograph (**Figure 2**), the fracture line extends completely across the metaphysis of the distal radius, so that both cortices are involved. There is also a fracture that transverses the metaphysis of the distal ulna. There is no associated angulation or displacement.

Figure 1. The anteroposterior view of a buckle fracture of the distal radius



Figure 2. The lateral view of a minimally displaced distal radius and ulna metaphyseal fracture



The traditional treatment for distal radius and ulna fractures is an above-elbow cast for 4 to 6 weeks,³ owing to the possibility of periosteal disruption and instability that might result in further displacement and angulation. However, a well-molded below-elbow cast might be equally effective.

Sherbino⁴ performed a systematic review of the literature on the management of pediatric distal radius fractures, including removable splints versus circumferential casts for buckle fractures. Sherbino found the following:

Removable splints versus circumferential casts for buckle fractures. Four trials, involving 417 children, compared a commercial splint, plaster splint, or soft bandage to a below-elbow circumferential cast. There were no short-term deformities associated with removable splints. Removable splints increased early functionality and comfort and were the self-reported preference of patients and their parents.

Below-elbow versus above-elbow casts for displaced fractures. Two studies, involving 229 children, did not demonstrate any difference in redisplacement between below- or above-elbow casts Below-elbow casts decreased the need for assistance with activities of daily living and reduced post-cast removal elbow stiffness.

Above-elbow casts positioned in supination, pronation, or neutral for displaced fractures. One study of 109 children did not demonstrate any difference related to arm position on post-reduction angulation at 6 weeks.⁴

Interestingly, this systematic review of the literature on the

treatment of pediatric wrist fractures addresses buckle fractures and displaced fractures but not undisplaced or minimally angulated fractures.

In 2010, Boutis et al⁵ provided the first study to challenge the current practice of routine casting and compare it with a commercially available wrist splint, with respect to recovery of physical function in children with acceptably angulated wrist fractures (<15°). Management of these fractures varies widely, and up to now there has been virtually no scientific evidence supporting one treatment over another. These fractures carry an excellent long-term prognosis because of the unique capacity of skeletally immature bones to heal via remodeling. More important, the most common treatment of cast application for 4 to 6 weeks is associated with many inconveniences. Boutis et al⁵ show that wrist splints are a more convenient alternative and that splints offer comparable immobilization and symptom relief without compromise of fracture stability, with less reliance on subspecialty care.

Conclusion

Given the evidence in the Canadian literature, the new standard of care for pediatric distal radius fractures, including buckle fractures and minimally angulated fractures (<15°), is the application of a wrist immobilizer, which provides increased early functionality and comfort without the complications of a cast. While it is prudent to avoid high-risk activities that might lead to re-injury, a child can return to usual play. ❁

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Competing interests
None declared

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BOTTOM LINE

- Radial fractures are by far the most common pediatric fractures (40% to 50%), and 80% of these involve the distal third of the radius.
- Traditional treatment of buckle fractures involved casting the injury for up to 3 weeks; and for distal radius and ulna fractures an above-elbow cast for up to 6 weeks has typically been used.
- The most up-to-date evidence suggests that for pediatric distal radius fractures, which include buckle fractures and minimally angulated fractures (<15°), the new standard of care should be the use of a removable wrist immobilizer.

POINTS SAILLANTS

- Les fractures du radius sont, dans une large mesure, les fractures les plus courantes chez l'enfant (de 40% à 50%) et, dans 80% de ces cas, elles touchent le tiers distal du radius.
- Le traitement traditionnel des fractures en motte de beurre comporte de plâtrer la blessure pendant jusqu'à 3 semaines; dans les cas des fractures du radius distal et du cubitus, un plâtre jusqu'au-dessus du coude est habituellement laissé en place pendant une période allant jusqu'à 6 semaines.
- Les plus récentes données probantes font valoir que, pour les fractures pédiatriques du radius distal, incluant les fractures en motte de beurre et celles minimalement angulées (< 15°), la nouvelle norme de soins serait d'utiliser un dispositif amovible d'immobilisation du poignet.

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