

## December 2011 Case Study: The Power of Remodeling Bones!!

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**History of Present Illness:** The patient is a 6 year-old boy who fell off the monkey bars onto an outstretched left forearm. He noticed an immediate deformity in the forearm and was brought to the emergency department via ambulance with his parents. Past medical history is unremarkable, he is a very healthy 6 year old male.

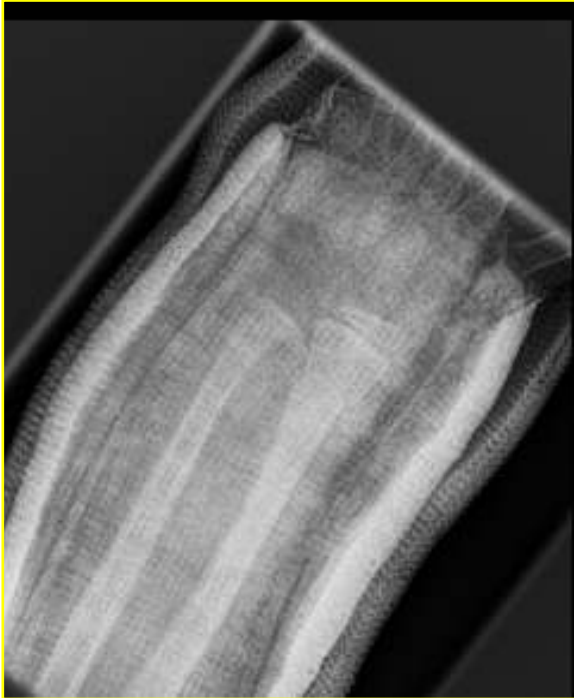
**Physical Examination:** Patient is alert, conversant, in mild distress due to pain, Height 140 cm, Weight 64 pounds, there is an obvious deformity and mild/moderate edema over left wrist/forearm. He is neurovascularly intact distally, normal ulnar, median, radial, nerve function, excellent capillary refill, appears to have normal sensation, normal pulses.

**Radiographs (Initial AP/Lat x-rays of the left forearm taken in Emergency Room)**  
**Significantly displaced distal both bone forearm fracture (radius/ulna)**



After conscious sedation was given, the displaced distal radius and ulna fractures were reduced and a long arm cast was applied. There was significant improvement in alignment.

Radiographs (AP/Lat x-rays of left forearm after closed reduction in Emergency Department)



The patient returned for follow up at one week at which time x-rays were repeated and demonstrated a slight increase in dorsal angulation of the distal radius fracture.



The patient was instructed to follow up in one week, however, did not return to clinic until 5 weeks after initial injury. X-rays were repeated which showed a significant increase in the amount of angulation. There was significant apex volar angulation of the distal radius fracture. There was abundant callus formation and healing of the fracture. Given the patients very young age and potential for significant bony remodeling, it was decided to treat conservatively and have the patient return for follow up x-rays in 4 months to ensure complete healing.



**Brief Discussion of Bone Remodeling:** There are significant differences in the bone structure of a child and an adult. These differences are important for the correct evaluation and treatment of the fracture. In general, a child's bone heals much faster than an adult's because of the thicker, stronger, and more active dense fibrous periosteum (covering of bone). The periosteum has extensive blood vessels that supply oxygen and nutrition to the bone cells. The stronger and thicker periosteum in children causes a better supply of oxygen and nutrients to the bones and this also helps in the remodeling of the fractured bones by supplying.

The ability to remodel depends on the bone involved, the patient's age (younger = more remodeling), the proximity to the joint, (closer to the physis or joint=more remodeling) and its orientation to the joint axis. In the typical long bone, 75% of the remodeling occurs by reorientation of the physis while appositional remodeling of the diaphysis can only be expected to contribute 25% to the remodeling process.

**Final Radiographs (AP/Lat Left Forearm 4 months post injury):**



Note complete healing of fractures and near complete remodeling of volar angulation. Physical examination showed no evidence of angulation. He had returned to all activities and all sports without any pain or restriction.