



POSNA

The Pediatric Orthopaedic Society of North America

Fractures Associated with Head Injury

Objectives

1. Discuss the effect of head injury on outcome of the multiply injured pediatric patient
2. Discuss the orthopaedic assessment of the head injured child or adolescent
3. Discuss management of fractures associated with the head injured patient
4. Describe problems other than fracture associated with head injury

Discussion points

1. What factors contribute to the exuberant callus formation in head injured patients?
2. What care does the child with fractures and a head injury need after hospital discharge?

Discussion

Severe head injury is the most devastating childhood injury. Recent reports indicate the mortality of severe head injury in children is nearly the same as for adults, and residual disability is common. Multiple injuries, including fractures, often accompany severe head injury, which is generally the result of a motor vehicle accident. In children less than 2 years of age, abuse remains a common causative factor, especially for subdural hematoma, and completely for retinal hemorrhage. There is general agreement that rigid fixation of fractures, either external or internal, facilitates care. It is not so clear whether outcome is changed by early fixation, in fact one recent report suggest early fixation of fractures may contribute to a worse neurologic result. Hemorrhage is less often a factor in children's pelvic fractures than adults, mortality was exclusively a

result of head injury. In general, the severity of head injury is related to outcome.

Recognition of extremity or pelvic fractures can be difficult in the comatose patient. Bone scintigraphy has been found to have a reasonable yield in identifying unrecognized fractures. Procrastination in management of fractures is most wisely avoided, as many children will again ambulate even after several weeks of coma. Peripheral nerve injury is another injury recognized late, and Gillogly reported late peripheral neuropathy in 19/ 122 patients with severe head injury unassociated with extremity injury; all had severe spasticity. Other complications include heterotopic ossification and/ or exuberant callus following fracture. Serum from head injured patients has been identified as having an increased quantity of growth factors, which may contribute to bone formation in anatomic sites not generally predisposed to ossification. To further complicate the diagnostic picture, venous thrombosis has been reported in a limb coexisting with heterotopic ossification. Late resection of heterotopic ossification can restore motion and function, results appear to be enhanced with administration of indomethacin or salicylates. Spasticity can be very difficult. Fractures in spastic limbs obviously require some type of rigid fixation, external fixation is most often used at present. Management of spasticity in the head injured patient can include splinting and casting, in conjunction with agents such as botulinus toxin or phenol which do not have a permanent effect.

A recent follow-up study by Greenspan noted that needed physical and/ or occupational therapy and mental health services were often not prescribed after discharge. Careful follow-up by knowledgeable professionals was recommended. The head injured child presents many challenges in the acute phase (recognition and treatment of fractures), the subacute phase (spasticity), and the chronic phase (rehab, heterotopic ossification, and maximizing function).

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