

Metatarsal Fracture In the Adolescent

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This case report deals with the diagnosis, considerations and treatment of fractures of metatarsal bones in an adolescent. Metatarsal bones are long bones and as such can be considered as a group. Adolescent fractures of long bones poses an additional consideration, damage to the epiphysis. The question is how do we determine the prognosis concerning growth following an epiphyseal fracture in adolescents.

Several authors have presented classification systems of epiphyseal fractures based on mechanism of injury and prognosis concerning disturbance of growth. One such system is the Salter and Harris classification of epiphyseal plate injuries. It is broken down into five distinct categories.

Type I is produced by shearing or avulsion force. The epiphysis separates from the metaphysis. There is no fracture of bone and the periosteum remains intact. The blood supply is uninterrupted and growth is usually not disturbed.

Type II which is the most common of all five types is rarely seen in children under ten years of age. It is produced by shearing or avulsion force. The line of separation is along the epiphysis and then a fracture through the metaphysis producing a triangular metaphyseal fragment which is still attached to the epiphysis. The periosteum is intact and the metaphyseal fragment is torn on the opposite side. Blood supply is usually undamaged. Reduction is usually achieved and maintained with relative ease. Growth is uninterrupted.

Type III is a rare injury caused by an intra-articular shearing force. The fracture extends from the joint surface to the epiphyseal plate, along the plate to the periphery. The most common location is the distal tibial epiphysis on the anterior lateral aspect. Restoration of a congruous articular surface is essential in its treatment. Prognosis for future growth is good provided circulation to the separated bone fragment of the epiphysis is not impaired.

Type IV is an intra-articular fracture usually caused by severe eversion or inversion forces. The fracture line begins at the articular surface and extends through the epiphysis across the epiphyseal plate and through a portion of the metaphysis. The fragment is usually displaced upward, thereby, necessitating open reduction to restore a smooth articular surface and to prevent growth arrest. The prognosis is not favorable.

Type V is an uncommon injury resulting from severe compression forces. Displacement of the epiphysis is minimal in this type of injury. As a result, diagnosis is difficult and may be misdiagnosed as a simple sprain. In treatment of this type of injury, weight bearing must be avoided for at least three weeks. Prognosis is poor because the premature closure of the epiphyseal plate.

Fractures occurring in the shaft of the metatarsal, greatly reduces the threat of a growth disturbances since the epiphysis is usually not involved. A disturbance in growth can occur, however, if applying traction to reduce the fracture you become too aggressive and inadvertently damage the epiphysis.

A seven year old male was presented to the office a few hours following a fall from a height and landing on his left foot. The patient complained of pain on the dorsum of the left foot and was non-ambulating on the involved foot. Upon examination, moderate edema with ecchymosis on the dorso-lateral aspect of the left foot in the area of the third to fifth metatarsal shafts was observed. The area was tender to light palpation. The posterior tibial and dorsalis pedis pulses were within normal limits and the sub-papillary venous plexus filling times was instantaneous. Radiographic evaluation revealed transverse fractures of the second, third, fourth and fifth metatarsals of the left foot in the metaphyseal region (Fig. 1). All fracture sites were in good alignment and reduction was not necessary. Treatment consisted of a non weight bearing below the knee plaster cast. Three days later the patient had broken down the cast and a new one had to be applied. Three weeks

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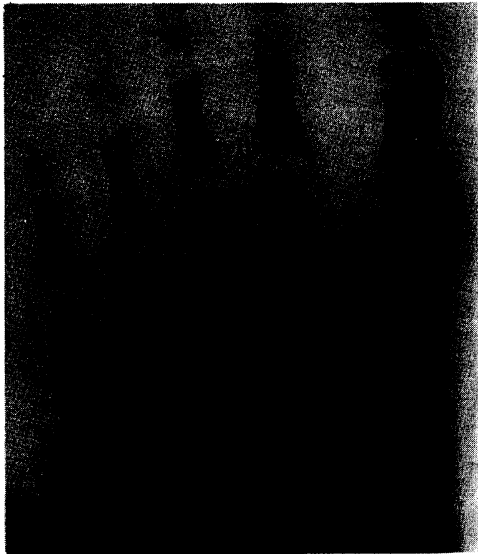


Fig. I

post injury the cast was changed and the edema was markedly reduced. Six weeks following the initial injury the cast was removed and the radiograph revealed four healed fracture sites in excellent alignment (Fig. II). The patient was discharged eight weeks post injury with a completely satisfactory result.

Although this case did not involve an epiphyseal fracture, epiphyseal injuries should be considered serious because growth disturbances frequently follow such injuries. The classification system presented earlier in this paper makes it somewhat easier to determine a prognosis when treating epiphyseal fractures. It should be remembered that certain basic principals in the treatment of epiphyseal fractures must be followed in order to achieve a successful result. Foremost is gentleness in reduction. Reduction should be performed the same day the injury occurs, if seen late (2 weeks) accept the deformity, manipulation at a late date may cause harm. Multiple attempts of reduction must be avoided.

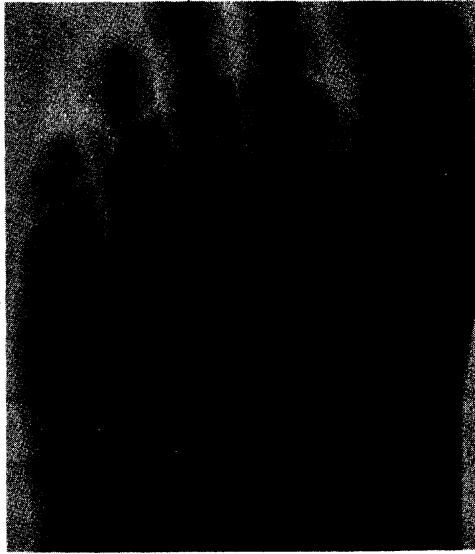


Fig. II

Five basic factors governing the prognosis in epiphyseal fractures are:

1. Type I, II and III have a better prognosis.
2. A disruption of blood supply averts growth.
3. Gentleness in reduction.
4. The younger the patient the less favorable the prognosis.
5. Infection destroys the growth plate.

Finally it must be remembered that no matter how carefully anatomic reduction is performed growth disturbances frequently follow epiphyseal injuries.

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