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It has been frequently stated that once a fracture heals, the bone is stronger than before and that the bone will never break again at the healed fracture site. It has also been stated that a sprain could be a more serious injury than a fracture. At times and under certain circumstances, both clichés are true. There are a number of basic factors that determine the prognosis in bone fractures. Among these are the age of the patient, the particular bone that is involved, the location or site of the fracture in the involved bone and the nature and extent of the damage to the overlying and surrounding soft tissue structures.

In general, the prognosis is more favorable in children than in adults. This is particularly true in fractures of the long bones. In accordance with Wolff's Law, nature will endeavor to correct shortening and deformity at the fracture site in children while the epiphyses or growing centers are present and bone growth is still taking place. This concept finds its application in fractures of the shaft of the femur in children. The standard treatment is the use of either Bryant overhead traction or Russell traction, depending upon the age of the child and followed about three weeks later by the application of a plaster body spica. With this customary and accepted form of treatment, one rarely obtains good apposition and alignment of the fractured fragments. The usual result is displacement and overriding of the fractured fragments with shortening of the lower extremity. One of the basic reasons for continuing this form of treatment despite the fact that it is rarely possible to obtain good position of the fractured fragments is the fact that in the great majority of the cases, nature eventually corrects the deformity at the fracture site and the shortening. It is not unusual to find that as much as

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one and a half to two inches of shortening which is present following the removal of the cast and x-ray evidence of bony union, will result in a quarter of an inch lengthening two years later.

On the other hand, fractures involving the epiphyses or growing centers in children can result in shortening of the involved long bone and deformity of the extremity. A fracture of the lower end of the radius with extension into the distal or lower epiphysis may result in impeded growth of the radius. With normal growth of the ulna, the other bone in the forearm, there will be progressive increasing deformity of the wrist due to the inequality of the lengths of the two bones. This deformity is referred to as a Madelung's Deformity, which is generally corrected by surgical resection or removal of the lower end of the ulna in an attempt to equalize the lengths of the radius and ulna. Similarly, in fractures of the lower end of the tibia with involvement of the distal epiphysis, there may be interference with the rate of growth of the tibia. Here again with the normal rate of growth of the unaffected fibula, the other bone in the leg, there will be progressive increasing deformity of the ankle and foot as a result of the inequality of the lengths of the tibia and fibula. Correction of this deformity is accomplished by surgical removal of an appropriate section of the shaft of the fibula in an attempt to equalize the lengths of both bones. In fractures of the hip with involvement of the upper femoral epiphysis or growing center, which is located between the head and the neck of the femur or thigh bone, deformity of the hip and shortening of the femur may occur.

The prognosis following bone fractures in the elderly is frequently poor because of reduced arterial blood supply to the fracture site. This is particularly true in the case of a fracture of the neck of the femur within the joint capsule and referred to as an intracapsular fracture. In individuals over sixty-five years of age, there is marked impairment of the arterial blood supply to the head and neck of the femur. As a result, the undernourished femoral neck weakens and fractures following a relatively minimal type of trauma. A common example is the elderly female who gets out of bed at night to go to the bathroom and suddenly experiences pain in the hip with inability to bear weight on the lower extremity. Another common manner of occurrence is the elderly male who while disembarking from a bus, misjudges the actual distance between the last step and the ground and steps down somewhat heavier on the lower extremity. He too experiences sudden pain in the hip and is unable to bear any weight on the affected lower extremity. The term Pathological Fracture is frequently applied to intracapsular fractures of the hip in the elderly since it takes relatively little trauma to produce the fracture in the poorly nourished weakened neck of the femur.

Considering the fact that intracapsular fractures of the neck of the femur are of a pathological nature because of the underlying impoverished blood supply or ischemia, the prognosis for eventual bony healing is extremely poor. Absorption of the femoral neck with shortening of the lower extremity ranging from one half inch to two inches is fairly common. Non-union is not uncommon and aseptic necrosis or death of the head of the femur does occur on occasion. Treatment would then consist of replacement with an artificial metal head such as an Austin Moore Prosthesis if the patient could tolerate this major surgical procedure. Otherwise, the patient would be permanently confined to a wheel chair.

Certain bones in the human skeleton are prone to delayed or non-union when fractured. The most notorious of these is the navicular bone in the wrist. The usual X-ray appearance is that of an undisplaced linear type fracture of the body or waist of the bone, a finding which is frequently missed on the X-ray film. The injury is generally diagnosed initially as a sprain of the wrist. However, the persistence of the pain leads to the taking of further X-rays perhaps three to six weeks later, at which time, the fracture is readily recognized, since in the process of bone healing, dissolution of the bone at the fracture site precedes bony union. The treatment for fractures of the navicular (scaphoid) bone of the wrist requires a minimum of twelve weeks complete immobilization of the wrist in a cock-up plaster cast. Failure of the fractured fragments to eventually unite calls for open reduction and the use of bone graft. Generally, the prognosis in fractures of the navicular (scaphoid) bone of the wrist is guarded.

The location or site of the fracture in the involved bone generally affects the ultimate prognosis. A specific example is the intra-articular fracture which enters or involves the joint surface of the bone. This type of fracture is seen at times in the wrist, ankle, knee and shoulder joints. In cases where the fractured fragments are displaced, it is generally not possible to accomplish an accurate mosaic anatomical reduction of the fractured fragments. This results in an irregularity of the joint surface, which causes pain and limitation of movement of the joint. This complication is referred to as Secondary Traumatic Arthritis. Even in undisplaced fractures involving the articular surface of the bone, it is not uncommon to find Secondary Traumatic Arthritis because of the irregularity of the cartilage which is not demonstrable by X-ray. It is not uncommon to find Secondary Traumatic Arthritis following intra-articular fractures of the lower end of the radius, the lower end of the tibia as in Trimalleolar Fractures of the ankle, in Plateau Fractures of the upper end of the tibia involving the knee joint and in fractures of the head of the humerus or scapula involving the glenoid cavity in the shoulder. It may also occur in the hip joint in cases involving a fracture of the acetabulum. Traumatic Arthritis generally causes permanent pain and restricted movement of the affected joint.

Finally, the prognosis in bone fractures may be affected by the nature and extent of the damage to the overlying and surrounding soft tissue structures. Open or Compound Fractures in which the external wound communicates with the underlying fracture site frequently lead to Osteomyelitis or bone infection, a prevalent cause of delayed or non-union. Interposition of muscle or other type of soft tissue between the fractured fragments must be dealt with by open reduction to avoid delayed or non-union. In general, massive destruction of overlying or surrounding soft tissue structures in bone fractures tends to a less favorable prognosis.

In conclusion, the prognosis in bone fractures may be affected by the age of the patient, the specific bone involved in the fracture, the actual site of the fracture in the involved bone and the nature and extent of the damage to the overlying and surrounding soft tissue structures.