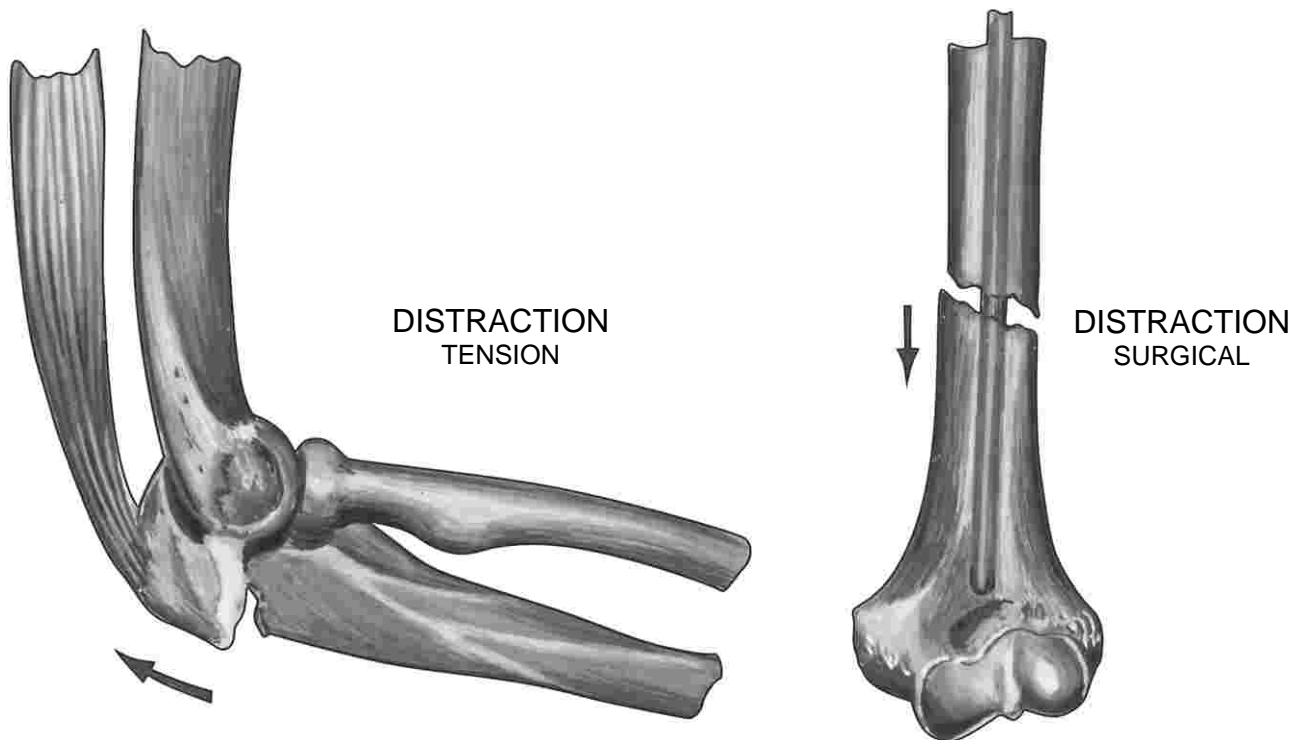


12 DELAYED HEALING AND NON-UNION



Discouraging Factors

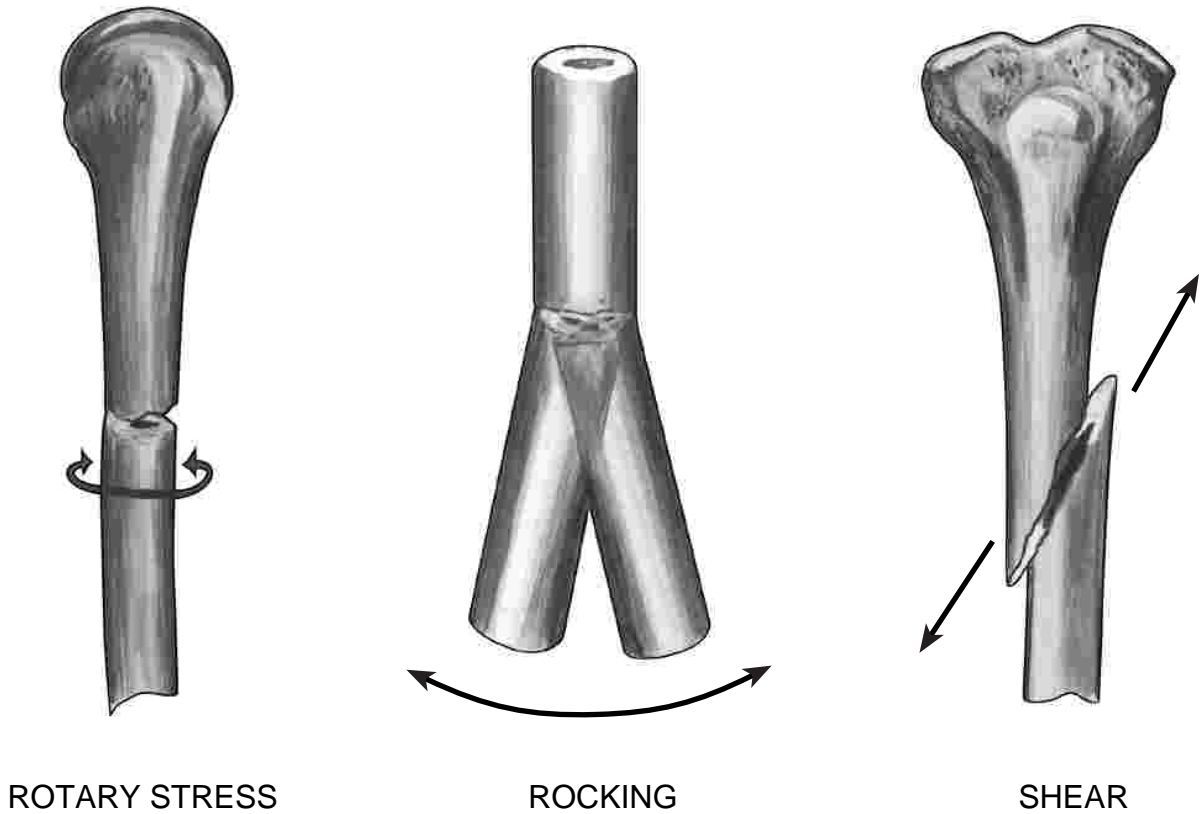
Anything which tends to pull or hold the bone apart can delay or prevent union.

(A and B) **Distraction:** In the **forearm** non-union can occur in the radius or ulna because the bone ends can be held apart by the relatively greater length of its fellow.

In the **tibia** the bone ends are frequently held apart by the rapidly healing or intact fibula.

In medullary fixation, distraction can occur from the following:

1. A large rod tightly impacted in the marrow canal.
2. A rod that is too long.
3. A rod which has a blunt distal end. A blunt rod by failing to penetrate the distal cancellous bone can force the fragments apart. This is to be especially guarded against in the shafts of the **ulna** and **humerus**.
4. Unusually weak musculature of an extremity (shaft of **humerus** and lower **ulna**).
5. Failure to exert counterpressure against the distal fragment, when indicated, as point is driven into fragment.



Discouraging Factors (CONTINUED)

(C) **Rotary stress:** With proper application of pins this is an infrequent problem, but can become disastrous. It is important mostly in those regions where healing is slow or delayed.

In delayed union of the **humerus**, periarticular adhesions can develop about the shoulder, partially to fix this fragment so that rotary motion of the lower fragment will produce twist at the fracture site.

The **radius** can usually be so securely fixed that torque is no problem. In some fractures of the lower third, external splinting might be necessary to prevent twist.

In the distal **ulna**, rotary stress is quite a problem. It can be remedied by driving a pin upward from a point of insertion in the side of the bone near the styloid end, or by external splinting.

Torque is not much of a problem in the **femur** when the patient is ambulatory, but it can be important in the bedridden patient because of the rotary action of the weight of the foot.

In the **tibia** external splinting is indicated in a majority of the cases.

(D) **Rocking** (at the fracture site): This is to be expected if:

1. The pin is too small.
2. The pin is too short.
3. The bone is badly comminuted.
4. The pin does not secure a good purchase on both fragments.
5. **Weight bearing is begun too early.**

Excessive rocking at the fracture site not only delays healing, but excessive motion of the rod within the bone can cause local bone necrosis.

(E) **Shear:** Lateral stress is usually limited by the presence of the axial rod. In the **femur** it is of little importance because we are dealing with a single bone and even though the fracture be oblique, good contact results from muscle pull.

Certain oblique fractures near joints will displace to cause persistent distraction. Example: shaft of **tibia** and proximal **ulna**.