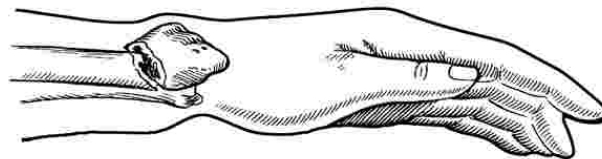


23 THE WRIST



Colles' Fracture: mountain or mole hill?

Colles' Fracture*

This is the unbelievable fracture. It appears simple, yet, is complex. Here the pin would appear contraindicated, yet it is unbelievably effective.

Surprisingly, the older patients respond better to pinning than the younger ones. The elderly patient regains function very rapidly. It is the middle age group which recovers slowly.

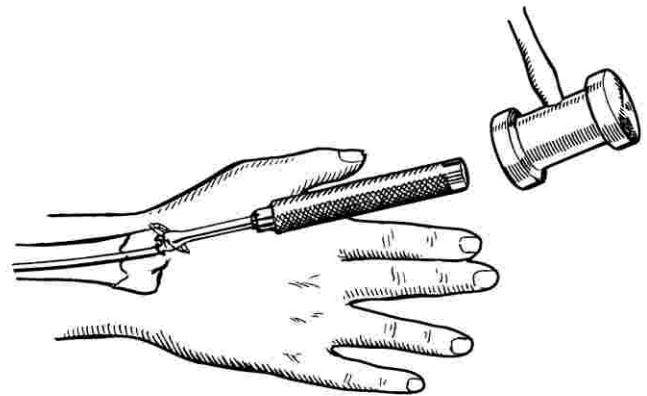
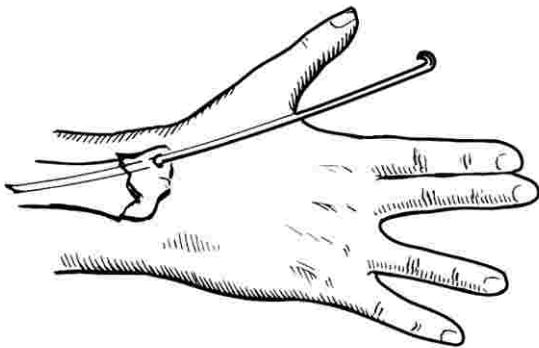
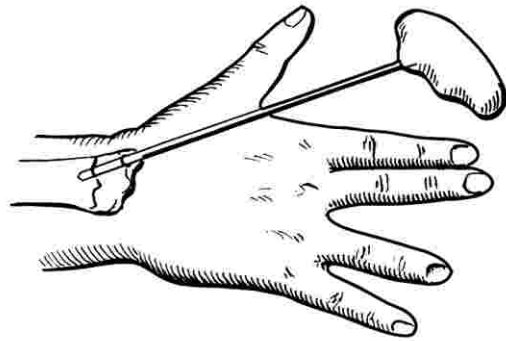
Upon the realization that our own results, following the closed reduction and external fixation method, left much to be desired, an effort was made to develop a pin technic. It proved surprisingly effective. And now, after the closed pinning of more than 400 wrist fractures, although the results have not been perfect in every case, the overall picture has been remarkably improved. At the present time, there is to us, no fracture more intriguing or technic

more gratifying than pinning of Colles' fracture.

The technic can be simple. But it must not be forgotten that the fracture itself is complex.

Follow-up treatment is most important if good function without deformity is to be secured quickly. The pinned wrist must be checked frequently for the first week, and at weekly intervals thereafter until complete recovery. Early motion must be insisted upon and temporary splinting done if indicated.

There is a marked difference in the bone structure of the wrist at different ages. In the elderly, the cancellous bone is friable and cortex is thin. Telescoping of the thin cortex must be guarded against. In the young, the cancellous bone is firm and angulation will occur unless the distal fragment is transfixed accurately.



Technic

The pin chosen is one-eighth of an inch in diameter and six or seven inches in length. If the medullary canal of the radius is unusually small, use a shorter pin or if necessary, a pin of three-thirty seconds inch in diameter.

The fracture is reduced and held in position by straight traction on the middle and index fingers, with the wrist in the neutral position. Traction widens the gap in the anatomic snuff box between the styloid of the radius and the base of the thumb, so that the tip of the styloid can be palpated even after considerable swelling has occurred.

Over the tip of the styloid, a 1/4 inch incision is made through the skin only. This safeguards against injury to tendons, nerves or blood vessels. This incision is made very slightly toward the dorsum about mid-way between the abductor and extensor tendons of the thumb. An opening is then made in the styloid end of the radius as near the articular margin as possible, passing the instrument (awl-reamer or drill) through the stab wound.

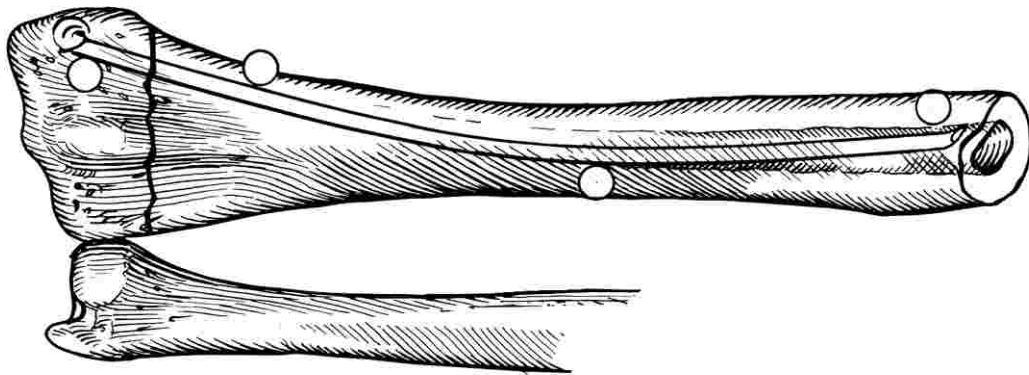
The instrument is first held vertical to the cortex of

the bone and rotated back and forth on its axis so as not to entangle the soft tissue and is passed just deeply enough to penetrate the cortex of the bone. Gradually the instrument is brought into fairly close alignment with the long axis of the radius as penetration of the bone is increased.

The pin is then pushed into this opening so that the sled runner surface of the point glides upon the far cortex and is driven up the cavity of the radius. The proximal end on the pin should be stress relieved to conform to the contour of the cortex. This will prevent excessive ulnar deviation of the distal fragment.

Check up x-rays are made before the head has been completely set because it is difficult to grasp the head of the pin for removal once it has been driven beneath the soft tissues. The skin incision is closed with one suture.

About one case in four requires plaster splints. After a few days, the splints should be removed frequently for exercise.



Dynamics of Fixation

The radius is a rather tortuous bone and when the pin is driven into the shaft it secures bone contact at three points giving firm fixation within this fragment.

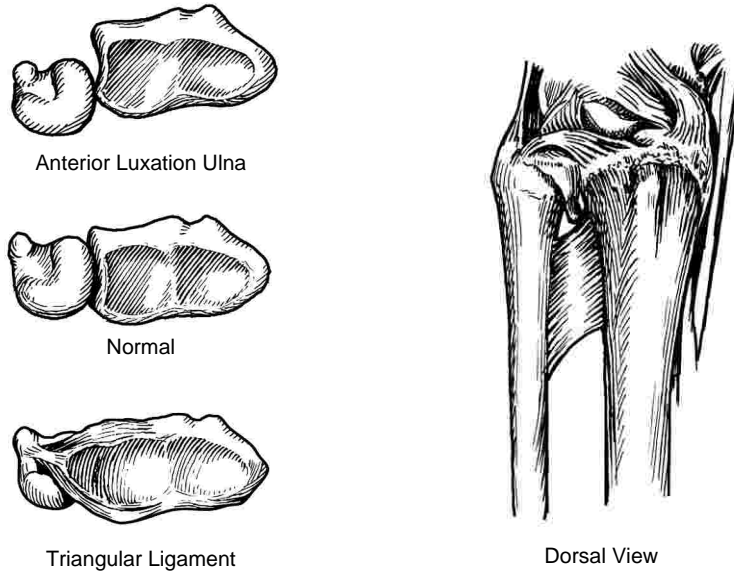
There is an intrinsic dynamic force at work in the wrist which produces and maintains the deformity of radial deviation. The reduction of the wrist fracture requires three point pressure whether applied externally or internally. The pin applies this pressure within the substance of the bone.

As the pin travels up the medullary cavity of the bone and the sled runner point is deflected toward the long axis of the shaft, the shaft of the pin rocks upon a fulcrum like a seesaw, so that the head or proximal end of the pin is forced

medially (vase of flowers principle) to resist the intrinsic dynamic force of the extremity and to force the distal fragment toward the ulna. The opposition force of the ulna gives additional stability.

For the reconstruction of the radio-ulnar relationship, the styloid end of the ulna is snugly pressed into its notch in the radius, and this joint usually becomes stable despite the fact that the triangular ligament has been damaged.

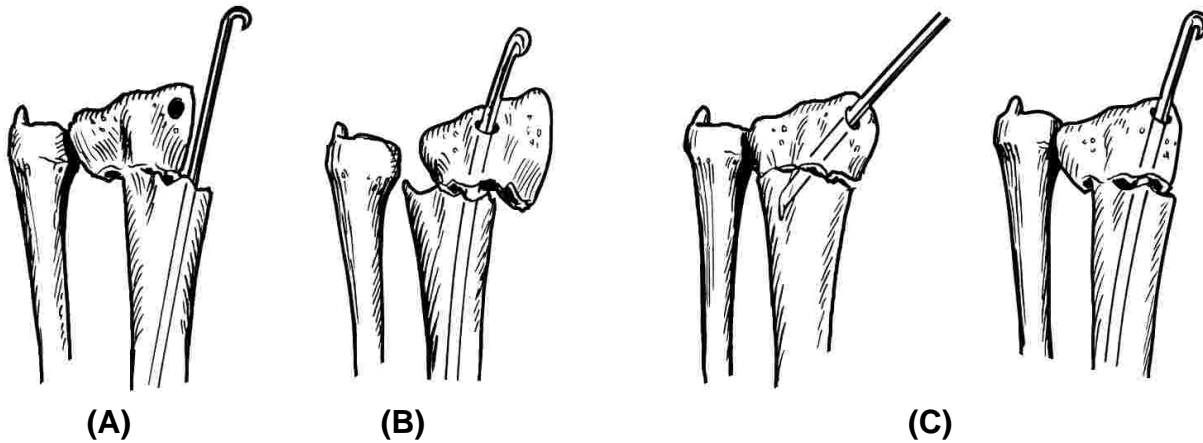
If one will inspect carefully, the lower end of the radius, it will be noted that there is a natural gutter within the bone into which the pin fits to limit anterior and posterior displacement of the fragment.



Radio-Ulnar Relationship

The radius glides over the distal end of the ulna through an arc of approximately 180 degrees to supinate and pronate the hand. This relationship must be accurately restored to give stability to the ulna because the styloid tip of the ulna is usually

fractured or the triangular ligament is torn. Over-correction of the distal fragment of the radius into the ulnar deviation or the production of a reverse Colles' type deformity tends to limit the function of supination.



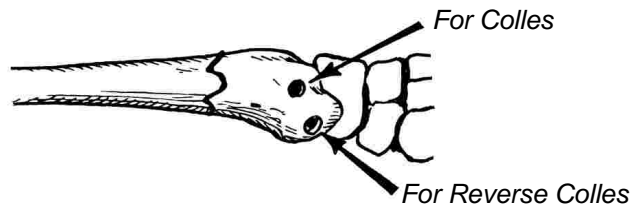
Technical Errors

(A) - Pin missed channel in distal fragment. Result: ulnar deviation of fragment, widening of the wrist.

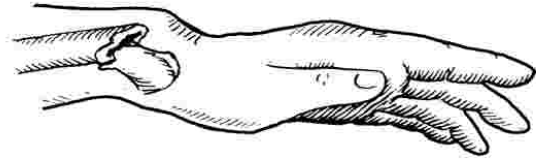
(B) - Point of entrance in distal fragment too far medial. Result: radial deviation of distal fragment with poor fixation and loss of ulnar relationship. The head of this pin would be beneath the tendons

and would be difficult to remove.

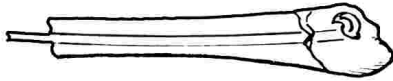
(C) - Pin enters distal fragment at an improper angle. Result: angulation with disturbance of radio-ulnar relationship. Wrong angle of insertion can produce ulnar deviation, dorsal angulation or posterior angulation of distal fragment.



Colles Fracture



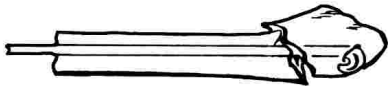
Reverse Colles Fracture



Right



Right



Wrong

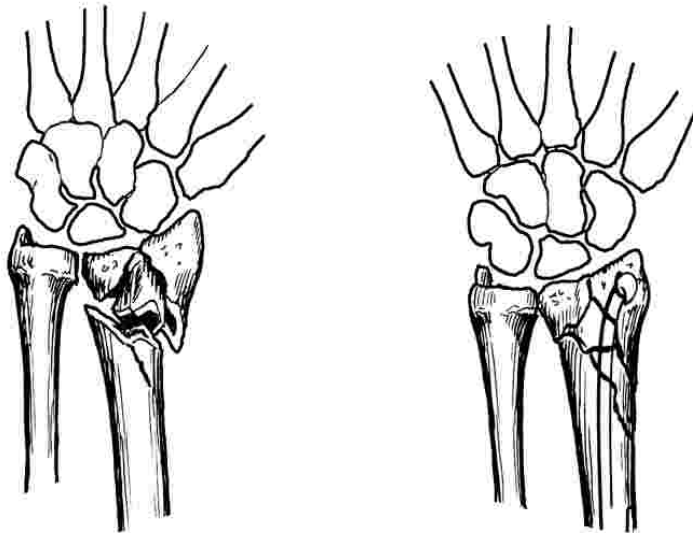


Wrong

Fracture Variations

The wrist strongly parallels the ankle in the mechanism of the injury and of the deformity produced. Nature of the violence must be taken into consideration to be sure that the dynamic forces exerted by the pin will oppose the intrinsic dynamic forces of the deformity. If the dynamic forces of the pin are exerted in the same direction as the intrinsic dynamic forces of the wrist, the deformity will be exaggerated.

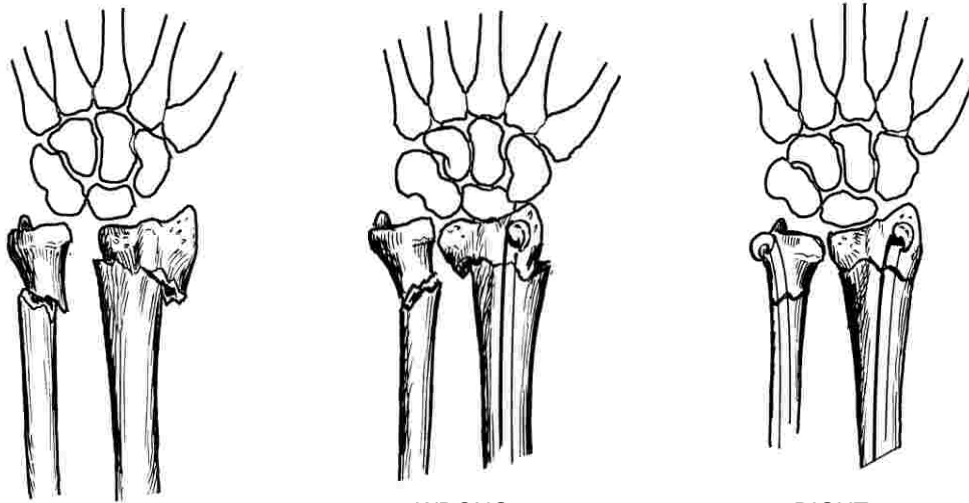
In an ordinary Colles' fracture it is necessary to introduce the pin in the distal fragment slightly to the dorsum to prevent recurrence of deformity. In reverse type Colles' fracture, the opening should be made slightly toward the anterior surface to resist the deformity. If these factors are not taken into consideration, angulation will occur.



Comminute

Comminuted fractures of the distal end of the radius can be successfully pinned if the styloid fragment is large enough to allow the pin to secure a purchase. The dynamic force exerted by the pin upon the styloid fragment results in maintenance

of the length of the styloid and compresses the multiple fragments to give good anatomic restoration. Despite the multiple fragments, fixation is often surprisingly stable.



WRONG

RIGHT

Fracture - Both Bones

When there is associated fracture of the distal end of the ulna as well as the fracture of the distal end of the radius, the application of a single pin in the radius will exert a dynamic force against the distal fragment which is unopposed by the ulna and results in deformity of both bones. The second pin introduced in the reduced ulna will oppose the

force of the first pin to give stable fixation without deformity.

In both fractures above depicted, the temporary application of removable plaster splints is an excellent safeguard. Shortening of the styloid end of the radius in the properly pinned wrist has been rarely observed.