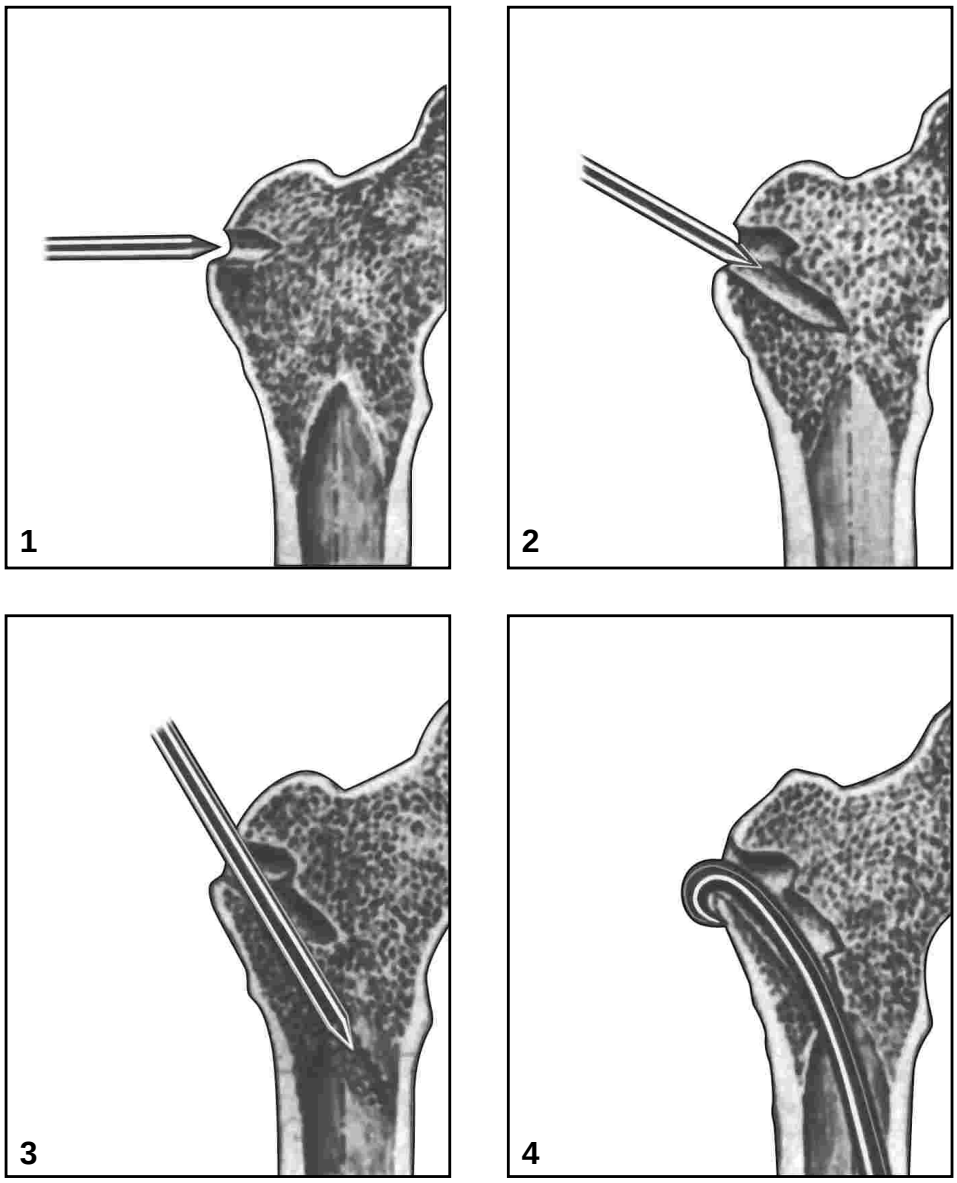
4
INSERTING THE PIN

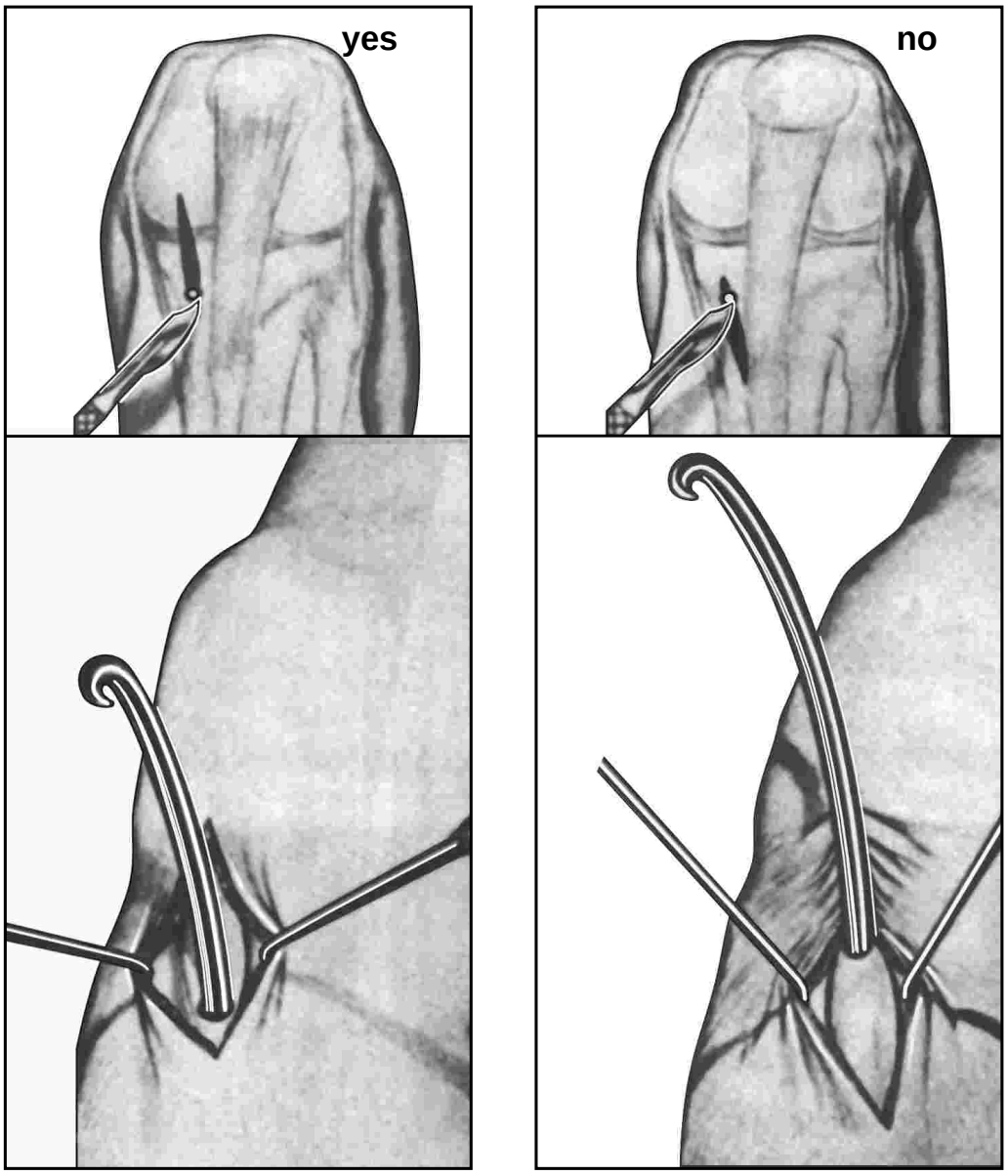


Making An Opening

Large incisions are not necessary but the incision should be accurately placed. It can be difficult to insert a pin into the bone at the proper angle when soft tissue interferes.

The opening in the bone is made with the awl-reamer of the same diameter as the pin to be used. The reamer is rotated back and forth in an arc of 180 degrees.

Hold the instrument vertical to the bone until the cortex has been penetrated. Do not drill deeply. Then change the direction to an oblique one, so that the axis of the awl-reamer closely approximates the long axis of the bone as the bone is more deeply penetrated.



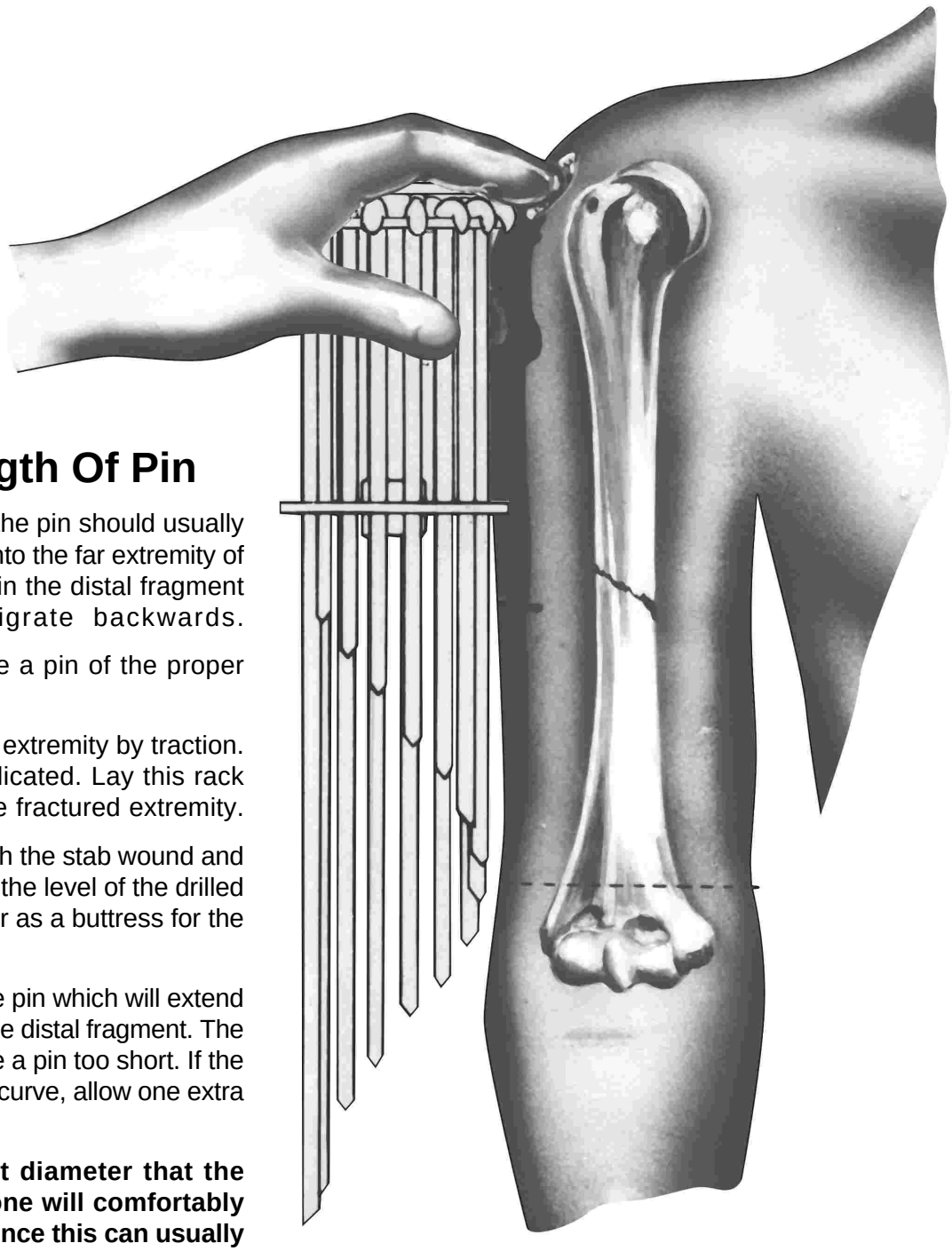
Incision for insertion of pin should be placed so that soft tissue will not interfere with proper direction of pin.

The pin is nearly always introduced from the side of the bone, practically never from the end. This gives firm fixation on the proximal fragment to control rotation and to prevent backward migration of the pin.

In the adult it is rarely wise to attempt to introduce the pin through the thick cortical bone of the shaft. At the extremity of a bone, near the joint the cortical bone is thin allowing the opening to be made more accurately and the pin to be inserted with minimal danger of splitting the bone. In the aged or debilitated the cancellous bone at the extremity is soft and brittle, but in the young it is firm and dense.

In children, however, it might become necessary to make the opening in the side of the shaft in order to avoid injuring the epiphysis.

In most bones the ideal point of entrance is through a bony prominence near the extremity of the bone, such as the tuberosity of the humerus or the great trochanter of the femur. With a little experience most of these prominences can be readily identified by the surgeon from palpation.



Selecting Length Of Pin

To secure the best fixation, the pin should usually but not always, extend well into the far extremity of the bone. If there is motion in the distal fragment the pin will tend to migrate backwards.

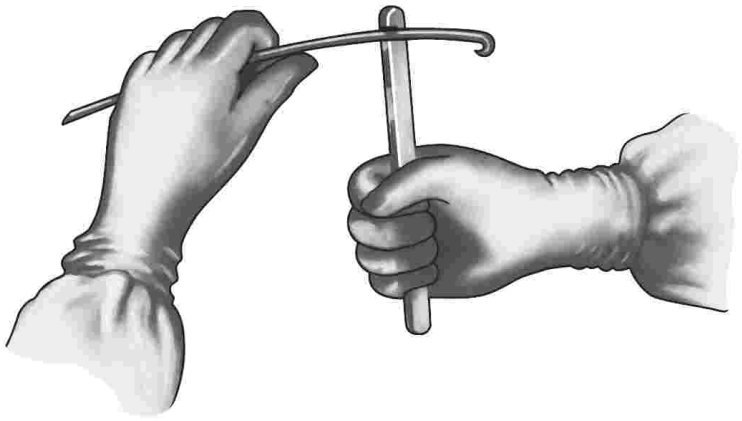
The simplest way to choose a pin of the proper length is as follows:

Overcome shortening of the extremity by traction. Choose the rack of pins indicated. Lay this rack alongside and parallel to the fractured extremity.

Insert the index finger through the stab wound and hold it vertical to the bone at the level of the drilled bone opening. Use this finger as a buttress for the heads of the pins.

Rotate the rack to choose the pin which will extend to the desired bone level in the distal fragment. The natural tendency is to choose a pin too short. If the pin is to be preshaped into a curve, allow one extra length for the curve.

Choose pin of the largest diameter that the medullary cavity of the bone will comfortably accept. With a little experience this can usually be judged accurately from the X-ray films.

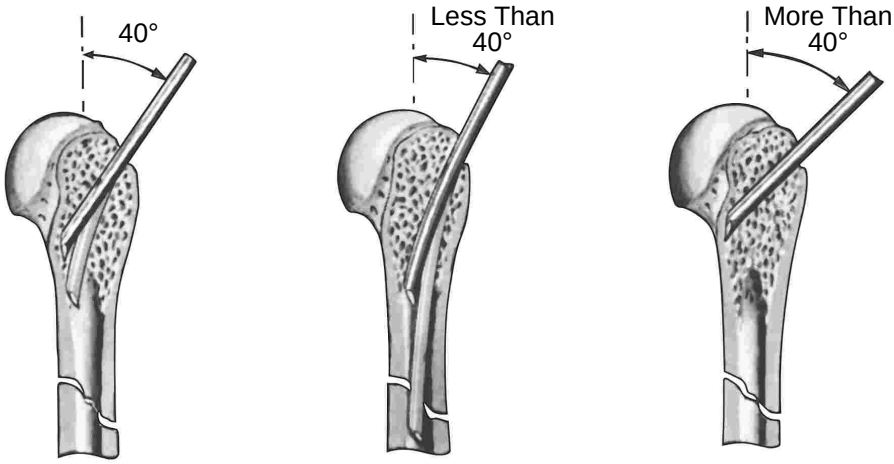


Preshaping the Pin

Curving the pin with the bending iron is done almost routinely in the shafts of the humerus, femur and tibia. The convexity of the curve is always away from the point and the hook of the head.

In the forearm the pin is rarely preshaped.

In fractures near joints the proximal portion of the pin is usually curved with the bending iron just before the pin is driven completely home. This is because a straight pin can be controlled better than a curved one and when only the proximal portion of the pin needs a curve to conform to the contour of the bone it is best to defer this procedure until the pin has been accurately placed.



Angle of Insertion

Diagram showing importance of angle at which pin is inserted. The angle of axis of pin to axis of bone should be less than 40 degrees.

The more acute the angle the easier the pin will drive. The greater the angle the more three point pressure is built up inside the bone. This principle can be used advantageously to secure stable fixation of the proximal fragment. If carried to the extreme, however, the pin may penetrate the far cortex, can split the bone or fail to drive.

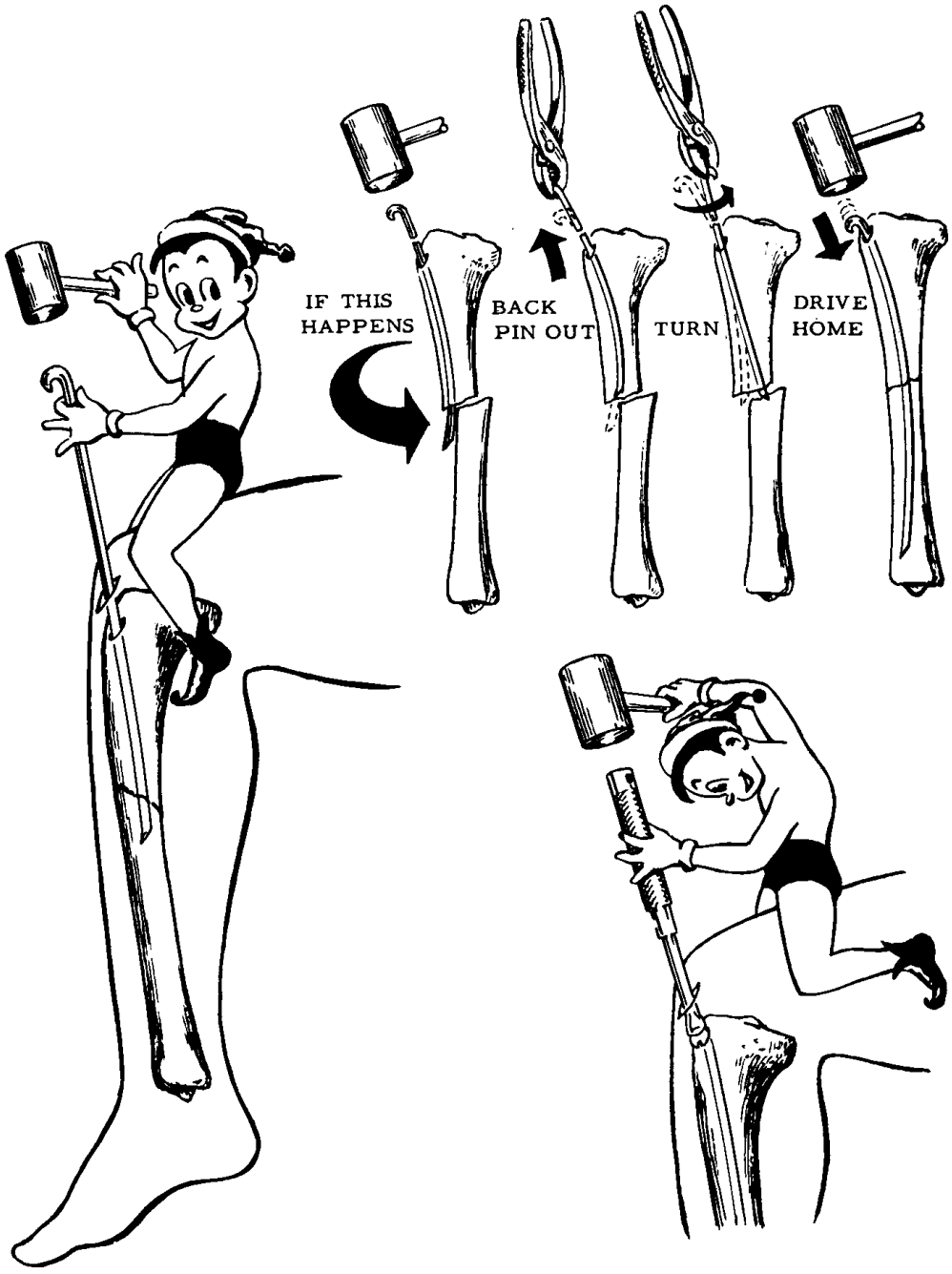
Bone will not split if the pin is introduced at the proper angle through the extremity of the bone. In the hard cortex of the shaft it is difficult to make a drill hole of sufficient obliquity. If a large rod is forced through an improper opening in the shaft splitting can occur. This is especially true in the aged and debilitated.

Driving the Pin

Keep in mind the toboggan sled. To guide properly it must be kept upright. It must be guided but left free to rotate partially on its axis to take the curves or glide over any elevations it might encounter.

The pin glides in the same manner. It will rotate on its axis to take curves or ride over obstructions. If traveling in the right direction, allow it freedom to guide itself.

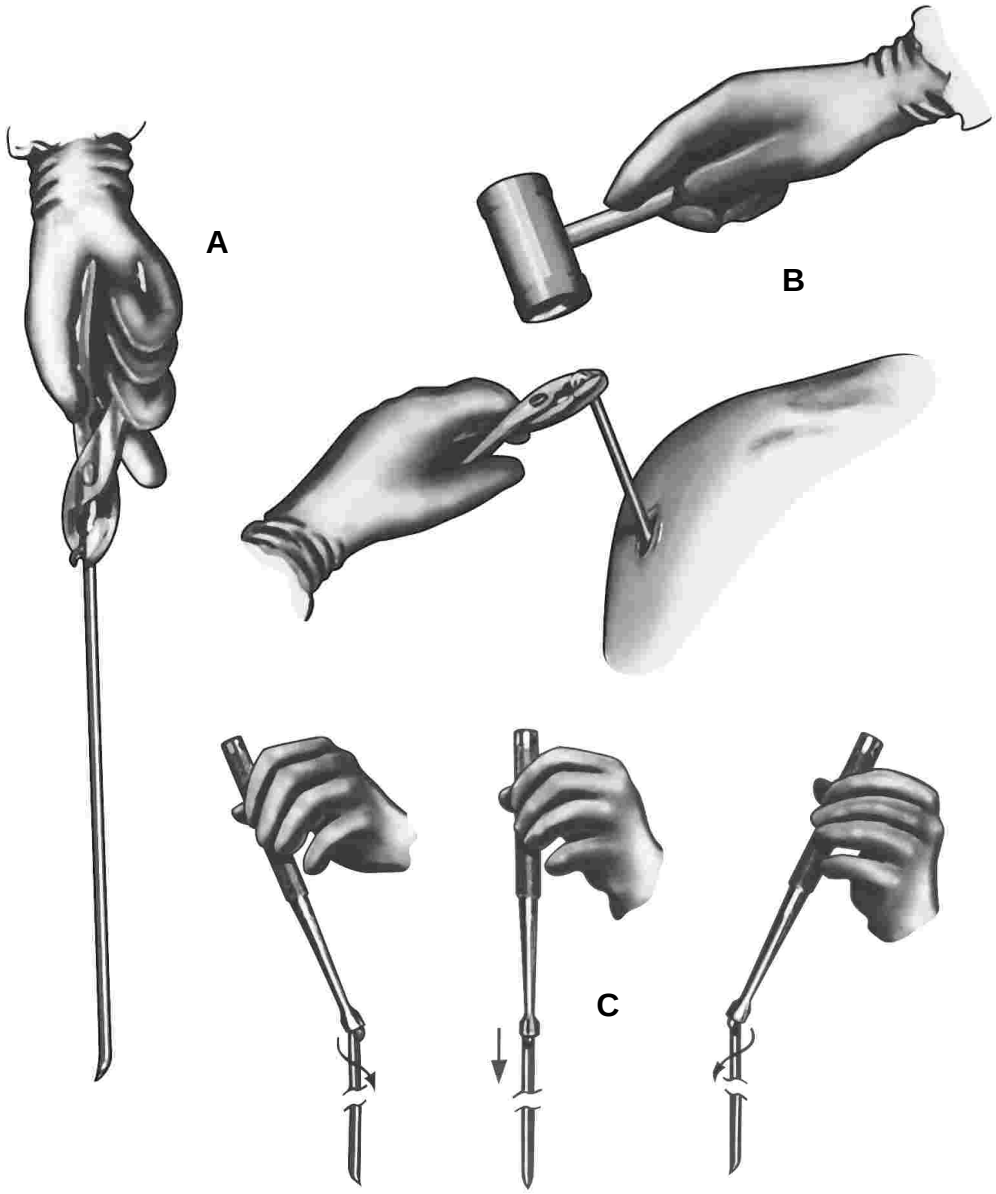
Arrows indicate the head and point which have been set against the cortex of the bone to increase the stability of fixation. This is done routinely.



Easy Does It

Once the point has entered the medullary cavity the pin should drive easily and without pounding. When reduction is perfect, the pin should cross the fracture line uneventfully.

If there is some offset in the position of the distal fragment, the pin may have a tendency to pass out of the bone through the fracture line. In this event, withdraw the pin partially until the point is approximately to the fracture line. Rotate the pin with pliers 180 degrees on its long axis. When the pin is again driven, it can usually be guided into the distal fragment by this maneuver.



Guiding the Pin

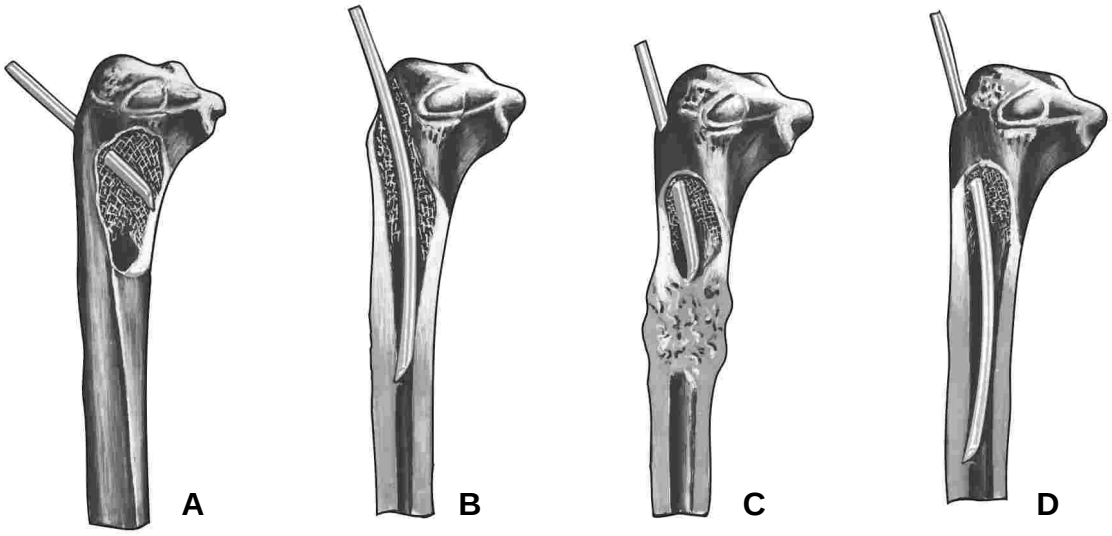
Remember that the point always faces the same direction as the hook of the head. The point can be guided as the pin is driven by:

(A) Rotating the shaft of the pin with a pair of pliers.

(B) Holding the head of the pin with a pair of pliers as the pin is driven.

(C) Using the driver-extractor instrument which allows the direction of the point to be influenced by the angle of inclination of the driver-extractor instrument. If it is inclined to the left, the head and point rotate to the right as the pin is driven. If the instrument is held vertically, the pin is driven straight. If the driver-extractor is inclined to the right, the head and point are forced to rotate to the left.

It is always necessary to set the head and point at the desired position when the pin is completely driven home.



If the Pin Doesn't Drive

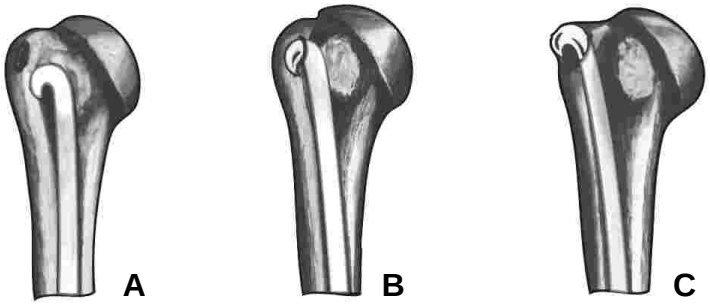
Rarely in young adults it is difficult to drive a pin through the dense cancellous bone. But, generally, the pin should drive easily. Do not continue hard pounding if it does not drive. Correct the trouble.

(A) If the angle of insertion is too horizontal, make a new opening more closely approximating the long axis of the bone.

(B) If the medullary cavity is too small for the size pin used, remove the pin and insert a new one of smaller diameter.

(C) If the medullary cavity is closed from a previous fracture, it is necessary to ream a new medullary cavity in order to drive the pin.

(D) If the point becomes arrested by hanging up against the cortex, disengage it by rotating the pin 180 degrees on its axis with a pair of pliers. Such an impingement is most apt to occur in a curved bone such as the radius. Remember that in driving down a curved bone, it is necessary for the sled runner, not the point, to engage the cortex.



Setting the Head

(A) Do not set the head too deeply in the bone. It may be irretrievably lost.

(B) If it is to remain for several months, drive it snugly down so that the hook of the head grasps the cortex firmly and does not protrude sufficiently to irritate the soft tissues.

(C) If the pin is to be removed in a short time, and particularly this is true in children, leave the head slightly prominent so that it can be palpated beneath the skin. This greatly facilitates removal. The greatest difficulty in removing a pin is exposing the head.