Hughston Health Alert

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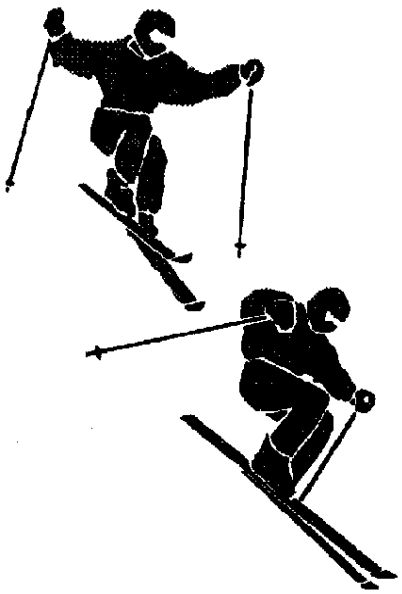

Can your ski boot protect your leg?

Inside This Issue:

Ski Boots and Bindings

The great majority of snow skiing injuries involve the leg. Fractures of the bones of the lower leg (the tibia and fibula), as well as injuries to the knee ligaments, are common. This is not surprising when we consider that the sport entails sliding down a slick, inclined surface at speeds that can exceed 150 kilometers per hour. Constantly changing direction with a pair of lever arms (skis) attached to the feet can create tremendous torsional forces that the legs are not designed to accommodate. The foot is a relatively short lever compared to a ski and so does not transmit the large torsional forces to the leg that skis do. The attachment of the foot to the ski via boot and binding limits foot rotation and effectively attaches longer levers directly to the legs. A twisting force at the tip of a ski is multiplied by the long lever arm and can result in tibia and/or fibula fracture. Deceleration fractures at the boot top, or "boot top fractures," may occur as a result of bending loads on the tibia when the forward motion of the skier comes to an abrupt halt (Fig. 1).

In an effort to reduce skiing injuries, technology is seeking to improve equipment. Of major importance in preventing ski accidents is the design of release bindings and ski boots.

Bindings

Release bindings are designed to release the boot from the ski when the load at the ski-boot junction exceeds a certain level. During normal skiing maneuvers, the boot must remain attached to the ski without inhibiting performance. If the binding releases at the proper time, the likelihood of a leg injury is greatly reduced. If, however, the binding fails to release, the foot is locked to the ski as if no safety device had been incorporated. The ideal ski binding would therefore be one that would consistently release before the load on the leg becomes great enough to produce a fracture or other injury. Proper calibration of the binding release is the key to this consistency.

Spiral fractures of the tibia are among the most serious ski injuries of the lower leg. These are produced by torsional forces acting on the tibia as the leg is twisted on the foot. Torsional loads delivered to the lower leg are resisted by both muscle and bone. As the muscles of the lower leg tense, they resist a portion of the torsional forces and decrease the deforming force "seen" by the bone. For safety's sake, however, when calibrating binding releases, one must assume that the bone "sees" all the torsional force because skiers are generally, and erroneously, advised to

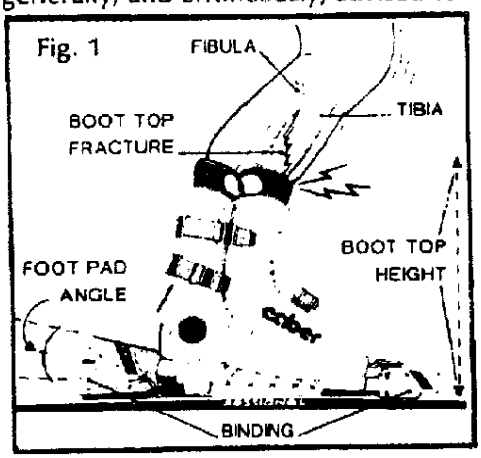

Fig. 1