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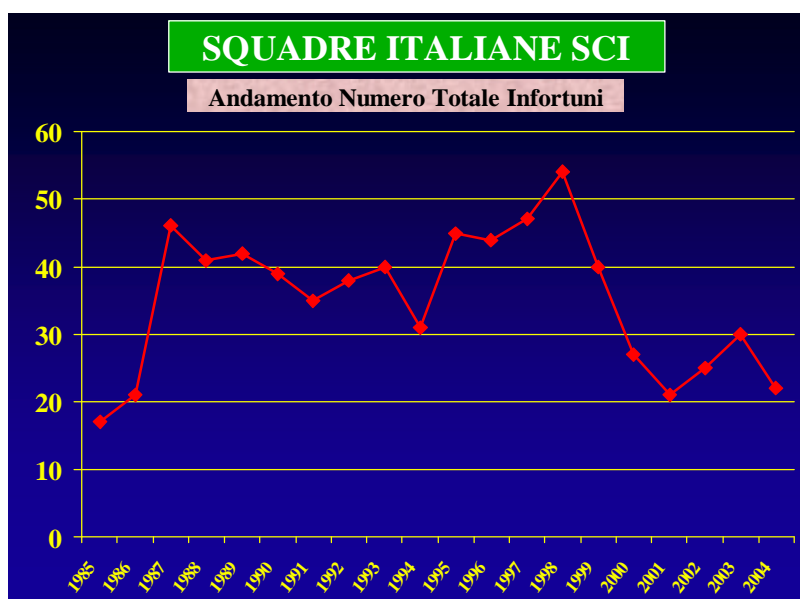
Centre for Sports Traumatology and Arthroscopic Surgery

The prevention of injuries in competitive skiing

By analysing the type of accidents that professional skiers suffer nowadays, we can above detect a marked difference from the accidents that occurred in the Sixties and the Seventies.

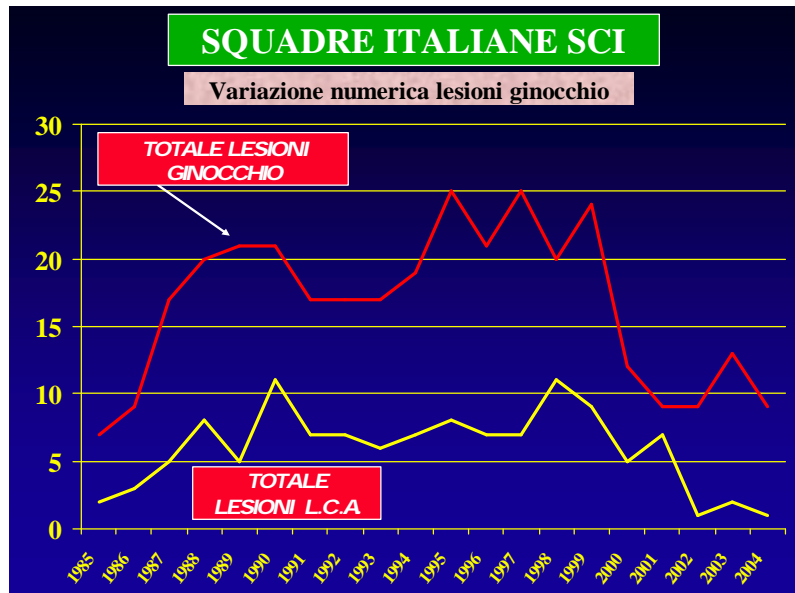
In the past, skiers used rather low leather ski boots and during a fall the torsional energy was mostly transferred to the legs, producing classic fractures of the tibia and/or the fibula.

But nowadays, skiers use ski boots that are more rigid and have a taller form, so that the first structure to which the majority of the torsional energy is transferred produced during a fall is actually the knee. This statement is confirmed if we look at the case studies of accidents incurred by the national ski teams in which two out of three athletes are subjected to one or more knee sprains, with a high percentage of A.C.L. injuries, during their sporting career.



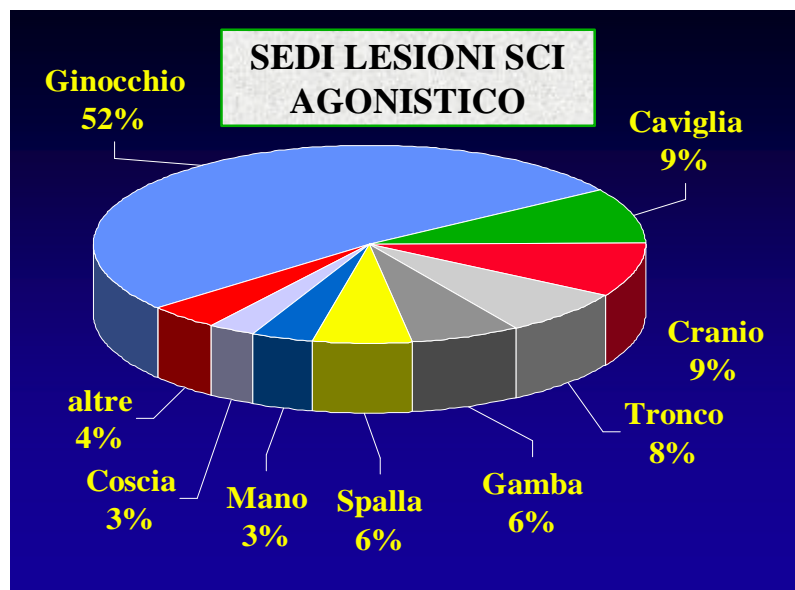
ITALIAN SKI TEAMS

Development of the overall number of accidents



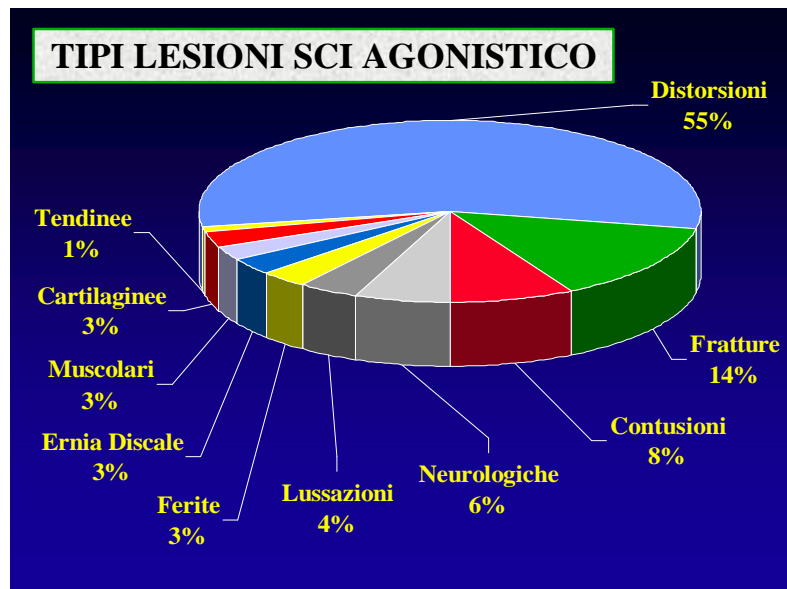
ITALIAN SKI TEAMS
 The number of knee injuries
 Total amount of knee injuries
 Total amount of A.C.L. injuries

The incidence of fractures is almost half that of the Sixties, nowadays these are more frequently caused by complex, high-energy traumas than by pure torsional mechanisms.



THE SITES OF COMPETITIVE SKIING INJURIES

Knee	52%	Ankle	9%
Other	4%	Skull	9%
Thigh	3%	Trunk	8%
Hand	3%	Leg	6%
Shoulder	6%		



TYPES OF COMPETITIVE SKIING INJURIES

Tendons	1%	Sprains	55%
Cartilage	3%	Fractures	14%
Muscular	3%	Contusions	8%
Herniated discs	3%	Neurological	6%
Wounds	3%	Dislocations	4%

So it appears to be clear that most of the research into ski accident prevention is actually directed towards studying the causes that determine a capsule-ligament injury to the knee in order to be able to limit the effects.

The study of injury mechanisms that determine a capsule-ligament injury to the knee has led to the identification of two types of injuries:

1) Knee injuries that occur following a fall.

In this instance, the knee is subjected to “external valgus-rotation” or “internal varus-rotation” stress during which the mechanical resistance of the ligaments in the knee is exceeded.

2) Knee injuries that occur without a fall.

Nowadays this type of injury is increasingly more common, especially in top-level skiers and determines the “isolated rupture” of the A.C.L.

In this type of injury, we refer to a “boot-induced A.C.L. rupture.”

We need to distinguish between the two types of accident prevention for knees; active prevention and passive prevention.

Active prevention can be put into practice by establishing a proper training programme aimed at achieving a balance of tone-trophism of the anterior and posterior muscles of the thigh which will then increase the anterior-posterior stabilisation of the knee associated with good proprioceptive training.

There are also numerous studies according to which a long-term training programme to generally strengthen the knees can increase the mechanical resistance and the rigidity of the joint structures which will provide, at least partially, protection against the risk of capsule-ligament injury.

Another form of active prevention includes special training for skiers and has recently been proposed by the “Vermont Safety Research” run by Dr. Robert Johnson.

According to Dr. Johnson, skiers can be suitably trained so that when they fall they try to succumb and follow the direction in which they are falling, instead of acting instinctively and doing everything possible to stand up again.

Passive prevention involves the ski equipment. This should always be kept in a perfect condition, both in terms of the skis and the bindings (the correct weight-related release force in accordance with international tables; proper binding maintenance). The FIS has also produced official rules that govern the level of thickness of the ski boots, the bindings, and the width and the length of the skis.

The protective clothing worn by the athletes also plays an important role. For example, back protectors and safety helmets are no longer used solely for downhill racing but for all disciplines, and even the protective netting along the competition courses is better designed and more sophisticated.

Thanks to this preventative programme, we can now state that capsule-ligament injuries to the knees were significantly reduced in the season from 2003 to 2004.