

# Multifragmentary Distal Crural Fracture Ski Injury in an Athlete: A Case Report

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## ABSTRACT

*While alpine skiing, a professional skater fell. He was examined at the nearest hospital and diagnosis was distal crural fracture with multifragmentary tibial metaphysis. The patient left the hospital with only temporary immobilization after the suggested treatment for his injury was crural amputation. Thirteen hours after injury he arrived at his home hospital. He was immediately operated on to perform osteosynthesis on his left lower leg. The healing of the damaged soft tissue as well as the bones was excellent even though Sudeck's syndrome appeared. Six months after injury he returned to skating and 1 year after injury he had completely returned to his everyday athletic routine without any complications.*

**Key words:** distal tibial fracture, skiing injury

## Introduction

Fractures of the distal tibia involve a significant portion of the weight bearing articular surface and overlying metaphysis are notoriously difficult to treat<sup>1</sup>. High energy traumas tend to be associated with greater degrees of metaphyseal multifragmentation and more severe soft tissue trauma<sup>1</sup>. In contrast ski accidents are usually lower energy injuries caused by torsion. With this case we show distal crural fracture with multifragmentary tibial metaphysis due to a ski injury and the unusual occurrences which are related to the injury, transport and treatment of the patient.

## Case Report

A 39-year old male on a ski trip fell and injured his left lower leg at about 3:00 pm, from there he was taken to the nearest hospital, where his injury was immobilized, from here he left by taxi to arrive at his home hospital at 4:00 am, 13 hours after injury. Before the patient's admission to our hospital his lower leg was swollen, vital with normal pulse which was confirmed by Doppler ultrasound<sup>2-4</sup>. Likewise there was no apparent damage to the peripheral nerves. With consideration to the type of injury we determined that further delaying surgical

treatment would not be in the best interest of the patient. Because of the complex fracture in region of the distal tibial metaphysis it was decided that we would proceed with open reduction and internal fixation. He accepted this course of treatment for the closed multifragmentary lower leg fracture, with complex injury of the tibial metaphysis (Figures 1 and 2). The patient was operated on under spinal anesthesia. The standard approach to the distal tibia was made, 1 cm lateral to the tibial crest. The incision is straight in the proximal and midshaft area, and distally the incision is curved gently in the direction of the medial malleolus. The incision is carried down straight to the fascia without undermining the subcutaneous tissues<sup>2</sup>. The fascia of the anterior compartment is left intact. The skin and subcutaneous tissues are elevated sharply from the periosteum<sup>2</sup>. The fracture was then reduced by direct anatomical reduction<sup>5</sup>, maintained by 3 interfragmentary lag screw fixations. The placement of the distal tibial plate required 11 screws (8 cortical and 3 cancellous). We avoided possible skin problems that may develop especially since the surgery was delayed 13 hours<sup>6</sup>, which is considered late timing for this type of surgery, with gentle surgical technique and wound closure without tension. The postoperative leg was elevated and splinted with the ankle at

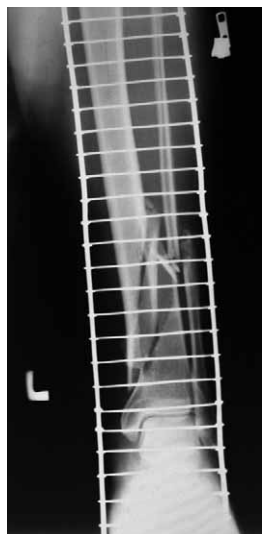


Fig. 1. A-P projection X-ray of the left tibial shaft after injury.



Fig. 2. L-L projection X-ray of the left tibial shaft after injury.

90° for four days, until the swelling had subsided and active dorsoflexion was regained. The postoperative course passed orderly. Antibiotics (gentamicin 2x120 mg and metronidazol 3x500 mg for 7 days)<sup>7</sup>, analgesics, and anti-coagulant therapy (clexane 20 mg) were administered. A physiotherapist began work with the patient 48 hours following the surgical procedure<sup>8,9</sup>. After his stitches were removed and the patient was released from the hospital, 2 weeks following surgical intervention, the patient started intensive physical rehabilitation at home. He developed the clinical picture of Sudeck's syndrome, and he needed more intensive physical therapist observation and treatment. The patient reported to the Department

of physical medicine and rehabilitation 70 days after injury, which is relatively late for the rehabilitation of this type of injury. In the Department of physical medicine and rehabilitation his therapies included: cryokinetics, electro-therapy, lymph drainage treatment, magnetic therapy, individual exercises movement extent, exercises for toning lower leg musculature, circulation exercises, exercises in slippers, pool exercises, walking in pool and exercises for walking with the help of crutches. As the patient was physically active prior to his Physical rehabilitation hospitalization twice a day he rode a bicycle for an hour. Six months following injury he daily exercised on rollerblades, which prior to injuring his leg was his main free time activity. The healing of the bone was followed regularly through surgical control, and the results were excellent. (Figures 3 and 4) Osteosynthetic materials were removed 2 years after operation (Figure 5) because of work related reasons the patient did not have time before this.

### Discussion

It is typical seen that difficult fractures have been managed by open reduction and internal fixation (ORIF)<sup>10-12</sup> but this technique has not produced consistent outcomes and has a high incidence of complications, including infection, poor wound healing and non-union<sup>10,13-16</sup>. However because of edema, the state of the 13 hour old injury, and the threat of compartment syndrome we still decided to use ORIF technique instead of the preferable minimal invasive plate osteosynthesis (MIPO) in this patient. MIPO is a technique which is recommended on the first day of injury, when the swelling is not that bad<sup>10,17</sup>. In our case using the MIPO technique with adequate reduction of the fracture to promote bone healing would have been very difficult to satisfactorily perform primarily be-



Fig. 3. A-P projection X-ray of the left tibial shaft after osteosynthesis in an open cast.



Fig. 4. Oblique projection X-ray of the left tibial shaft after osteosynthesis in an open cast.



Fig. 5. A-P projection X-ray of the left tibia shaft 1 year after injury.

cause the fracture was multifragmental and displaced<sup>18</sup>. In this patient ORIF technique which was used had absolute justification. It is known that high energy injuries or more comminuted nature of fracture may result in increasing complications<sup>10,19</sup>. This type of fracture even treated percutaneously with the MIPO technique would take a long time before full recovery could be expected, and this is another reason why we chose to use the ORIF technique<sup>10,20,21</sup>. Anatomical reduction is necessary in this type of fracture, which our patient presented with, and he showed a very good postoperative result (Figure 5). Of course the chance of infection using the ORIF method is higher than the MIPO method<sup>20</sup>. In the literature, the rate of infection of plating ranges from 0–6%<sup>10,13,21–28</sup>. Fortunately, in our patient we did not experience complication from infection. Fractures similar to that of our patient have been reported to have a high incidence of delayed union or nonunion, from 9–15%<sup>29</sup>. In fact, up to 60% of infections were associated with a delayed union or non-union<sup>7,29</sup>. The ORIF method is often recommended in the literature for multifragmental fractures of the distal tibia<sup>30</sup> without regard to the higher possibility of infection and added damage of the soft tissues as compared to MIPO technique.

Fractures of the tibia are frequent injuries in skiing<sup>31</sup>. Usually they are transversal fractures of the distal third, so-called boot-top fractures, which have good prognosis<sup>31,32</sup>, because they are usually low-energy forces. However, high-energy fractures are also possible skiing injuries, though with less intensity than a traffic accident

injury<sup>31</sup>. These authors group fractures of the distal tibia as a group of intermediate-energy injuries. This is precisely why closed comminuted fractures are seen in skiing injuries more than typical low-energy injuries, but less often than seen in a typical high-energy injury<sup>31</sup>.

The exceptional results of this case can be explained by the patient being an active athlete who ice and inline skates. He fell while skiing, then transported to the closest hospital, and then to our hospital which delayed treatment 13 hours. The severity of injury was such that at the first hospital's suggested treatment was amputation of the left lower leg, the patient then not being in any condition to drive his own car took a taxi to his home hospital. The injury was serious, fracture of the distal lower leg with metaphyseal multifragmentary fracture of the tibia (Figures 1 and 2). The operational procedure was conducted according to the AO School<sup>2</sup> and showed excellent results (Figures 3 and 4). Physical rehabilitation which the patient consistently exercised alone at home, bicycle riding, and hospital rehabilitation therapy made a large contribution to this result. Even the complication with Sudeck's syndrome, which the patient developed, did not leave any after effects on his injured left leg. At the end of treatment, this patient had no consequences following this serious fracture of the distal lower leg, and his career in sports and way of life has returned as it was before his accident. This case shows that the number of likely complications<sup>2</sup> that may accompany this type of complex injury may be avoided with the proper treatment and physical therapy<sup>17</sup>.

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## **MULTIFRAGMENTARNI PRIJELOM DISTALNE POTKOLJENICE KOD PROFESIONALNOG SPORTAŠA, PRIKAZ SLUČAJA**

### **S A Ž E T A K**

Ovo je prikaz slučaja profesionalnog sportaša, koji je pri skijanju pao na planini. Pregledan je u obližnjoj bolnici i ustanovljen je multifragmentarni prijelom distalne lijeve potkoljenice osobito u području tibijalne metafize. Napušta bolnicu samoinicijativno zbog predložene amputacije potkoljenice i taxi službom dolazi 13 sati nakon ozljede u našu ustanovu. Odmah je učinjen operacijski zahvat i osteosinteza lijeve potkoljenice. Oporavak ozlijeđenih mekih tkiva kao i kosti je izvrstan s obzirom na pojavu Sudeckovog sindroma tijekom liječenja. Nakon 6 mjeseci nastavlja sa svojom sportskom aktivnosti, a potpuno vraćanje u svakodnevni profesionalni sportski rad kao i prije ozljede nastavlja nakon 1 godinu bez posljedica.