

ACUTE SPORTS INJURIES REQUIRING HOSPITAL CARE

J. SANDELIN, MD

*Division of Orthopaedic Surgery and Traumatology, Surgical Hospital and
Department of Orthopaedics and Traumatology, University Central Hospital, Helsinki, Finland***ABSTRACT**

The present investigation reports 138 consecutive patients injured in sports, who needed treatment as in-patients in a one year period. More injuries were sustained in soccer than in other sports. The lower extremity was the site of most injuries, fractures and dislocations being the most common type of injury. At follow-up 50% of the patients complained of discomfort. The average stay in hospital after a sports injury requiring hospital care was 6 days. In 52% of the patients the duration of sports incapacity was at least six months and in seven per cent the sports incapacity after the sustained injury was permanent.

Key words: Sports injuries, Injury epidemiology, Hospital care.

INTRODUCTION

Recent epidemiological investigations report an increase in the number of sports injuries (Nicholas and Reilly, 1985; Walter et al, 1985). More than 9% of traumatic injuries seen at casualty departments are sustained in sport (Franke, 1980; Lorenzon et al, 1984; Smodlaka, 1979). The incidence of injuries in sports has been shown to vary from 2 to 4% per year according to the specific event (Biener and Fasler, 1978; Groh and Groh, 1975). In total the number of sports injuries in Finland each year has been estimated as 210,000 (Lättilä et al, 1980).

In general, sports injuries are considered to be of a relatively mild character and this has become evident in our previous investigations in which the average period of sick leave was found to be three weeks among patients receiving medical treatment at the acute stage in a casualty department (Sandelin et al, 1985). A number of those injured in sports, however require hospital treatment as in-patients (Crompton and Tubbs, 1977; Watters et al, 1984). Since little is known about the outcome of severe sports injuries, it appeared to be of interest to analyse the profile, specific features and outcome of those patients injured in sports who needed treatment as in-patients.

MATERIALS AND METHODS

The present study was designed to analyse consecutive patients attending the Casualty Department of Orthopaedics and Traumatology, University Central Hospital, Helsinki during a one-year period as a result of an acute injury sustained in sport who needed treatment as in-patients. In a previous study, it was concluded that during the same time period 2,493 patients or 9% of the total number of attendances at the casualty department were treated for an injury sustained in sport. In this study a sports injury was defined as any sports-related incident that resulted in the patient seeking medical assistance at the casualty department within three days of the injury.

The clinical records and radiographs of these patients were analysed and a questionnaire was designed to obtain more specific information about the circumstances of the injury and its late sequela. The response rate to this questionnaire was 81%. In an attempt to outline some of the specific features of severe sports injuries and their load on the hospital, some of the results were compared with the results of patients treated during the same time period as in-patients for injuries not related to sports.

The mean follow-up time was 24 months (range 18-30). In this series men outnumbered women by 75% to 25% and the mean age of the men was 26 (8-56), while that of the women was 25 years (9-50) (Table I). In the patients who were in-patients with injuries not related to sport, 58% were men, the mean age among men being 43 years and correspondingly 41 years among women. In 69% of the patients the treatment consisted of an operation, in 22% of plastering reduction of fractures or dislocations. In 9% the patients were admitted for observation after sports injury.

TABLE I
Occurrence of injuries by age groups

Age	N	%
0-14	15	11
15-24	49	35
25-34	48	35
35-44	18	13
45-54	7	5
>55	1	1
Total	138	100

The collected data were analysed in co-operation with the Automatic Data Processing Department of the University Central Hospital, Helsinki, and to assess the statistical significances the chi square test was used.

RESULTS**Occurrence of sports injuries**

One hundred and thirty-eight patients with a sports injury were admitted as in-patients from the casualty department. This represents 5.5% of the total new patients injured in sports seen at the casualty department during the year. The

Address for correspondence:

Jerker Sandelin, MD
Division of Orthopaedic Surgery and Traumatology
University Central Hospital
Kasarmikatu 11-13
Helsinki 13
Finland

corresponding number for patients treated for injuries not related to sports was 2,633. The distribution of injuries per event is presented in Table II. Most injuries were sustained in soccer, followed by injuries in indoor ball games and skiing.

TABLE II
Distribution of injuries according to sport

Sport	Requiring hospital care (N = 138)	Attendances at the casualty department (N = 2493)
Soccer	35 (25%)	591 (24%)
Indoor ball games	27 (20%)	582 (23%)
Skiing	24 (17%)	167 (7%)
Ice-hockey	13 (10%)	343 (14%)
Motor sports	7 (5%)	32 (1%)
Tennis, squash	6 (4%)	122 (5%)
Skating	5 (4%)	118 (5%)
Judo, karate	5 (4%)	128 (5%)
Others	16 (11%)	410 (16%)
Total	138 (100%)	2493 (100%)

Site and type of injury

The majority, 73%, were located in the lower extremity, followed by injuries in the upper extremity (14%). Injuries to the trunk and head or neck accounted for 7% and 6% respectively. Among non-sports injuries, those located in the head and neck accounted for a significantly higher number of 23% ($p < 0.001$) compared with the sports injury group.

In this study the most common categories of injury were fractures and dislocations (57%) while sprains accounted for 33% of the total. Contusions were found in 8% and wounds accounted for a mere 2% (Table III). Significant differences existed when the type of injury was compared between those injured in sport and the control group of other injuries, the most significant being the low incidence of 13% sprains in the latter group.

TABLE III
The type of injuries at different body sites (N = 138)

Location	Fractures and dislocations	Sprains	Contusions	Wounds	Total
Lower extremity	56	45	—	—	101
Upper extremity	17	—	—	2	19
Trunk	5	—	5	—	10
Head & Neck	1	—	6	1	8
Total	79	45	11	3	138

The sites of the seventy-nine fractures are shown in Table IV. A quarter of the fractures occurred in skiing, 22% in soccer and 9% in indoor ball-games. Fractures sustained in cross-country skiing involved the ankle area, while fractures sustained in downhill skiing were generally located higher in the tibia or fibula.

TABLE IV
Distribution of fractures among sports injured requiring hospital care (N = 138)

Location	N	%
Lower leg	19	24
Ankle	16	20
Lower arm	6	8
Knee region	6	8
Upper leg	5	6
Hand, finger	4	5
Upper arm	3	4
Other	20	25
Total	79	100

Injuries in lower extremity

A closer analysis of the 101 lower extremity injuries revealed that the most commonly injured site was the ankle region, accounting for 36% of the total and fractures were seen as often as injuries to the ligamentous structures. The knee accounted for 29% of all injuries in the lower extremity, over half of them being ligamentous injuries, principally the anterior cruciate alone or in combination with the collateral ligaments and meniscal structures.

Seasonal variations

There was a tendency for more injuries to occur during the winter months (January/February/March) but this was not statistically significant. In two events, soccer and skiing, more severe injuries occurred at the beginning of the season. In indoor ball games including handball, basketball and volleyball the injury spectrum was the same throughout the season and in the rest of the events the number of injuries was too small for definite conclusions to be drawn.

Follow-up

The median stay in hospital after a sports injury was six days. The subsequent sports incapacity following an injury is presented in Table V. The relative severity of sports injuries in the present series is reflected by the fact that 52% of the injured had to give up sporting activities for at least 6 months. Ten athletes had to give up sports permanently, the majority of them suffering from chronic instability after a ligamentous injury of the knee joint.

TABLE V
Duration of sports incapacity in months (N = 138)

Time	N	%
<1	9	7
1-2	20	14
2-3	24	17
3-6	20	14
6-8	23	17
8-12	32	23
Permanent	10	7
Total	138	100

The athletes' abilities to reach the same level of sports activity especially in strenuous and competitive sports was

not analysed in this study. The length of sick leave in 80% of the cases was over three months and in 3% the sick leave exceeded one year.

At follow-up, sixty-nine patients still complained of discomfort. In the majority of cases (58%) the mode of discomfort was pain at straining, followed by limited range of motion of a joint (23%) and reduced muscle strength (13%).

Outcome of injuries

The relative importance of the location of injury and the remaining discomfort is seen in Table VIa. The location of injury did not seem to influence the outcome.

In Table VIb the relative importance of the type of injury and the remaining discomfort is presented. Significantly more discomfort was found after a ligamentous type of injury ($p < 0.001$) in comparison with fractures and dislocations.

TABLE VI

(a) The location of injury and its relative importance to the outcome

Location	Discomfort at follow-up Number (%)
Lower extremity	56 (55%)
Upper extremity	8 (42%)
Trunk	3 (33%)
Head & Neck	2 (25%)
Total	69 (50%)

(b) The type of injury and its relative importance to the outcome

Type	Discomfort at follow-up Number (%)
Fracture, dislocation	37 (47%)
Sprain	31 (69%)
Contusion	1
Wound	—
Total	69 (50%)

DISCUSSION

In the present study 5.5% of patients with sports injuries needed in-patient hospital treatment, this number being in accordance with the reports of other recent investigations (Lorenzon et al, 1984; Mæhlum and Daljord, 1984; Zaricznyj et al, 1980). Injuries sustained in soccer lead most often to treatment as in-patients, followed by indoor ball games and skiing. This is also consistent with the reports of other authors (Crompton and Tubbs, 1977; Deveraux and Lachmann, 1983; McMaster and Maartens, 1978; Peterson and Renström, 1980). Franke (1980) postulates that soccer is responsible for 3.5 to 10% of all injuries treated in hospitals in Europe.

Site and type of injury

The vast majority of sports injuries are located in the lower extremity, as has been pointed out by several authors in comprehensive studies analysing sports injuries (Biener and Fasler, 1978; Groh and Groh, 1975; Franke, 1980). In this study a slightly higher incidence of 73% lower

extremity injuries than usually reported, was found. This was possibly due to the large contribution of injuries sustained in soccer and skiing, both being events with a high incidence of injuries located in the lower extremity (Ekstrand, 1982; Johnson et al, 1980; Renström, 1984).

A striking feature found in this study was the high incidence of fractures, with lower leg and ankle fractures making up 44% of all these injuries. The number of fractures reported in other studies of sports injuries are considerably lower, the nature of this study however, being slightly different, reporting only on severe sports injuries (Biener and Fasler, 1978; MacIntosh et al, 1972; Watters et al, 1984).

In general, fractures seem to occur with a higher incidence in skiing and motorsports, events associated with high-energy injuries and on the other hand in contact sports, such as soccer and rugby (Franke, 1980; Johnson et al, 1980; Johnson and Rust, 1985; Markham, 1983; Rooas and Nilsson, 1979; Whitside et al, 1981). What can be done to reduce the number of major fractures, mainly located in the lower extremity? In skiing a reduction can be achieved through better slope conditions, safety measure in skiing areas and foremost by improvements in the skiers' equipment (Blitzer et al, 1984; Johnson et al, 1980).

In soccer a number of these fractures could probably have been avoided by using adequate equipment including shin guards (Peterson and Renström, 1980; Rooas and Nilsson, 1979). According to a recent Swedish study, only 30% of the players were found to use shin guards during practice and at the same time all the registered serious lower leg injuries occurred in players not using shin guards (Ekstrand, 1982).

Seasonal variations

When the seasonal distribution of injuries was analysed, a slight tendency for more injuries to occur during the winter months (January/February/March) was seen. This probably depended on the fact that in addition to all the skiing injuries, soccer injuries from numerous winter series played in the hospital's catchment area contributed to this trend. The injuries in indoor ball games were evenly spread throughout the season. A similar pattern regarding the time distribution and severity of injuries has been reported by others (Ekstrand, 1982; Mæhlum and Daljord, 1984; Wester, 1985).

Knee injuries

At follow-up sixty-nine of the patients still complained of discomfort resulting from the injury. The statistical analysis showed that the relative incidence of discomfort was significantly higher after ligamentous injuries than after fractures and dislocations. In the knee joint more than half of the injuries involved the ligamentous structures and the present series confirms other recent findings that in sports the most commonly injured ligament of the knee joint is the anterior cruciate, particularly in the presence of haemarthrosis (Clancy, 1985; DeHaven, 1980; Gillquist et al, 1977; Jensen et al, 1985).

During the period under investigation, acute arthroscopy was not a clinical routine in cases of suspected ligament injuries of the knee, but in clinical practice it has proved to be of great diagnostic value. Furthermore, arthroscopy at

the acute stage has shown the fallacy of the well-known classic tests of knee joint instability such as the drawer test and on the other hand showed the efficacy of recently more popular tests such as the Lachman test (Johnson, 1982; Larson, 1983; Torg et al, 1976).

The arthroscopic examination of the acutely injured knee should always include testing the stability of both the cruciate ligaments as well as the menisci with a probe (Gillquist, 1984; O'Connor, 1977; Odensten, 1985).

In the present series all the patients with total ruptures of the ligaments in or around the knee were treated operatively at the acute stage. The torn ligaments were as a rule sutured and post-operatively the leg was immobilised in a plaster cast for six weeks. When the clinical results were evaluated at follow-up, the recent findings of other authors could be confirmed. Operatively treated ruptures of the collateral ligaments as well as ruptures of the anterior cruciate at its tibial or femoral attachment usually lead to a good result, whereas the outcome of ruptures of the ligament at its midsubstance, which incidentally is the most common site of rupture, its unpredictable (Johnson, 1982; Lysholm et al, 1982; Müller, 1983; Santavirta et al, 1981). A concomitantly performed meniscectomy usually leads to an increased degree of remaining discomfort. It appears that whenever possible, partial resection or suture of the meniscus to its attachment, should be performed (Hamberg et al, 1983).

Post-injury course

In the post-injury course it is important to remember that the healing of fibrous tissue is rather slow, and that the strength after ligament suture is only adequate after six months and the strengthening process continues for up to one year (Noyes, 1977). Thus several recent investigations have suggested that after ligamentous surgery, the scar tissue should be allowed time to mature and return to full-effort practice should not be allowed before six months (Montgomery and Steadman, 1985; Paulos et al, 1981; Steadman, 1983).

General comments

The majority of acute sports injuries can be classified as minor ones (Biener and Fasler, 1978; Zarincznyj et al, 1980). However, in Finland sports injuries requiring hospital care have been estimated to occur every 4 hours (Lättilä et al, 1980). This is in accordance with Biener's and Fasler's (1978) recent report from Switzerland where they conclude that sports injuries could fully occupy a hospital with 175 beds the whole year round.

Thus, beside in addition to incapacity of individual athletes, serious sports injuries place a considerable burden on community medical resources.

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