Injuries caused by falling soccer goalposts in Denmark

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Abstract

Objective—A falling soccer goalpost is associated with the potential risk of serious injury that can sometimes even be fatal. The aim of the study was to analyse the extent of the problem in Denmark and focus on the mechanism of injury and prevention.

Methods—Data were analysed for the period 1989–1997 from the European Home and Leisure Accident Surveillance System, which is an electronic register of the injuries seen in the casualty departments of the hospitals of five selected cities in Denmark representing 14% of the Danish population; in addition, fatal accidents in the whole of Denmark since 1981 were examined. Forty two injured persons were interviewed about the circumstances of the accident. Attempts were made to estimate the proportion of goalposts secured by counterweight in the five different regions, compared with the proportion secured with ground stakes and those that were unsecured, by analysing data from the largest producers of goalposts in Denmark.

Results—In the period 1981–1988, two fatal accidents were recorded. In the period 1989–1997, 117 people were injured by a falling goalpost; six of the injuries required hospitalisation. Some 88% of the injured were under the age of 15. In a telephone interview with 42 of the injured, 50% stated that the goalpost fell because someone was hanging on the crossbar. Comparing the five different regions with respect to the proportion of goalposts secured by counterweight and the number of accidents, the following relation was found. Areas in which a high percentage of the goalposts were secured by a counterweight correlated inversely with a high number of accidents ($r = -0.9$; $p = 0.04$).

Conclusion—Soccer is a widely played sport and it is important to be aware that accidents caused by falling goalposts can occur and that they presumably can be prevented by proper use of goalposts, by using secure goalposts, and by securing old goalposts with a counterweight.

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problem, despite soccer being the most popular athletic activity in many countries, including Denmark, involving a significant number of people. In a 14 year report from the National Electronic Injury Surveillance System of the United States, which collected data on all fatal and non-fatal accidents related to falling soccer goalposts, 27 injuries were identified, of which 18 were fatal.¹ The mean age of the injured was 10 years. Head trauma was the principal cause of death in 14 cases. Of the 27 goalposts involved, 26 were made of steel or galvanised pipe, and at least 18 were not anchored.

In 1982 an inquiry was organised in Denmark by the Danish Health Authorities, after two fatal accidents caused by falling soccer goalposts.² This resulted in an appeal to clubs, unions, and schools to secure goalposts in an adequate manner. According to the rules laid down by The Danish Soccer Association, either a counterweight or ground stakes must secure a goalpost.

By analysing the extent of injuries associated with falling soccer goalposts and the details of the accidents, we hope to draw attention to the problem and focus on prevention.

Methods

Data from the European Home and Leisure Accident Surveillance System (EHLASS) were analysed. EHLASS is an electronic register of injured persons seen in the casualty departments of hospitals in five selected cities in Denmark representing 14% of the Danish population (about 741 000 inhabitants).

Records of mechanism of injury, site of accident, type and anatomic region of injury, etc. were started in 1987. "Accident caused by falling soccer goalpost" was first recorded as a mechanism of injury in 1989. In addition to the above, fatal accidents have been registered for the whole of Denmark since 1981 (about 5 295 000 inhabitants).

A local Danish goalpost producer, who supplies the largest number of new goalposts in Denmark, provided data on the proportion of goalposts secured by counterweight compared with those secured with ground stakes or unsecured, in the five different areas of EHLASS registration. The producer was informed about the purpose of the investigation, but was ignorant of the distribution of accidents.

Forty two of the 52 injured persons from one of the casualty departments were successfully contacted by telephone, after the emergency report had been studied, and asked specific questions on the details of the accident in relation to playing soccer, even though some of goalposts involved were of the handball or

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A falling soccer goalpost is a rare occurrence, but can be associated with a potential risk of serious injury that can sometimes even be fatal. There is very little in the literature about this

Figure 1 Annual distribution of injuries (total 117) caused by falling soccer goalposts in the period 1989–1997 in an area representing 14% of the population of Denmark.

Table 1 Anatomical distribution of injuries (n=117)

Injured region	n
Head	36
Back and pelvis	8
Arms	30
Legs	41
Other	2

Table 2 Distribution of injuries with respect to diagnosis (n=117)

Diagnosis	n
Wounds	25
Fracture	19
Luxation	1
Distorsion	17
Concussion	6
Head trauma excluding concussion	9
Contusion excluding head	40

Table 3 Distribution of injuries with respect to site of accident (n=117)

Site of accident	n
Park	14
School/institution	21
Sports ground	70
Residential area	7
Other	5

Table 4 Distribution of injuries in the five hospitals of EHLASS (n=117)

Hospital	n
Glostrup	52
Esbjerg	24
Randers	2
Herlev	29
Frederiksund	10

Figure 2 Number of injuries per 100 000 inhabitants per year in the five regions of EHLASS. Calculations are based on injuries in the period 1989–1997.

hockey types. Information on construction and securing of soccer goalposts was obtained from The Danish Soccer Association, the two largest producers of goalposts in Denmark, and the chief inspector for Brøndby IF.

Results

No fatal accidents were observed in the EHLASS area, but two were recorded in the register of death in the period 1981–1989. The information is incomplete, but both victims were boys aged 8 and 12. In one case, the crossbar had fallen on the back of the boy's neck, and, in the second, the boy was swinging on the crossbar which caused the goalpost to fall on his head.

In the period 1989–1997, 117 injuries caused by falling soccer goalposts were recorded in the EHLASS register covering 14% of the Danish population. From this, a mean number of 93 injuries a year can be estimated for the whole population during this period. Figure 1 shows the annual distribution.

Six of the injuries required hospitalisation: three fractures of the crus, one fracture of the elbow, one contusion of the liver, and one concussion. The mean length of stay was 2.7 days.

Ten patients were referred for an orthopaedic ambulatory check up, and 20 patients were referred to the general practitioner. Forty one patients had some kind of treatment in the casualty department and 40 had no treatment.

Eighty four (72%) injuries occurred in boys under the age of 15, and 14 (12%) in males over the age of 15. Nineteen (16%) injuries were to girls, all under the age of 15.

Sixty six of the injuries occurred in the period from May to September and were evenly distributed throughout the week.

Tables 1 and 2 show the distribution of injuries with respect to anatomical region and diagnosis, and tables 3 and 4 the distribution with respect to the site of the accident and the hospital respectively. Figure 2 gives the number of injuries in relation to the number of inhabitants served by the five hospitals. The values from fig 2 correlate with the number of goals secured by counterweight in the five respective areas. Using Spearman rank order, the following correlation was found: $r = -0.9$; $p = 0.04$. To see if there was a downward trend in the annual number of accidents through the period of registration, we used Spearman rank order to analyse the data and found $r = -0.33$ and $p = 0.39$.

Of the 42 patients interviewed, 38 stated that the goalpost fell during recreational play, and four that it fell during a soccer match. Of these accidents, 21 were caused by someone hanging or doing chin ups on the crossbar, six occurred while the goalpost was being lifted, three were caused by a gust of wind, two occurred while someone was sitting on the crossbar, two occurred while someone was trying to crawl up the goal, in two cases the cause could not be remembered, and six were caused by other reasons.

Thirty goalposts were of large size, eight were of medium size (handball), and four were small (hockey), but all were being used for soc-

cer. None of the goalposts were secured. There was no accumulation of accidents in any particular area.

Discussion

Goalposts in Denmark are mainly made of wood or aluminium and are secured either using ground stakes of length 30–50 cm or by one or several counterweights on the hindbar. The stakes are pulled up when the goalpost has to be moved—for example, when the grass in front of the goalpost is becoming worn or the size of the pitch has to be changed. It is possible that in some cases the stakes are not replaced, and this is regarded as one of the main causes of goalposts falling over. A goal may collapse as the result of someone hanging on the crossbar, during recreational play, when the goal is moved, or from a gust of wind, and only rarely in relation to a match.

The correlation ($r = -0.9$) between the number of accidents and areas with a small number of goalposts is based on somewhat insecure data. It indicates a possible explanation for the large geographic variation. Goalposts secured by a counterweight seem to fall more infrequently. According to the goalpost manufacturer, five children with a mean weight of 60 kg are able to hang on the crossbar without causing the goal to collapse. Goalposts can be made to fall and in that situation possess a potential major risk for serious injury, because of the large weight and therefore large inertia. Providing goalposts with heavier hindbars would perhaps make them more secure; however, they would then be more difficult to move. Providing them with a wheeling system could eliminate this problem.

The depth of the goalpost is also of importance with respect to the efficiency of the counterweight. Many existing goals are old types without a counterweight and of relative small depth. To replace all these would be expensive. A more economical solution would be to place counterweights on the hindbar.

Janda *et al*³ have shown that padded goalposts can reduce the impact energy from a collision with a bar by absorbing the energy, thereby not only reducing the risk from a falling goalpost, but also injuries from simple collisions with the upright, which are much more common.^{4,5}

We estimate that about 93 injuries a year are caused by falling goalposts in Denmark, but a certain amount of error has to be taken into account—for example, cases seen in general practice will not have been recorded, causing some, but presumably only a little, underestimation.

Compared with the number of serious accidents reported in the United States,¹ our study reports only a few, which is in accordance with the smaller number of soccer players in Denmark. Also goalposts in the United States are mainly made of steel or galvanised pipe, and these types are very rare in Denmark. However, the total number of accidents are significantly higher in Denmark. Some of the dissimilarities can presumably be explained by the different methods of recording the injuries. However, the injury pattern with respect to age and gender and the mechanism of injury seems to be almost identical.

Most of the accidents occurred in schools, sports grounds, and other institutions that appear to be well organised, but it cannot be determined who is responsible for the accident. This lack of clear responsibility for the care of goalposts presumably increases the number unsecured. We believe it is important to give information to all relevant staff, including parents, teachers, coaches, inspectors, and children, on the danger of a falling goalpost, the potential risk of serious injury, and how accidents may be prevented.

In Denmark and several other countries, there are still a relatively large number of older-type goals which are more prone to collapse, and we believe that, with the outlay of a limited amount of money, they can be secured by the use of counterweights.

Although insignificant, there seems to have been a fall in the number of accidents through the years ($r = -0.33$), with only four accidents in 1997, and this could be the result of the steady replacement of old-type goalposts with the more modern and secure types.

Contributors

The Danish Administration of Consumption initially asked the Department of Orthopaedic Surgery at Glostrup to investigate accidents caused by falling soccer goalposts. L B applied to EHLASS, who agreed to distribute the data. The other four hospitals (Esbjerg, Frederikssund, Herlev, Randers) were asked for permission to publish their data, which was given. L B designed the protocol, analysed the data, conducted the telephone interviews with the injured, consulted the goalpost producers, the Danish Soccer Association, and the chief inspector, and wrote the paper. L B H contributed some of the core ideas, participated in the contact with EHLASS, and edited the paper. Both authors act as guarantors for the data and conclusions.

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Take home message

Accidents from falling goalposts do occur, with a potentially fatal outcome. Prevention of these accidents is simple.