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# Injuries in Polo: A Retrospective Evaluation of 103 Polo Riders

## Verletzungen im Polo: Retrospektive Analyse von 103 Poloreitern

1. ATOS-CLINIC HEIDELBERG, Department of Sports Traumatology, German Joint Center, Heidelberg, Germany

### Summary

- **Objective:** To assess injury incidence, nature, severity, and mechanisms in amateur and professional polo players in Germany and Switzerland during the 2017 season.
- **Methods:** Questionnaire-based survey, where players were interviewed by the first author and injuries over the last two years recorded. The study was conducted from May-July 2017. Players were interviewed during tournaments and practice matches.
- **Results:** A total of 103 polo players were interviewed. 40% (n=41) of the players experienced a total of 55 injuries. The injury rate was 5.3-6.1/1000 player-game hours. 67% of all injuries were classified as major. Trauma was the main (84%; 46 cases) cause of injury. Most cases (42%) involved the upper extremity, followed by the lower extremity in 14 (25%) cases. The trunk was affected in 12 cases (22%) and the head in 6 (11%). Overall, a typical pain pattern after playing polo (without missing play) was observed in the lumbar spine, groin, and hitting arm.
- **Conclusions:** Although the injury rate was low, the severity was quite high. Typical injury and overuse patterns are presented in this study. Life-threatening injuries do occur, and medical staff trained in trauma management should be present at polo matches. Safer helmets according to the newest standards should be worn and the face should be protected to avoid fatal injuries.
- **Clinical Relevance:** Polo is a dangerous team sport that can lead to major injuries and suitable preventive methods should be developed.

### Zusammenfassung

- **Hintergrund:** Ziel der Studie war es, die Verletzungshäufigkeit, Art und Schwere von Verletzungen sowie die Verletzungsmechanismen von Amateur- und Profi-Polospielern zu erfassen.
- **Methoden:** Die Daten wurden anhand eines standardisierten Fragebogens durch den Erstautor erhoben. Die Studie wurde zwischen Mai und Juli 2017 in Deutschland und der Schweiz durchgeführt. Es wurden dabei Verletzungen der letzten zwei Jahre dokumentiert. Die Spieler wurden sowohl bei Trainingsspielen als auch bei Turnieren interviewt.
- **Ergebnisse:** Insgesamt wurden 103 Polospieler interviewt. 40% (41 Spieler) der Spieler erlitten insgesamt 55 Verletzungen. Die Verletzungshäufigkeit war 5,3-6,1 pro Spieler und 1000 gespielten Stunden. 67% aller Verletzungen wurden als schwer klassifiziert. Die Hauptursache für Verletzungen waren Unfälle (84%; 46 Fälle). Am häufigsten (42%) war die obere Extremität, gefolgt von der unteren Extremität (25%; 14 Fälle) betroffen. Der Körperstamm war in 12 Fällen (22%) und der Kopf in 6 Fällen (11%) involviert. Zudem konnte ein typisches Überlastungsmuster (Überlastungsschmerzen ohne Spelausfall) mit Schmerzen im Schlagarm, der Lendenwirbelsäule und der Leiste beobachtet werden.
- **Zusammenfassung:** Obwohl die Verletzungshäufigkeit niedrig war, traten im Falle einer Verletzung meist schwere Verletzungen auf. Typische Verletzungsmuster und Überlastungsschäden werden in dieser Studie präsentiert. Da potenziell lebensbedrohliche Verletzungen auftreten können, sollte traumatologisch geschultes Personal bei allen Polospielen anwesend sein. Zudem sollten Polohelme nach neuesten Standards und adäquater Gesichtsschutz getragen werden.
- **Klinische Relevanz:** Polo ist ein gefährlicher Teamsport, bei dem schwere Verletzungen auftreten können. Deswegen werden präventive Maßnahmen vorgestellt und empfohlen.

### KEY WORDS:

Polo, Injury Rate, Injury Severity, Polo Riders

### SCHLÜSSELWÖRTER:

Polo, Verletzungshäufigkeit, Verletzungsschwere, Poloreiter

### Introduction

The game of polo consists of two teams of 4 horse-mounted players with the goal of hitting a ball through a pair of goal posts. The game is divided into 4-8 periods, called "chukkers," each lasting 7 minutes. The team scoring the most goals wins. Horses must be exchanged after each chukker to protect them from exhaustion. The capacity of each player is measured by a handicap system from -2 to 10 goals. A good amateur player can reach a handicap of 0 goals.

There are only 9 professional players worldwide with a handicap of 10 goals (3, 8).

Polo still is considered a peripheral sport. Worldwide, there are around 14,000-30,000 players. The leading countries that play this sport are Argentina, the United States, and Great Britain; each has around 3,000 players. Germany and Switzerland have around 400 and 200 players, respectively.



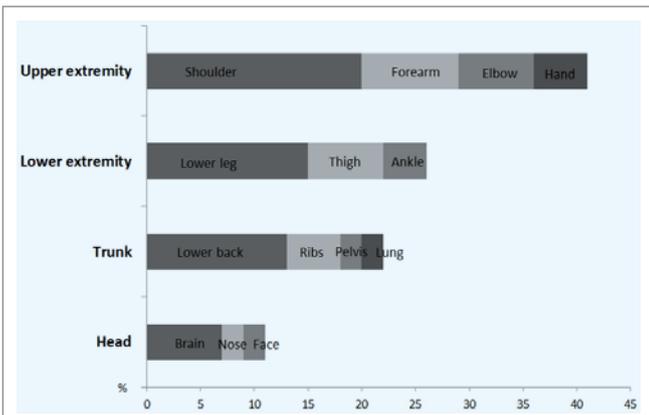
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### CORRESPONDING ADDRESS:

Dr. med. Ludwig Neumayr  
 Department of Traumatology  
 Theresienkrankenhaus Mannheim  
 Bassermanstrasse 1  
 68165 Mannheim, Germany  
 ✉: l.neumayr@gmx.de



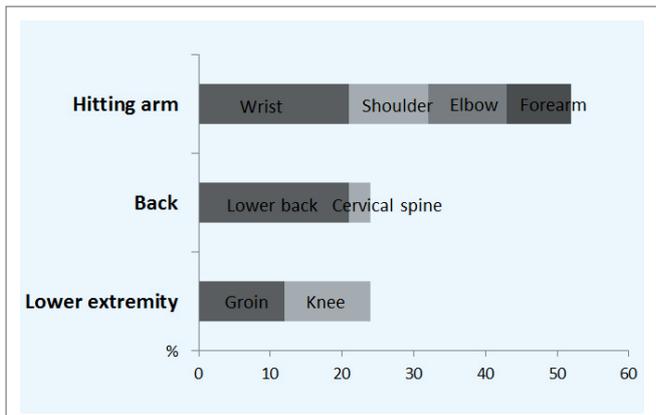
**Figure 1**  
Location of injuries; Y-axis: body region, X-axis: percentage (%) of injuries in relation to total Injuries.

Data on polo injuries are still limited. To the best of our knowledge, there exists only one study focusing on the incidence, nature, and severity of injuries in polo (3). Moreover, the study sample is small, but provides profound data from the highest ranked (handicap 7-10) polo players (top 34) in the world.

The aim of the study was to broaden the evidence on polo injuries and provide more insight into typical injury patterns (including, for the first time, from amateur players as well). The results can help the medical team provide more specific care and enable prevention strategies.

**Methods**

Interviews were conducted according to a standardized questionnaire by the first author (resident of orthopaedic surgery) during tournaments and practice matches in Germany and Switzerland. Data were collected from May to July 2017. The standardized questionnaire was developed by both authors. Data were collected on injuries over the last two years; the authors believe that events occurring beyond 2 years prior often cannot be accurately recalled. Data regarding age, sex, number of years of playing polo, handicap, days practiced per week, and tournaments played per year were collected. An injury was defined as a medical condition occurring during the polo game and leading to absence from training or playing. For all injuries, we recorded the body part affected, type of injury, time of absence from match or practice (minor, <7 days; moderate, 7-30 days; major, >30 days), and the occasion during which the injury occurred (match, tournament, stick and ball, or riding). Additionally, we recorded details of any pain resulting from playing polo that did not lead to absence from the game. Finally, data on passive protection tools (helmet, faceguard, goggles) were collected. Traumatic and overuse injuries were defined according to the consensus statement on injury definitions of the Fédération Internationale de Football Association (FIFA): "A traumatic injury refers to an injury resulting from a specific, identifiable event, and an overuse injury to one caused by repeated microtrauma without a single, identifiable event responsible for the injury" (4). All active players taking part in the selected tournaments and practice matches were proactively asked to take part in this study. As the polo community is very small (as mentioned above, there are only 600 players in Germany and Switzerland), we tried to convince as many players as pos-

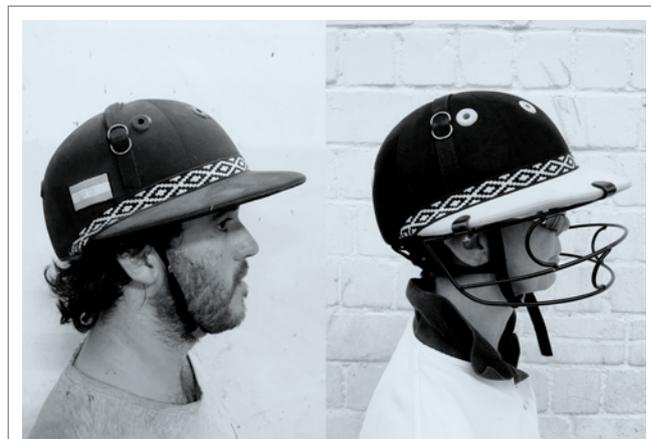


**Figure 2**  
Overuse pattern/pain from playing polo without absence from the game; Y-axis: body region, X-axis: percentage (%) of overuses in relation to total overuses.

sible. The inclusion criterion was playing a minimum of two polo games per month. The exclusion criterion was playing another sport predominantly as this could falsify the study. The statistical analysis was carried out descriptively. Regarding descriptive features, absolute, relative, and mean frequencies were recorded. This study was approved by the ATOS-Clinics' Ethics Committee.

**Results**

We interviewed 103 players for our study (105 players were asked, whereof 103 accepted to be interviewed). In total, 41 (40%) players experienced 55 injuries; 62 (60%) reported no injuries. Trauma was the dominant cause of injury, accounting for 46 (84%) cases; 9 (16%) cases involved injuries from overuse. Thirty-seven (67%) injuries were classified as major. Regarding sex distribution, 68 (66%) players were men and 35 (34%) were women. The mean age of the players was 36 (range, 12-63) years. Players ranged from no handicap to a handicap of 6 (mean handicap, 0). No relationship of injuries to age or sex was seen. The injury rate per 1000 player-game hours was 5.3 during tournaments and 0.6 during training for professionals, and 6.1 in tournaments and 3.2 in training for amateurs. The average time of playing polo was 9.6 years; 11 players had played for less than two years.



**Figure 3**  
Polohelmets; left side: traditional polohelmet; right side: polohelmet with faceguard.

Table 1

Type of injury; in percentages (%).

TYPE OF INJURY	
Fracture	31
Contusion	18
Overuse	16
Muscular strain/tear	13
Dislocation	9
Concussion	7
Sprain	4
Pneumothorax	2

Table 2

Mechanism of injury; in percentages (%).

MECHANISM OF INJURY	
Fall from the horse	44
Overuse	17
Fall with the horse	15
Crash with a player	6
Hit from a ball	4
Unexpected movement	4
Others	10

Table 3

Helmets (certified vs. non certified); in percentages (%).

TYPE OF HELMET	
Non certified	93
Certified	7

The most predominant site of injury was the upper extremity (42%, 23 cases), with the majority of cases involving the shoulder (20%, 11 cases) and the distal forearm (9%, 5 cases). The lower extremity was the second (26%, 14 cases) most affected location. The trunk was involved in 12 injuries (22%), whereof the predominant location was the spine (13%, 7 cases). We registered 6 injuries (11%) to the head (Fig. 1).

The most common type of injury was fracture (31%, 17 cases), followed by contusion/bruise (18%, 10 cases), pain due to atraumatic muscle pain (16%, 9 cases), muscular strain/tendon tear (13%, 7 cases), dislocation (9%, 5 cases), concussion (7%, 4 cases), sprain (4%, 2 cases), and pneumothorax (2%, 1 case) (Table 1).

Most players were injured through a fall from the horse (44%, 21 cases), followed by overuse (17%, 8 cases), fall with the horse (15%, 7 cases), crash with a player (6%, 3 cases), hit from a ball (4%, 2 cases), and strange movement on the horse (4%, 2 cases). Each of the following mechanisms was seen only once: hit from a mallet, hit from a mallet on the chest and fall from the horse (pneumothorax), getting on the horse, crash with goal post, and hit from a horse's head (Table 2).

Pain from playing polo without cessation of play was reported in 57 cases (55%). The most predominant sites of overuse were the wrist (21%, 12 cases) and the lower back (21%, 12 cases). A typical pattern with pain in the lumbar spine, groin, and the hitting arm could be observed (Fig. 2).

Seven players (7%) wore a polo helmet that was tested according to the newest standards (VG1, Europe; PAS 015: 2011, Britain, ASTM F1163, U.S.). Ninety-six players (93%) used uncertified helmets (Table 3, Fig. 3).

Sixty-nine players (67%) used equipment to protect the face; 22 (21%) of them wore a faceguard and 47 (46%) wore glasses. Three of the players who wore glasses also used a mouth guard. Thirty-four players (33%) did not use any protective face equipment (faceguard, glasses, or mouth guard) (Fig. 3).

## Discussion

Polo is a thrilling summer game where players reach speeds of 55 km/hr on a horse weighting up to 500 kg. The players hit a ball that can reach a speed of 200 km/hr. Forces involving high speeds, body contact, and projectiles are associated with high risks of serious injuries (9). We now present the largest study on polo injuries worldwide.

In our study, 67% of all injuries were classified as major; this is in accordance with the Argentinian study, where 64% of all injuries were major (3). The injury rate per 1000 player-game hours was 5.3 for professionals and 6.1 for amateurs, compared to 7.8 for professionals in the Argentinian study. The injury rate seems to be quite low compared to other sports such as rugby (44.9 per 1000 player-game hours) and soccer (16.9 per 1000 player-game hours), but, if an injury occurs, it is likely to be major (5).

The upper extremity was the predominately injured area (42%); a similar proportion (39%) was affected in the Argentinian study. The lower extremity was the second most affected area at 25% in our study, compared to 31% in the Argentinian study. In contrast, when comparing our study to their study, we noted more injuries in the trunk (22% vs. 5%) than in the head (11% vs. 25%). Players in our study are mostly amateur players working in an office, which could explain the higher number of trunk injuries from atraumatic back pain. Conversely, the Argentinian collective, consisting of professional players, experienced more head injuries, mostly concussions, which may be more associated with higher speeds and more competitive play. Besides potentially life-threatening head injuries, there was also one pelvic fracture and one pneumothorax, injuries that have been described in the literature previously (10, 12) (Fig. 1). In accordance with other polo and equestrian studies, the most frequent injury mechanism was falls (3, 7, 11, 14; Table 2). Here, for the first time, we present data on overuse injuries in polo. The result is a typical pattern with pain in the lumbar spine, groin, and the hitting arm (Fig. 2).

We also focused on head and face protection, because we think better protection of these areas can assist in avoiding fatal injuries.

Only 7% of the players used polo helmets according to the newest standards (Table 3). We strongly recommend to make polo helmets according to the newest standards of equestrian helmets (VG1, Europe; PAS 015: 2011, Britain, and ASTM F1163, U.S.; NOCSAE ND 050, Standard for Newly Manufactured Polo Helmets in the U.S.) compulsory worldwide (2).

Furthermore, players in our study rarely used protective face equipment (21%). Fortunately, no serious head injury occurred; however, two players reported fractures (zygomatic bone hit from a ball and nose hit from a mallet) in the face. But one player in the Argentine study lost an eye during a polo match (3). Recommendations and tests for faceguards are not listed in the standards of the PAS 015: 2011 (2). We recommend faceguards to be studied in future studies.

Helmets and knee protection are compulsory worldwide. The U.K. is the only country to make the use of certified helmets (according to PAS 015: 2011) mandatory, as of 2018. The United States Polo Association encourages players to wear certified helmets, but they are not mandatory. All Associations recommend face and/or eye protection. The Asociación Argentina de Polo also makes glasses mandatory for players under 18 years of age (1, 6, 13).

Our study has some limitations: This is a retrospective collection of very diverse traumas in an extremely inhomogeneous population with respect to age, fitness, skills and furthermore in quality of the polo ponies which are the major cause of accidents. Therefore a normalisation of all the above mentioned aspects needs to be established. This could be achieved in a carefully planned prospective study during an effort in collaboration with the involved and responsible Polo Sport Federation.

## Conclusion

Polo is a dangerous team sport, and life-threatening injuries do occur. Medical staff trained in trauma management should be present at all polo matches. We recommend that certified helmets be made mandatory to prevent serious head injuries. Finally, we strongly advise to protect the face with protective glasses or an adequate (certified) faceguard. A definite recommendation to wear a faceguard cannot be provided, as certified models are not available on the market yet. ■

## Conflict of Interest and Source of Funding

*Ludwig Neumayr is a polo-playing member of the Polo Club Hesen. Holger Schmitt has no conflict of interest. No funding was received related to the manuscript.*

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