Finger injuries in a developing sport: cachibol (Newcomb Ball)

Uri Farkash^{1,2} · Oleg Borisov^{1,2} · Orit Bain^{1,2} · Paul Sagiv^{1,2} · Meir Nyska^{1,2}

Published online: 7 July 2015
© American Association for Hand Surgery 2015

Abstract

Background Cachibol (also known as Newcomb ball) is a team ball game with characteristics similar to volleyball. Cachibol is becoming increasingly popular, particularly among middle-age women, and is now the fastest growing female sport in our country. Despite its growing popularity, there is a lack of information about the epidemiology of injuries incurred from this activity. The purpose of this study is to describe the incidence and pattern of finger injuries among female cachibol players competing in a 3-day tournament.

Methods We conducted a cross-sectional survey and an observational cohort study of 612 amateur female cachibol players participating in a 3-day national tournament; 355 players completed questionnaires (58 % response rate). All injuries sustained during the tournament were reported.

Results Fingers were the most commonly injured part of the body; 148 of 355 respondents reported sustaining a finger injury. During the tournament, 26 players reported a total of 27 injuries, 15 to the fingers. Most finger injuries resulted from a direct hit by the ball. Finger injuries, though considered “mild,” have long-term implications; over 50 % of injured players reported long-term discomfort.

Conclusions Finger injuries are more prevalent in cachibol than volleyball due to the unique characteristics of the game. Cachibol-related injuries are a growing cause for concern due to the growing number of cachibol players. This study may be

useful in developing effective treatment protocols and injury prevention programs for cachibol players.

Keywords Cachibol · Newcomb ball · Finger injuries · Sport injuries

Background

Cachibol (also known as Newcomb ball) is a team ball game that has characteristics similar to volleyball. Clara Gregory Baer, a pioneer in the field of physical education at Sophie Newcomb College in Louisiana, USA, invented Cachibol in 1895 [11]. In both games, the aim is to get the ball into the opposing court, while transferring it across the net. However, instead of volleying, hitting, or striking the ball, cachibol players are allowed to catch and hold the ball for up to 1 s. The nature of cachibol allows players of any age or level of fitness to learn and participate in this sport; thus, cachibol is becoming increasingly popular particularly among middle-aged women.

Over the last decade, cachibol has evolved from a recreational activity to a competitive sport and is now the fastest growing female sport in our country. Thousands of women participate weekly in organized amateur leagues, including national leagues, workplace leagues, and “Mamanet”, a league specifically designed for mothers. The “Sportiada”, a 3-day tournament in which dozens of teams and hundreds of players take part, is the largest “sport for all” event in our country and the largest sporting event in workplace and “Mamanet” leagues (Fig. 1).

With the increasing popularity of cachibol there are a growing number of female patients suffering finger injuries incurred playing this game. Understanding the type and mechanism of injuries resulting from specific sport activities is

✉ Uri Farkash
urifarkash@gmail.com

¹ Department of Orthopedic Surgery, Meir Medical Center, 59 Tchernichovsky Str, Kfar-Saba 44281, Israel

² Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

Fig. 1 Players' positions in a cachibol game during the tournament

invaluable for sports medicine professionals, both for treating patients, and for designing injury prevention programs. The purpose of this study is to describe the incidence and pattern of finger injuries among cachibol players participating in a 3-day tournament.

Materials and Methods

The study was conducted during the 2014 3-day tournament of the “Sportiada” games and approved by our institutional review board. We conducted a cross-sectional investigation by interviewing players regarding previous injuries resulting from cachibol activity. We also performed prospective injury registration during the tournament. A cachibol-related injury was defined as any physical complaint resulting from cachibol-related activities, either during practice or the game, irrespective of the need for medical attention or time-loss from sports. This definition was adapted from the consensus statement on injury definitions and data collection procedures in studies of football injuries [6]. Overuse injuries were not included in the study.

All injuries were classified by loss of training time. Using previously published criteria [9], “incidental” injury was defined as injury resulting in no time lost from competition or training; “minor” injury as injury that interrupted participation for less than 1 week; “moderate” injury as injury necessitating absence for more than 1 week but less than 1 month; “major” injuries as those causing absence of more than 1 month.

Table 1 Severity of reported injuries in common locations

Injured area	Incident <i>N</i> (%)	Injury severity ^a			
		Minor <i>N</i> (%)	Moderate <i>N</i> (%)	Severe <i>N</i> (%)	Total
Finger	62 (45 %)*	30 (21 %)	14 (10 %)	33 (24 %)	138
Ankle	9 (15 %)*	11 (19 %)	19 (33 %)	19 (33 %)	58

* $P < 0.0001$

^a Classified according to Morgan and Oberlander [9]

All cachibol players registered for the tournament were asked to fill in a questionnaire. An investigator personally distributed questionnaires to players at the competition site. Goals and methods of the research were explained, and players were informed that participation was voluntary and were assured that information provided was confidential. Players could ask questions regarding the research and were also given the opportunity to contact our clinic after the tournament for further medical advice.

Data gathered about the participants included age, hand dominance, duration, and frequency of cachibol training. Participants reported previous traumatic injuries incurred during cachibol activity. Injuries were subdivided by anatomical region. A thorough inquiry was made about type and circumstances of finger injuries, treatment received, and persisting injury-related complaints.

We also conducted an observational cohort study during the tournament. An “injury report form” (IRF) was prepared; this included questions referring to type, location of, and circumstances associated with the injury. The IRF was completed after each injury. Injured players were contacted at the completion of the tournament to record subsequent medical treatment received, document the final diagnosis, and record time lost from sports in the period following the tournament as a result of injury.

Statistical Methods

Continuous variables were represented by mean and standard deviation; categorical variables by absolute and relative frequencies. The Mann-Whitney test or *t* test were used for comparison of continuous variables, each when appropriate, and the chi-square test or Fisher exact test for categorical variables, each when appropriate. Level of statistical significance was set at $P < 0.05$ for all analyses.

Results

Of 612 female players participating in the tournament, 355 completed questionnaires (58 % response rate). Average age of players was 42.3 ± 7.9 years (range 22–64). Among 355 respondents, 190 players (54 %) reported sustaining at least

Table 2 Reported number of fingers injured among 148 players

Injured finger	Small	Ring	Middle	Index	Thumb
No. of injuries	65	55	27	31	9

one injury during cachibol activity; 34 players reported injuries in more than one body location. Players reported significantly more finger injuries compared to injuries to other parts of the body; 148 players reported finger injuries, then ankle (61 players), knee (19), wrist [7], and shoulder [7]. Fingers were not only identified as most commonly injured, but 57 of 148 players reported multiple finger injuries.

Table 1 shows recovery time (time when players could not train and/or play due to injury) for finger and ankle injuries, as reported by the players.

Finger injuries were distributed evenly between right and left hands, and no correlation between hand dominance and injured side was found. Most finger injuries were to the small and ring fingers (Table 2). Contact with the ball caused most finger injuries; 75 % of the injuries were from the ball, 14 % from hitting another player, 5 % from hitting the floor. Eighty nine percent of players injured by the ball were injured while attempting to catch it, the others were injured while attempting to block or hit it.

Diagnosed fracture of the finger was reported by 58 players, 5 reported a dislocation, 21 reported other soft tissue finger injuries, and 64 were not able to report the exact diagnosis of their finger injury.

For long-term consequences of finger injuries in cachibol, as perceived by the players, see Table 3. Fifty-five percent of players reported pain, limited range of motion, or finger deformity.

Several players contacted our clinic following the study enabling us to gather more information regarding the diagnosis of finger injuries. Figures 2, 3, 4, 5, 6, 7, and 8 illustrate typical finger injuries for cachibol players we treated.

During the tournament, 26 players reported a total of 27 injuries. For distribution of injuries by severity and location see Table 4. Fingers were the most frequently injured body part. Of 15 players suffering finger injuries, 3 injured more than one finger. The little finger was the most affected, then the ring

Table 3 Long-term complaints reported by 148 players with finger injuries

	Number of responses
Normal finger function	60
Finger pain	38
Limited flexion	30
Limited extension	17
Finger deformity	14

Fig. 2 Mallet finger injury in a patient with hyperlax joints that resulted in swan-neck deformity

finger (Table 5). The most frequent joint injured was the proximal interphalangeal (PIP) joint—nine players suffered a sprain, two players suffered avulsion fracture of the volar plate of this joint. Other diagnoses were sprains of the metacarpophalangeal (MCP) joint (3 cases) and the distal interphalangeal (DIP) joint (1 case). The ball caused most injuries in general, and finger injuries in particular, causing all but one finger injury. Nine finger injuries occurred while attempting to catch the ball, five while blocking or striking it, and one from a fall.

Fig. 3 Mallet fracture of the left small finger

Fig. 4 PIP joint volar plate avulsion fracture

Discussion

Cachibol, like volleyball, is a non-contact sport in which players are separated from the opposing team by a net. We therefore expected the type of injuries to be similar in both games. Comparison of injury rates between different studies is difficult, due to variability in injury definition and athlete population used by different authors. Upper extremity injuries account for a minority of injuries in volleyball. The National Collegiate Athletic Association (NCAA) has collected injury and exposure data from different collegiate sports activities in the Injury Surveillance System (ISS) since 1988. In the

Fig. 5 PIP joint dislocation

Fig. 6 Condylar fracture of proximal phalanx

NCAA report, approximately 20 % of volleyball injuries involved upper extremities, predominately the shoulder [1]. Other studies [2, 14] also show that only about 7–10 % of injuries in volleyball involve the fingers. In a large case series of volleyball injuries, 23 % of patients who visited the trauma department had injuries localized around the hand [3] suggesting a higher prevalence of finger sprains in volleyball, but

Fig. 7 Combined mallet and volar base fractures of middle phalanx

Fig. 8 Same patient as in Fig. 3, 8 months after the previous injury. Fractures of middle and distal phalanges of the right small finger

since many players use sports tape and continue playing, these injuries rarely cause loss of playing time during training or games, therefore may be under-reported in injury incidence studies. Our results show that finger injuries are frequent in cachibol players. They accounted for more than half the injuries in cachibol, both as reported by players answering the questionnaire, and as occurring during the tournament.

The spectrum of upper limb injuries varies in different sports. In sports involving ball handling or catching, or where there is physical contact with a ball struck at speed, finger injuries tend to be common [4]. Certain injuries are more characteristic to particular sports. The mechanism of injuries to the hand and wrist in volleyball players typically results from passing, blocking, or diving. Hyperextension at the MCP and PIP joints occurs frequently in volleyball and may result in volar plate avulsion. Bhairo [3] reported that most finger injuries in volleyball occurred near the net, with a hyperextension mechanism, particularly involving the MCP joint of the thumb and little fingers while blocking the ball.

Table 4 Acute injuries during the tournament by severity and body location

Body region	Incident	Injury severity ^a			
		Minor	Moderate	Severe	Total (%)
Finger	8	3	1	3	15 (56)
Knee	–	–	3	2	5 (19)
Ankle	1	1	–	–	2 (7)
Head	1	1	–	–	2 (7)
Shoulder	–	2	–	–	2 (7)
Wrist	–	–	1	–	1 (4)
Total	10	7	5	5	27 (100)

^a Classified according to Morgan and Oberlander [9]

Table 5 Distribution of finger injuries among 15 players during the tournament

Injured finger	Small	Ring	Middle	Index	Thumb
Incidence	8	5	2	3	1

We found a different distribution of finger injuries in cachibol. Most injuries were to the PIP joint, with the small and ring fingers most susceptible. Basketball players suffer similar injuries as they are susceptible to direct axial load from the ball causing PIP joint dislocation, mallet finger, or central slip disruption resulting in a boutonniere deformity [7]. Although cachibol and volleyball are similar, and the same type of ball is used in both games, we assume that in cachibol the higher rate, and variety of finger injuries and the tendency to injure the ring and small fingers, result from the unique feature of this game which requires catching rather than hitting the ball, thus exposing players to finger injuries typical of basketball, as well as volleyball.

Most finger injuries in cachibol can be managed conservatively. Both the retrospective survey and the data collected during the tournament show that most finger injuries result in a short or no time lost from sport. Athletes tend to underestimate the severity of hand injuries, and serious injuries such as fractures may be dismissed as a “sprain.” Delays in diagnosis and management can have significant added morbidity. Even if properly diagnosed and referred to proper therapy, athletes desire to return to play as rapidly as possible, often before completion of rehabilitation. Wong [15] reported that average time off work was usually shorter than average length of rehabilitation, especially for minor and moderate finger injury patients, and they resumed work while still receiving treatment. Hand surgeons approach the treatment of hand and wrist injuries in general, and in athletes in particular in varying ways [5]. These factors may lead to undesirable incomplete recovery and long-term discomfort reported by a significant number of cachibol players.

We theorize that proper initial management may influence outcome. Paschos [10] reported similar outcomes in patients suffering PIP joint hyperextension injuries treated with buddy strapping compared to those treated with aluminum orthoses. Buddy strapping enabled earlier recovery of motion. Further investigation is needed to determine whether avoiding prolonged rigid fixation is also advantageous for other types of finger injuries.

Our study shows that compared to volleyball, cachibol has unique game characteristics resulting in a high rate and diversity of finger injuries. Contact with the ball causes most finger injuries. Strategies proposed for the prevention of volleyball-related injuries may not be suitable for cachibol because they focus mainly on prevention of ankle sprains, patellar tendinopathy, and shoulder overuse injuries [8, 12, 13]. Since

many injured players did not regain normal finger function, the need to raise awareness among players, and hand surgeons treating them, of the finger injury potential and ramifications is important. Prompt diagnosis, treatment, early protective mobility, and consideration of time to resume sporting activities, should improve long-term consequences. We believe that our study, and further research into the mechanism of finger injuries and risk factors in sports, may form the basis for designing measures to reduce future risk of injury and long-term consequences for players.

Conflict of Interest Uri Farkash has no conflicts of interest to declare.

Oleg Borisov has no conflicts of interest to declare.

Orit Bain has no conflicts of interest to declare.

Paul Sagiv has no conflicts of interest to declare.

Meir Nyska has no conflicts of interest to declare.

Statement of Human and Animal Rights This study does not involve experimental intervention in humans or animals.

Statement of Informed Consent Informed consent was obtained before any information was collected from study subjects.

References

1. Agel J, Palmieri-Smith RM, Dick R, et al. Descriptive epidemiology of collegiate women's volleyball injuries: national collegiate athletic association injury surveillance system, 1988–1989 through 2003–2004. *J Athl Train*. 2007;42(2):295–302.
2. Bahr R, Bahr IA. Incidence of acute volleyball injuries: a prospective cohort study of injury mechanisms and risk factors. *Scand J Med Sci Sports*. 1997;7(3):166–71.
3. Bhairo NH, Nijsten MW, van Dalen KC, et al. Hand injuries in volleyball. *Int J Sports Med*. 1992;13(4):351–4.
4. Court-Brown CM, Wood AM, Aitken S. The epidemiology of acute sports-related fractures in adults. *Injury*. 2008;39(12):1365–72.
5. Dy CJ, Khmelnitskaya E, Hearn KA, et al. Opinions regarding the management of hand and wrist injuries in elite athletes. *Orthopedics*. 2013;36(6):815–9.
6. Fuller CW, Ekstrand J, Junge A, et al. Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *Br J Sports Med*. 2006;40(3):193–201.
7. Gaston RG, Loeffler BJ. Sports-specific injuries of the hand and wrist. *Clin Sports Med*. 2015;34(1):1–10.
8. James LP, Kelly VG, Beckman EM. Injury risk management plan for volleyball athletes. *Sports Med*. 2014;44(9):1185–95.
9. Morgan BE, Oberlander MA. An examination of injuries in major league soccer. The inaugural season. *Am J Sports Med*. 2001;29(4):426–30.
10. Paschos NK, Abuhemoud K, Gantsos A, et al. Management of proximal interphalangeal joint hyperextension injuries: a randomized controlled trial. *J Hand Surg [Am]*. 2014;39(3):449–54.
11. Paul J. A lost sport: Clara Gregory Baer and newcomb ball. *J Sport Hist*. 1996;23(2):165–74.
12. Pedowitz DI, Reddy S, Parekh SG, et al. Prophylactic bracing decreases ankle injuries in collegiate female volleyball players. *Am J Sports Med*. 2008;36(2):324–7.
13. Reeser JC, Verhagen E, Briner WW, et al. Strategies for the prevention of volleyball related injuries. *Br J Sports Med*. 2006;40(7):594–600.
14. Schafle MD, Requa RK, Patton WL, et al. Injuries in the 1987 national amateur volleyball tournament. *Am J Sports Med*. 1990;18(6):624–31.
15. Wong JY. Time off work in hand injury patients. *J Hand Surg [Am]*. 2008;33(5):718–25.