Handball: The Beauty or the Beast

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Croatian Handball Phenomenon

When the skill of doing a sport turns into art, and its protagonists become virtuosos, when the team spirit gets subordinate to every individual prominence, and a wish to succeed outweighs any physical and mental pain – then one becomes the best among the best in sport.

The Croatian national handball team touched the stars in the “Hellenico” Olympic arena on September 29, 2004, adding the title of the Olympic winner to the title of the current world’s champion from Portugal 2002. The second gold Olympic medal for handball virtuosos (the first was brought from Atlanta in 1996) out of only two performances in the Olympics since the independence of Croatia, deserves pinpointing the phenomenon of the handball strategists and playmakers in the leadership and the artists in implementation of their ideas as a top sports phenomenon.

Handball is a team contact game in which players dribble, pass, and shoot the ball with their hands, trying to make it end up as many times as possible in the opponents’ net. It is played indoors or outdoors, by both sexes and all ages: young children, juniors, and seniors.

Since its very beginnings, in the late 19th century, handball has seen numerous transformations regarding the rules, technique, tactics, training, and preparations. Those changes have especially been intensified since the indoor handball became a dominant form of this sport.

A dynamic development of handball along with an increasing interest of the public has resulted, as in other sports, in major professionalization of all top teams, which has directly affected the transformation of the basic characteristics of this sport.

The players’ speed, strength, and weight have increased. The game tempo has grown more intense, and special attention has been paid to intensifying the power of the shot. Handball has today definitely become a tough and uncompromising sport requiring from players enviable physical, mental, and technical preparedness. The concept according to which a firm and strong defense decides about the success on the court has been increasingly accepted. That is why sharpness in tackling the opponent and aggressiveness in realizing one’s intentions increasingly characterize this sports’ discipline, regardless of the sex and age of the protagonists. Success in sport becomes the only measure. Winners are remembered and the defeated grieve, falling into oblivion.

At trainings, thus, a lot of time is devoted to movements and specific exercises, the goal of which is to disable the attacking team. No matter how many trainers during the training process and warming-up of the team try to practice optimal motor situations in their players’ moving, falling, and shooting (optimization of conditions), the opponent in the game, even when respecting the rules, tries to obstruct these conditions. When the concept of “disabling the opponent at any cost” is applied, numerous injuries may result, some of them very severe and with dubious prognoses regarding the further sport career of the players (1-3).

Most Prevalent Injuries in Handball

Handball is today, without any doubt, an extremely traumatic sport and it will be getting even more so with reference to the increase of strength, speed, and rhythm of the game. Numerous injuries which occur during the training process and games do not differ greatly with reference to age and sex (4, 5).

Today sports injuries unfortunately are a part of sport. Knowing their etiology, as well as incidence, may also be useful to all those dealing with sports traumatology and sports injury rehabilitation because of both their prevention and proper treatment.

A question arises in what respect do the characteristics of handball traumatism exceed the frame of sports traumatology?

It can be claimed with certainty that numerous specific traits of this sport, especially burdening of the upper extremities and tougher contact mechanism...
make its traumatism specific (1,6,7). As for acute injuries, their main causes lie in merciless play, which most often makes wrists and shoulders suffer, and as for the overstraining syndrome, reasons should be sought in a great frequency of repeating certain movements and straining all joint structures, which is most often manifested in the shoulder and the knee (8,9).

The popularity of handball in Scandinavian countries and Germany, where one can hardly speak of a sport anymore but of a true handball movement, also conditioned a need for a scientific approach in monitoring the causes, mechanisms and consequences of injuries in handball. Therefore, it does not surprise that a large number of scientific papers and studies have been published in those countries and are available to all of us who base our work on personal experiences only.

European women multi champions and the Olympic winners from Denmark, European champions from Germany, and great games in national leagues, led also many other campaigns, not directly associated with the sport, to start taking an interest in the phenomenon of handball.

The incidence of injuries monitored and studied by Nielsen and Yde (8) in their epidemiological and traumatological study of injuries in handball players was determined to be 4.6 per 1,000 of training hours and 11.4 per 1,000 game hours. It showed that the upper extremities were exposed to injuries in 41% of cases, including the incidence of 21% of finger injuries. Ankle sprain is the most frequent leg injury, accounting for 33% of the total injuries, while overstraining syndrome has the incidence of 18%. Repeated exposure to the same mechanisms and burdens during trainings, as well as contests, results in a relative risk of repeated injury of 32% (8).

Numerous researches, but also everyday experiences showed that other joints are not immune either to injuries during handball game, not even those which are not quite represented in sports traumatology. It was thus showed that the elbow may also be the point of injury, although this type of injury most commonly affects handball goalkeepers.

Popovic and Lemaire (10) conducted their study about elbow injuries on 30 top goalkeepers. The specific nature of their trainings and preparations for extremely high burdening of this joint while blocking shots, when the handball flies at great speeds, leads also to the specific burdening of the elbow and wrist as well as the structures around the joints. Radiological tests (classical radiogram and ultrasound diagnostics) showed a high incidence of reparatory degenerative changes in the elbow joint – appearance of osteophytes in the handball goalkeepers’ elbows, which is the reflection of great mechanical burdening of that joint. In 67% of the subjects, the existence of osteophytes in the elbow was radiologically verified. The specific nature of the goalkeeper’s elbow due to such biomechanical developments during rapid arm movements, repeated rapid elbow movements, and the consequences of tough collisions during defenses, is also seen in many injuries of the collateral ligament in the elbow – in 50% of the subjects. The fact that this is an extremely traumatized joint in handball goalkeepers may further be proved by the incidence of synovitis and bursitis of the elbow with an incidence rate of as much as 66% (10).

This joint deserving special attention for being exposed to injuries among handball goalkeepers was also showed in the studies by Tyrdal et al (11). They studied the problem of elbow injuries in goalkeepers in a two-year study on 449 seniors and 32 juniors. The obtained results showed that 8.6% out of the total number of monitored goalkeepers had some kind of elbow dysfunction in the monitored period, not having any similar complaints up to then. Their basic complaint was repeated pain and instability of the joint. It showed that the most common injury mechanism here was hyperextension trauma. Since this research showed that a number of handball goalkeepers have such complaints, this clinical entity and functional incident may also be called “handball goalie’s elbow” (11).

There is a big difference among burdens, and also among risks of injuring each other at trainings and competitions. More precisely, during a training process, in spite of a wish for a contest and proving one’s individual qualities in relation to fellow players, there is still solidarity within the team. That is why injuries, as well as their types and intensity, differ at trainings and during the competition period. Seil et al (2) studied the incidence of injuries at trainings and games in 186 subjects – handball players from 16 clubs. The incidence of injuries was much higher during games than in the course of trainings: 14.3 injuries per 1,000 game hours in relation to 0.6 per 1,000 hours of training. Upper extremities were represented in the total number with 37%, and lower with 54%. The most common injury was the knee injury, followed by finger, ankle, and shoulder injuries (2).

The same authors showed there was a significant difference in the type and intensity of injury with reference to the competition level. More precisely, at a higher competition level, where there are greater ambitions, higher tasks and burdens, a greater professional wish for success, which is today not motivated by sports ambitions only, there are also more severe injury types (3).

Specific mobility of the shoulder joint, with a great need for its use in handball, leads to common complaints and injuries of this joint, and considerably more often of the soft tissues surrounding it. The most severe shoulder injury that can happen while playing handball is dislocation of the shoulder joint with a rupture of all the surrounding joint stabilizers and is not encountered often (12), even considerably less than in some other sports. Piper studied a considerably more common injury of handball players, monitoring the significance of the position of the upper arm, i.e. increase in brachium retroversion in the dominant arm, as well as the incidence of the syndrome of overstraining the shoulders in handball players (13,14). The retroversion angle in the dominant “throwing” or “shooting” arm of the handball player in relation to the non-dominant one is increased by 9.4°. In people with chronic dysfunction and clinical con-
dition of the shoulder, the measured retroversion was by 5.5% lower than with non-dominant arm. It seems that the increased retroversion angle is one of the adaptations of our body to increased strains, which develops during exercise in the phase of growth and development and at the same time represents the mechanism of injury prevention (13,14).

Due to this dynamic sport’s need for a rapid change of movement direction, common falls and knocking one’s knee against another or a hard surface, as well as due to the injuries while landing from a height, knee injuries are relatively common with handball players (1,5,8,15). An exceptionally important factor of knee injuries with handball players is the surface on which the games are played. Olsen et al (16) studied the connection of the cruciate ligament injury incidence and the ground surface played on, detecting higher injury risk on the artificial surface in relation to the wooden floor or parquet. The injuries of the cruciate ligament belong to more common knee injuries in handball and are related to abrupt direction changes and contact during play. Neither the surface played on was to be ignored, as well as the type of sports footwear worn, as it may considerably prevent knee and ankle injuries in handball players by its quality and adjustment to different individual surfaces. It has thus become customary that all sports shoe manufacturers employ top experts from numerous complementary areas (such as design, biomechanics, and kinesiology).

It was showed that among handball players in Norway there was a considerably high correlation of the anterior cruciate ligament injury and the circumstances in which the injuries appeared. The results of the research showed an annual injury incidence of 1.8 % or 0.82 injuries per 1,000 hours of play, mostly on an artificial surface. The mechanism of injury development indicates that the main reason for its development is friction of the footwear against artificial surface. Two thirds of the injuries thus developed without any contact with other players.

As with all sports, there are handball competitions that have their continuity and go on for months during the contest season. That is when there is enough time for the players’ recovery from possible injuries, but also for preventing injuries with some spotted weaknesses.

The specific nature of acquiring injuries and inability to recover and heal the injury quickly, as well as persistence in enduring everyday roughness, to which the best ones are especially exposed, mostly get revealed with the tournament type of contests, such as European and World’s Championship and the Olympic games. The tournament type of contest carries along great risks and leads to unpredicted contest circumstances. Oehlert et al (17) from the Orthopedic Clinic in Kiel studied by means of video the injuries appearing during Olympic games and assessed the risk of injuring certain parts of the body. The tournament contest lasted for 6 days (five days plus one day-break) during which handball players played 5 games each and also held 6 more trainings each. Monitoring of top handball teams during the tournament contest showed the specific nature of the teams’ preparedness for it. Also each player has to be in a top psycho-physical shape so that he or she could keep up with an intense rhythm of trainings and games where there is very little time for recovery. Out of all injuries only a single injury of the knee joint (rupture of anterior cruciate ligament) and an injury of the lower leg (partial rupture of the median head of the gastrocnemius muscle) demanded longer rest. Both injuries took place on the last day of the contest, in the last game. The injuries of the cruciate ligament belong to the most common knee injuries in handball, related to abrupt direction changes, contact game with a lot of mutual knee knocks, but we must not neglect the surface played on either (16).

Due to the contact character of this sport, numerous injuries of the face and all its structures are also possible. Fortunately, the injuries of eyes, nose, teeth, earlobes, and mouth are not so common, although they can in individuals occasionally lead to severe consequences.

All these studies show that handball is an exceptionally dynamic contact sport but still with a relatively low number of injuries in top players with reference to the intensity of work during trainings and contests.

Prevention and Principles of Handball Injury Rehabilitation

There are numerous ways of preventing injuries in handball. Some were discussed earlier in the text (high-quality and scientifically based training processes, appropriate footwear, surfaces on which games are played, psycho-physical preparedness).

Some authors also showed the importance of the ratio of the forces of antagonist muscle groups during movements as a way of preventing injuries (18).

In the preventive activity the significance of bandaging the joints or extremities (e.g. fingers) or supporting the orthoses must not be neglected. This passively leads to increased stabilization of the segment under risk, which at the same time lowers the risk of injury. There are also other common procedures, such as stretching exercises and warm-up, which are used before trainings and games with the purpose of preparing the athletes as much as possible, and they are useful in prevention.

Isokinetical machines can also be used in the prevention and rehabilitation of almost all sports injuries, in conservative treatment as well as following surgical procedures, with different forms of physical therapy.

It is certain that the decision in favor of conservative or surgical treatment primarily depends on the injury itself and should be left to experts, but after one or the other way of treatment, it is necessary to always conduct a rehabilitation procedure.

Rehabilitation is, according to the World Health Organization’s definition, a complex process of enabling again for daily and professional activities as well as for emotional and social stability the persons
who have lost this ability partly or completely due to an illness or injury.

Rehabilitation following handball players’ injuries does not refer only to doing usual everyday activities, but also the complete return to his or her sport activities (19).

The process of rehabilitation in handball players starts immediately following the injury on the sports court and lasts as long as disability demands. It is important for it to be professionally led and individually adjusted to the personal needs. In rehabilitation of certain sport injuries, including handball, there are no common algorithms of rehabilitation procedure, and the handball player has to be in the shortest possible time enabled to meet all professional obligations.

One of the important differences of the rehabilitation process consists in sparing the handball player of strict rest immediately following the injury. More precisely, rehabilitation should start immediately, even with most complex injuries requiring immobilization of a body part (fractures of long bones or hand bones, or injuries of certain vital joints). Rehabilitation at this time means isometric exercises and certain forms of physical therapy (e.g., magnetotherapy above plaster or osteosynthetic material). Individual program of exercises for the rest of the body, meant to preserve the muscle mass, joint, and spine mobility, sustain some physical preparedness and a feeling that the player is not lost to physical activity (Box 1, ref. 17).

Box 1
Following preconditions are required for good rehabilitation:
• preserving muscle mass and quality,
• mobility of all joints and prevention of contractures,
• preserving proprioception,
• keeping functional exercises for certain sports,
• reducing the loss of handball skill,
• correction of biomechanical mistakes not related to the injury,
• maintenance of good cardiovascular ability is, and
• psychological support.

During rehabilitation procedure it is necessary to change forms of activity, duration of activity forms and their frequency and intensity, depending on the progress of the rehabilitation process. The final return to fully stressed handball play is fulfilled when conditions listed in Box 2 are fulfilled.

Box 2
Conditions for return to play:
• when no more painfulness is felt in any activities,
• when functional capacities of all joints are fully preserved,
• when there is a satisfactory quantity of good-quality muscles,
• when there is a preserved sports skill as before the injury,
• when the cardiovascular system is prepared to the optimum,
• when there is appropriate proprioception,
• when there is psychophysical preparedness,
• when stamina and strength correspond to the expected exertions, and

Rehabilitation of all athletes, including handball players, is thus a very complex and demanding job, which requires knowledge, skill, patience, and an individual approach to every athlete and every injury, no matter how similar they may seem.

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