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# MEDICAL CARE AND STRENGTH TRAINING PROGRAM FOR THE HANDBALL GOALIE'S ELBOW SYNDROME

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**SUMMARY**

The "handball goalie's elbow" is a chronic and almost inevitable syndrome affecting a great number of team handball goalkeepers. The aim of this study was to assess information regarding the medical care of high level team handball goalkeepers who present the "handball goalie's elbow" syndrome, before and following a muscle-strengthening program. Sixteen goalkeepers were randomly divided into two equal groups. The injuries were inflicted by the intense striking of the ball on goalkeepers' hands when blocking a shot. The players filled in a specific questionnaire relating to previous elbow injuries. The study group followed a muscle-strengthening program for three months. The control group did not follow any specific muscle-strengthening program. After the program was complete, all the athletes filled in the specific questionnaire again. The results displayed that the frequency of complaints was continuous for both groups, even after the muscle-strengthening program. Medical diagnosis revealed a variety of symptoms, and all players followed conservative treatment. Both group members presented complications. Relapses occurred when they returned to athletic activities, while the syndrome caused problems in their daily life outside the athletic field.

**Key words:** Team handball, goalkeeper, sports injuries, overuse syndromes, elbow, muscle-strengthening, exercise

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## *ÖZET*

*HENTBOL KALECİ DİRSEĞİ SENDROMUNDA SAĞALTIM VE GÜÇ GELİŞTİRME PROGRAMI*

*"Hentbol kaleci dirseği" kaçınılması çok güç kronik bir sendrom olup, çok sayıda hentbol kalecisini etkiler. Bu çalışmanın amacı, adı geçen sendromu gösteren üst düzey hentbol kalecisinin sağaltımına ilişkin bilgileri bir kas gücü geliştirme programı öncesinde ve sonrasında incelemektir. Toplam 16 kaleci iki eşit gruba rastgele ayrıldılar. Yaralanmalar bir şutu bloke ederken topun kalecinin ellerine şiddetle çarpması sonucu oluşmuştu. Oyuncular önceki dirsek yaralanmalarına ilişkin bir sorgulama formunu doldurdular. Araştırma grubundakiler üç ay boyunca bir kas güçlendirme programı izlediler. Kontrol grubunu oluşturanlar ise herhangi bir özel güç geliştirme programı uygulamadılar. Program tamamlandıktan sonra tüm sporcular özel sorgulama formunu tekrar yanıtladılar. Sonuçlar; kas güçlendirme programı uygulanmasına karşın, her iki grup için yakınma sıklığının benzer süreklilik arzettiğini ortaya koydu. Tanı, çeşitli semptomların varlığına işaret etti. Tüm oyunculara konservatif sağaltım uygulandı. Her iki grup sporcuda da komplikasyonlar ortaya çıktı. Sportif aktiviteye dönüşte yaralanmalar tekrarlarken, sendrom saha dışı günlük hayatta da problemlere yol açtı.*


***Anahtar sözcükler:*** *Hentbol, kaleci, spor yaralanması, aşırı kullanım sendromu, dirsek, güç geliştirme, egzersiz*

## INTRODUCTION

Team handball goalkeepers present upper extremity problems, especially in the elbow, at a percentage of 75% during their career. Most of these athletes suffer from an elbow syndrome, known as the "handball goalie's elbow syndrome" that has been defined as pain in the elbow region due to repetitive hyperextensions of the elbow (6, 8).

The mechanism of the syndrome is related to the nature of the goalkeepers' movements, such as the blocking or saving of shoots during the game or training. More specifically, almost all goalkeepers (95%) attributed their symptoms to hyperextension trauma when blocking a shot because of the intense striking of the ball, which has a significant mass and velocity. Most times, this mechanism is the main reason of deterioration or relapse of these injuries (6, 7, 8). Tyrdal and Finnanger (7) stated that the syndrome's mechanism is the reason of its

being a unique elbow injury, differing from team handball players' injuries due to throwing or falling.

The main clinical characteristics of the syndrome are continuous or intermittent pain, and sometimes the presence of instability of the elbow joint, with differing duration (6,8). Strength training is thought to be more effective than other therapeutic methods like taping, use of special splint, bracing, and physiotherapy (6). Moreover, systematic exercise is important for the syndrome's prevention, since it improves muscular function and consequently joint stability (8). Muscle strengthening exercises aiming the medial collateral ligament, which is usually found injured when the syndrome exists (5), may improve joint stability. They can help the prevention or the rehabilitation of medial collateral ligament injury (3), and thus in general prevent the syndrome.

The consequences of the syndrome for goalkeepers seem to be particularly important. The main outcome is absence from games and trainings as well as problems in the players' daily life, such as absence from work or school. Suggestively, it is ascertained that in every new season, 8.6% of goalkeepers are added to those who have already presented the syndrome (6).

The aim of this study was to study information concerning the medical care of high level team handball goalkeepers, who present the "handball goalie's elbow" syndrome, before and following a muscle strengthening program.

## MATERIAL AND METHODS

### Sample

The sample of this study consisted of 16 male team handball goalkeepers. All of them were high level, and competed in the two highest divisions organised by the Greek Handball Federation. During the previous two years, these players had taken part in championships and were active, regular participants in their teams. All of them had presented symptoms in the elbow joint in the past.

### Research tool

During this study, a special questionnaire was used. More specifically, each player was asked to provide information and data regarding the symptoms' frequency, previous elbow injuries, the specific

diagnosis, occurrence of oedema, the causes of injury, time and place of diagnosis, the person who made the diagnosis, hospitalisation, the kind of treatment and physiotherapy, the frequency of therapeutic means, joint mobility rehabilitation, return to athletic activities, complications, relapses, and information about problems in daily life. The questionnaires were answered, in the presence of researchers, who answered any questions posed by the athletes.

**Procedure**

The players who answered the questionnaire at the start of the season were randomly divided into two groups: group A (study, N=8) and group B (control, N=8). Athletes of group A only followed a muscle-strengthening program for three months. The aim of this program was to develop maximum strength with a high-load, low-repetition training regimen. Group B members did not follow any strengthening program during this period at all. At the end of the three months' period, at the mid-season break, the questionnaire was again filled by all the players. The statistical program SPSS 12 was used for the statistical analysis of the results.

## RESULTS

**Pre-season answers**

Regarding the frequency of symptoms in the elbow, most goalkeepers (67 %) had severe symptoms in the elbow joint area at least once during the previous years, while the rest (33 %) had severe symptoms more than twice during the previous years. During the last season, six goalkeepers had severe symptoms in the average of 6.0 ± 7.1 times. The averages in group A and group B were 3.9 ± 7.0 and 0.6 ± 0.9 times, respectively. About 56 % of the goalkeepers did not receive any medical diagnosis. The rest mainly had ligament injuries (57 %), muscle injuries (14 %), dislocations (14 %) or other (14 %). None of them reported occurrence of edema in the elbow joint area, following an injury. In almost all cases (87 %), symptoms were due to contact with the ball, after saving or blocking a strong shoot. The average distance between the goalkeeper and the player who performed the shot causing the symptoms in the elbow joint area was 5.4 ± 2.9 m.

In 46 % of the cases, the diagnosis was immediate, whereas in 27 % it was made after a week. In the remaining, diagnosis was made 6 h (9 %), 48 h (9 %) following the injury, and within a week (9 %).

About 60 % were diagnosed in the field, 20 % in the consulting room, 10 % at the hospital, and 10 % elsewhere. The person who made the diagnosis was a medical doctor (42 %), a physiotherapist (42 %), or a trainer (17 %). No one were hospitalised following the elbow symptoms. Only one goalkeeper (6.2 %) received operative treatment, four goalkeepers (25 %) did not follow any treatment, and 11 (69 %) followed conservative treatment.

The conservative treatments received by the players were as follows: rest in six players, elastic bandaging in four, activity restrain in two, splint in one, pharmaceutical treatment in two, cold compress in seven. During the physiotherapeutic treatment, cold compresses were applied to six players, one player received electrotherapy and another one received laser therapy. Ten players followed the medical doctor's and physiotherapist's instructions during the complete rehabilitation period. Safe return to athletic activity was succeeded after an average of 8.9 ± 9.1 days. Four players (25 %) had complications following the elbow injury. Relapses occurred in 31 % of the goalkeepers, while 15 % of the players faced problems in their daily life. The main problems were pain, strain and numbness.

**Mid-season answers**

Regarding the frequency of symptoms, in group A the average was 2.9 ± 3.4 times, while in group B it was 1.9 ± 2.6 times. Medical diagnosis in group A revealed muscle injuries (33 %), ligament injuries (33 %) tendon injuries (17 %), or other lesions (17 %). In group B, medical diagnosis revealed muscle injuries (33 %), bruises (33 %) and tendon injuries (33 %). Most goalkeepers (79 %) reported that they did not have any occurrence of oedema in the elbow joint following injury.

Both groups reported that the symptoms were aggravated by contact with the ball, after saving or blocking a strong shoot. The average distance between the goalkeeper and the player who performed the shoot causing the symptoms in the elbow joint area, was 5.0 ± 2.5 m and 6.8 ± 1.1m for groups A and B, respectively.

In group A, diagnosis was done immediately (25 %), after 12 h (12 %), after 24 h (38 %), or after a week (25 %) for the cases. In group B, diagnosis was immediately done (83 %) or after 12 h (17 %). In group A, the place of diagnosis was the field (37 %) or a private consulting room (63 %). In group B, in 38 % of the cases the diagnosis was made

in the field, in 12 % in a hospital and in 12 % in a private consulting room. The remaining athletes of group B did not say where the diagnosis had taken place. The person who made the diagnosis in group A was a medical doctor (63 %), a physiotherapist (25 %), or a trainer (12 %). In group B, the diagnosis was made by medical doctors (67 %) and physiotherapists (33 %). No hospitalisation followed in either group.

Seven goalkeepers in group A and six goalkeepers in group B followed conservative treatment. One player from group A and two players from group B did not receive such treatment. Tables 1 and 2 display the kind of conservative treatments and the physiotherapeutic treatment applications the players of both groups received, respectively. All players in group A followed the medical doctor's and physiotherapist's instructions, during their rehabilitation period, whereas 33 % of the goalkeepers in group B did not follow instructions.

**Table 1.** Conservative treatments received

| Conservative treatment | Group A | Group B |
|---|---|---|
| Rest | 3 | 3 |
| Elastic bandaging | 4 | 4 |
| Activity restrain | 2 | 1 |
| Splint | 1 | - |
| Pharmaceutical treatment | 2 | - |
| Cold compress | 4 | 3 |

**Table 2.** Physiotherapeutic treatment applications

| Physiotherapeutic treatment | Group A | Group B |
|---|---|---|
| Cold compress | 4 | 4 |
| Ultrasound | 3 | 2 |
| Electrotherapy | 3 | 1 |
| Kinesitherapy | 1 | 1 |
| Laser | 2 | - |

Safe return to athletic activity was succeeded after 9.4 ± 10.4 and 6.2 ± 7.2 days for group A and B, respectively. In group A, 57 % of the players had complications after an injury, while this rate was 33 % in group B. In group A, the players who had complications reported that they had experienced pain (80 %) and lack of flexibility (20 %). In group B, all the players who had complications reported that the main

symptom was pain. As for the relapses, 43 % of all the goalkeepers presented symptoms again. In both groups, 21 % of the players faced daily life symptoms due to these injuries. In most cases, these symptoms were numbness and pain.

## DISCUSSION

### Pre-season assessment

Regarding the frequency of symptoms, the majority of the goalkeepers experienced severe symptoms in the elbow area at least once in the past and about one-third experienced intense symptoms more than twice. In the literature, it is ascertained that in every new season, 8.6 % of goalkeepers is added to those who have already presented the syndrome (6). The findings support the observations about the frequent occurrence of the syndrome in goalkeepers.

Most goalkeepers did not have any medical diagnosis. This result is in accordance with that of Tyrdal and Pettersen (8), who stated that only a small percentage of the goalkeepers asked for medical advice. In our study, most diagnoses concerned ligament injuries and mainly the rupture of the medial collateral ligament, which is one of the characteristic lesions of this syndrome. These findings support the fact that the goalkeepers suffered from this specific syndrome. It is also remarkable that none of the players had an oedema.

In almost every case, the action that aggravated the symptoms was the contact with the ball when blocking or saving a shoot. Tyrdal and Bahr (6), reported similarly and stated that the ball's blocking caused injuries to the elbow joint, or aggravated some pre-existing injuries. Chatzimanouil et al (2) stated that the technique of blocking and saving the ball plays an important role in the prevention of this syndrome. For this reason, trainers should focus on teaching the blocking and saving technique even to goalkeepers who play in high level teams. Blocking a shot is an eccentric movement (8), thus goalkeepers should focus on correct movement both in games and training, so that upper extremities move actively from back to forwards, in order to meet the ball exceeding the frontal level of the body, with the forearm at the medium position. Thus, the violent hyperextension of the elbow joint and the forearm's supination can be avoided.

In most cases, injury diagnosis was made in the field. This fact perhaps suggests that the diagnosis was superficial. Although the

majority of the diagnoses were made by medical doctors, a significant number of players reported that the diagnosis was made by the physiotherapist. The lack of hospitalisation may imply that the syndrome is not as serious to lead the players to the hospital, contrary to other Greek handball players' injuries (4).

The results reveal that some players did not receive any therapeutic treatment, probably a wrong strategy in the treatment of the syndrome (6,8). Apart resting, frequently used therapeutic methods included cold compress applications in accordance with the reports of Adamczewski (1), and bandaging. In fact, Tyrdal and Bahr (6) reported bandaging amongst the most popular therapeutic methods used by goalkeepers. These researchers further advised that goalkeepers should consider strength training as a most effective method.

All goalkeepers of the present study returned to athletic activity within a few days. One-fourth reported complications after a serious injury, and all of them reported that they had pain. However, in the Greek handball leagues, in all field positions, the complications after an injury are more frequent, and symptoms like gait and lack of flexibility may exist (4). Moreover, about one third of the present study's players experienced relapses. These results agree with those of Hatzimanouil et al (4). Furthermore, the present study's results show that the syndrome causes daily life problems in some goalkeepers, such as pain, strain and numbness. Tyrdal and Pettersen (8) realised that strength training also reduces the players' problems in daily life.

**Mid-season assessment**

The frequency of symptoms in the elbow area after the strength training period was similar in goalkeepers of both groups. The medical diagnosis for both groups presented diversity, in agreement with the results of Tyrdal and Pettersen (8). Again, no oedema was present in the elbow joint, while Tyrdal and Bahr (6) mentioned an oedema in 7.5 % of their cases. In both groups, the cause of injuries in the elbow area was again contact with the ball, when blocking or saving a strong shoot from a short distance. Suggestively, in team handball saving the ball is often performed at speeds more than 130 km/h, and thus the elbow joint is under high risk of injury (8).

There was a difference between groups regarding the place of diagnosis. For group A, the diagnoses took place in a suitable room, while a significant percentage of players of group B did not mention

where the diagnosis took place. As for the time of the diagnosis, groups presented different distribution. In group A, diagnosis was immediate in most cases. In most cases for both groups, medical doctors made the diagnosis. The players of both groups followed conservative treatment and once more, it became clear that the application of cold compresses and bandaging was among the most popular therapeutic means used by the players. Just like in the initial assessment, cold compresses were applied to most players, during the physiotherapeutic treatment.

For group A, safe return to athletic activity was achieved a little later than for group B. Furthermore, just like in the first assessment, this return occurred many days later for both groups. There were more complications in group A compared with those in group B, while pain was the main aspect in both groups. An important number of goalkeepers in both groups again presented symptoms after resuming athletic activity. Moreover, the syndrome again caused problems in daily life in both groups, mainly pain and numbness in the elbow area.

In conclusion, the “handball goalie’s elbow” syndrome is ascertained as a permanent problem in goalkeepers. Conservative treatment with the application of cold compresses and bandaging is needed. Although a muscle-strengthening program is suggested for the prevention of the syndrome, a significant number of players presented symptoms after the completion of such a program. Complications and relapses appeared again in some players. The goalkeepers’ injuries caused daily life problems too, with pain being the main characteristic.

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