Chapter XX

COOPERATION OF TEAM DOCTOR AND COACH IN THE PREVENTION OF INJURIES

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In modern sport, alongside the fundamental notions of technique, more and more frequent use is being made of the principle of physiology, biomechanics, physiopathology, psychology and so on.

The preparation of an athlete, and even more so, that of a team, has thus become a multidisciplinary matter, engaging the attention of physiologists, doctors and psychologists, all collaborating with the coach who always remains the central figure for every member of the team.

In this chapter, attention is concentrated on one particular aspect of doctor-coach cooperation - that dealing with the prevention of traumatic injuries - although it should be remembered that, because of his knowledge of physiology, pathology, psychology etc., the doctor's collaboration is often sought at other "vital" moments of team preparation: the preliminary selection of players, planning of the training schedule, use of functional tests to check the results of training and offering of psychological advice, especially before and after the most important competitions. These other aspects will, however, be dealt with in later chapters of this manual.

In volleyball, as in other games, injuries are classified as acute and chronic. Acute injuries are the results of a single impact, violent enough instantly to overcome the resistance of the tissue involved. Chronic, or overuse injuries occur through the continuous repetition of certain movements that lead to the appearance of microtraumata which may, in time, induce sometimes serious damage to the structures of the musculoskeletal system.

Because of the peculiarity of their aetiological mechanisms, there can be no doubt that chronic injuries are those most characteristic of the different sports, being as they are inseparable from the repetition of typical technical movements. Prevention should, therefore, concentrate the greatest and most thorough attention on this kind of injury.

The very nature of such injuries, so often evolving very slowly and insidiously, makes their treatment much more complex than that of the majority of acute lesions, which are easier to
care for but harder to prevent. Acute injuries are often the result of accidental, violent and unpredictable factors (landing on the foot of an opponent, loss of balance during jumping, direct contact - contusion - with equipment or the playing surface).

The most frequent overuse-injuries to volleyball players are to the knees, shoulders and lumbar spine. In addition to specific preventive measures that vary from one injury to another, requiring individual assessment case-by-case by both doctor and coach, there are general standards for prevention that should be agreed on, again by the two together, and applied systematically at every single training session.

**Warm up**

The first and often the most effective way of preventing injury, is to go through a thorough and complete warm up. Its duration and intensity should be adapted to suit the local climate and surroundings, the stage of team preparation and the kind of training that has been prescribed, with special reference to those anatomical structures that will be subjected to the greatest stress. It is also advisable, after warm up, to allow each player time to devote individual attention to parts of the body that have been recently or remotely affected by injury, carrying out specific specialized exercises.

**Stretching**

Although discovered many years ago, stretching has only recently been reassessed as a definitely effective technique for the prevention of injuries to the musculoskeletal system. Indeed, improved extensibility of certain structures, especially the musculotendinous units, can render the transmission of forces on the skeletal leverage in muscular contraction more harmonious and less abrupt. This means an appreciable reduction in the stress on the bone-tendon junctions which are so sensitive to this kind of functional overuse.

On the basis of these biomechanical considerations, stretching exercises should very definitely be included as an integral part of training. Most authors agree that the ideal time for them is immediately after warm up and again, to facilitate relaxation, at the end of the training session.

Other series of stretching exercises are recommended after phases of training involving prolonged contraction (e.g. after defense and receiving exercise there should be stretching of the knee flexors).

**Alternation of Exercises**

Although it is not yet precisely known how overuse injuries occur, it may be assumed that even the slightest microtraumatic insult may produce a microscopic injury. Under normal circumstances, the body is quite capable of repairing such damage very quickly during the period of rest that follows. However, when maximum stress is undergone at intervals shorter than the time needed for full recovery, instead of healing, the injury tends to spread until the typical pain symptoms appear.
For this reason, another fundamental principle of prevention, that coaches should keep constantly in mind, is alternation of the anatomical structures subjected to stress during the different phases of training. This means, for example, that any exercise that puts stress on the knee extensor system (jumping) should be followed by one that mainly involves other structures (serving and receiving). It is also advisable to establish an interval of rest between one maximum stress (or series of maximum stresses) and another of the same kind.

**Playing Surfaces**

There can no longer be any doubt that playing and training surfaces influence the onset of overuse injuries to the lower limbs. This was already known because players reported their subjective impressions of onset or recurrence of myotendinous pain after training on specially hard surfaces. Recent epidemiological studies (some of them actually on volleyball players) have confirmed that hard surfaces have a negative influence on the muscles, ligaments and, especially, tendons of the lower limbs. This is a factor that should never be neglected by coaches when planning and conducting training sessions. The amount of the load on the lower limbs should also be varied to suit the surface on which the session is being carried out. *(Fig. 20-1)*

![Graph showing the relationship between affected players and training sessions per week](image)

**Compensation Exercises**

The principle that there should be alternation of exercises is closely connected with another, that there should be compensation exercises. This is meant that exercises should be included for the purpose of countering certain incorrect postures the body tends to maintain after performing exercises in certain positions involving repeated contraction of just one particular group of muscles. Compensation exercise generally consist of the contraction of groups of antagonist muscles and stretching of the agonist.

After this discussion of the main general principles of prevention, we can go on to describe in detail the most effective preventive measures against the overuse injuries that are “typical” in volleyball players.
Bone-Tendon Junction Pathologies of the Extensor Mechanism of the Knee (Jumper’s Knees)

This is a very common injury (about 40% of top-level volleyball players appear to suffer from it more or less seriously) producing subjective and objective pain at one of the three points that are fulcrum of the movement of knee flexion and extension: the superior pole of the patella (20% of cases), the inferior pole of the patella (70% of cases) and the tibial tuberosity (10%). (Fig. 20-2) For such a frequent injury, coaches should pay the closest attention to the general principles described above and also, not only as a preventive measure but also during the earliest stages of treatment (it is not always essential for training to be interrupted) prescribe the following exercises: isometric potentiation of the quadriceps (a series of 10-15 submaximal contractions lasting from 7 to 10 seconds with the knee extended, alternated with from 1 to 2 seconds of contraction with the knee in slight flexion (of 20-30 degrees) and specific stretching exercises for the knee flexion and extension system.

As regards the kind of training, it appears that neither pliometry (with falls from a height not above 70-80 cm) nor weight lifting exercises have any significant influence on the onset of jumper’s knee. It can be affirmed, in conclusion, that these injuries are caused by the amount of work done, (Fig. 20-3) or rather maldistribution of work loads, and not by the kind of training.
Shoulder Injuries

The commonest overuse injury to the shoulder is, in volleyball players, what is known as the impingement syndrome (also called bursitis, tendinitis of the rotator cuff or, somewhat outmodedly, scapulohumeral peri-arthritis). The term refers to the particular situation in which the rotator cuff tendons (supraspinatus, infraspinatus) and sometimes the long head of the biceps brachii, are increased in volume by inflammatory or degenerative changes and impinged by the inferior facet of the acromion and the coraco-acromial ligament in movement involving more than 90° of shoulder abduction and flexion. This friction against the bony and ligamentous structures of the coraco-acromial produces pain which, in turn, causes more inflammation of both the tendons and the subdeltoid bursa.

Adequate specific kinesitherapy is most effective in treating even so apparently complex a pathology and, when included in training schedules, can also be an effective means of prevention. Adequate potentiation of the shoulder rotator muscles (these are muscular structures that keep the head of the humerus in contact with the glenoid cavity during shoulder movements) can effectively minimize upward migration of the head of the humerus during abduction and flexion i.e. while the arm is loading before spiking or serving. This upward movement of the head of the humerus, due to the component of the deltoid, tangential to the shaft of the humerus, is, in fact, one of the mechanisms that produce friction. These exercises to potentiate the shoulder rotators (inner and outer rotation, isometric and against resistance) should be performed with the arm in adduction to avoid even the slightest impingement during their performance.

Other useful exercises for preventing shoulder impingement syndrome are what are called Codman’s pendular exercises. They consist of shoulder circling with the trunk bent forward while holding weights of from 3 to 4 kg. In this way, adequate joint excursion is maintained with no compression of the acromiohumeral space.

Low Back Pain

The lumbar and lumbosciatic syndromes are another frequent affliction of volleyball players. There is no doubt that a decisive role in their onset is played by landing after jumps, and overextension of the spine which, in the course of spiking, can sometimes be violent. In the long run, such movements may induce degeneration of the intervertebral discs and damage to the posterior intervertebral capsules, ligaments, etc., which are responsible for low back pain. The best way of preventing these syndromes is by potentiation exercises of the abdominal muscles and, secondly, the glutei muscles which, in tone, reduce to a minimum the negative effects of lumbar hypertension and disc compression on landing after jumping. These exercises should become a regular feature in the training of volleyball players. The doctor should inform the coach about any players with specially formed or abnormal lumbar spines who are therefore at greater risk and need close attention and more specific preventive measures.
We have here given some examples of how the work of team doctor and coach can converge to help prevent traumatic injury to volleyball players. Prevention requires an extensive knowledge of the nature and cause of such injuries and they could never be diagnosed without the cooperation of doctor and coach and repeated analysis of the fundamental movements involved in order to reduce them to their successive stages and thus discover the essential pathogenetic elements of the various pathologies.

At this point, it is no longer surprising that during training many effective means of prevention can be discovered for injuries due to overuse and thus, in the final analysis, to an excess of physical exercise.

Research of this sort, where the coach is looking for biomechanically more rational, technical, effective solutions, with the doctor at his side, ready to offer the most suitable series of modifications, is still very much at the development stage. It cannot, certainly, be halted as it has already become an integral part of the natural evolution of every sporting discipline. Indeed, there can never be any genuine technical progress without parallel progress in safeguarding the health of players.