

Essentials of Sports Injury Prevention & Rehabilitation

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Lecture - 38

Return to sports & long term injury prevention - Part 02

Welcome back to this NPTEL course on essentials of sports injury prevention and rehabilitation. So towards the final week, week 8, I will be covering on return to sports and long term prevention. We saw part 1 earlier. Now we will move further ahead on part 2 of this particular module. And you are with me.

I am Dr. Chandrashekara Guru. I am a sports medicine specialist, Assistant Professor in the field with Armed Forces Medical Services. During this module, you have learnt in the previous part about return to sports concerns, how to make RTS decision making, what is the approach and the framework, the start framework used for return to sports decision making.

In this part, we will discuss return to sport and reinjury prevention. So to revise what we have discussed in the previous part, we discussed different phases of rehabilitation. We discussed the concerns of return to sport and the problems associated if the return to sport is improper. We advocated that the decision making process should be a team based approach with a proper criteria based approach. We also dwell in detail about the strategic assessment of the risk tolerance framework and a case scenario to substantiate the different stages that you include in your return to sport process.

We also saw what determines the variation in terms of the return to sport, the factors that determine these variations with respect to different individuals, and what you must do in case nothing is going right for you during a rehab process in the return to sport decision making approach. So in this part, we will dwell upon the return to sport strategies that you need to consider to prevent reinjury risk. So below that, the rehabilitation program takes place in phases. Phase one involves acute management. Phase two is mainly the tissue healing process. Phase three is replicating sports related specific demands, that is the tissue stresses. Then in phase four and phase five, you address the return to sport decision making with a good criteria based approach and then in phase five, we incorporate the prevention aspect for reinjury so that you have a long term injury prevention program incorporated in the athletes training microcycle. So we are focusing on the challenge of when to RTS. This we have discussed in the previous part. Now we will discuss how to prevent reinjury risk in such individuals who are made fit for return to sport after an injury.

So the decision making process involves three stages, and the stages here are the: tissue health assessment which involves the demographics, the symptoms, physical examination and the physical science. Step two which includes the sports related factors like the sports being played, the position, the competitive level of the athlete, ability to protect, functional tests that you would have with respective criterias on the normative data and the psychological readiness. Step three involves the assessment of risk tolerance which are predominantly the factors that decide the return to sport decision or influence the return to sport decision. These are the stages of the season in which the individual got injured, and is now in a state to return to sport. Pressure from the individual as well as from the external authorities like the coach, the federation of the sponsors, conflict of interest and the fear of litigation.

However, in certain cases there may be reinjury. So what predisposes is respective of a good strategic framework that you have reinjury. So the probable factors attributed for reinjury after a successful return to sport are premature return to sport. So at the first stage itself you have made a wrong decision in terms of prematurely returning the individual to sport. Insufficient rehab: The rehabilitation has been insufficient probably at the step one itself. And risk factors along with risk factors are still present that the individual has suffered a reinjury. That means that the risk factors have not been addressed and the most common risk factors that are to be addressed during the program are the mechanism of injury or the biomechanical factors which have not been addressed. So these are the common factors that lead to an injured athlete returning to sport to again get reinjured. So why do we need to prevent after all the reinjury and why is it key? Because previous or past injury in an individual is a definitive risk factor for occurrence of a reinjury and this has a very good level of evidence.

The most common of the sports injury is the ankle injuries, and in ankle injuries the chances of reinjury increases by four times more than non-injured ankle. Even more so in the initial phase after return to sport that is between six to twelve months the chances of recurrence on the same ankle increases by ten times. It is very alarming. Coming on to the hamstring injuries more common in sprinters and footballers. In soccer players there is a study which has shown that the increase of reinjury increases about five to seven times.

This is well documented. With respect to the knee injuries, the previous ligament injuries will predispose the individual for ACL graft re-rupture. It can also cause a contralateral injury because of the shifting in the force onto the normal limb and also injury to the other knee structures. So that's the kind of importance that a previous injury has, and hence it is important to prevent this so that the individual is not having a major impact because of the injury. So this can be easily understood using this injury causation model.

Injury causation model was adopted from the epidemiological model of Meeuwisse et al,

wherein the internal risk factors leads or predisposes an athlete and in presence of an external risk factor this predisposed athlete becomes a susceptible athlete. When such a susceptible athlete is exposed to an inciting event or a sport specific situation that may end up in occurrence of an injury. I am sure that this particular model would have been happily described by the other faculty during the progress of this particular course. So I am here to reiterate that the internal factors in terms of previous injury also predispose an athlete here. So it's important that we target the previous injury aspect of it during the rehabilitation of that particular injury.

The external factors and the inciting event especially inciting events in terms of the biomechanical factors and the mechanism which is commonly attributed to is if present can again cause a re-injury risk. So how do we prevent injury? So this conceptual approach has already been discussed earlier. The approach is to establish for any injury prevention program it is important that at the first stage to establish the extent of the injury. So we need to know what is the extent to which the injury is happening in that particular team or particular group of people or in our case in this case to that type of injury and based on that establish the mechanism. The step two would be to establish the mechanism and the various associated risk factors.

So easy would be to fall back onto Meeuwisse's the injury causation model. It lists out various factors that would contribute for the individual to predispose an individual to develop an injury. So these factors and the mechanism which would have been contributing factors in occurrence of an injury should be studied in depth. Once these factors are identified, studied and addressed during the rehab program we need to go and introduce a preventive measure. So preventive measure or a preventive program, injury prevention program once introduced is not the end of it.

Thereafter it needs to be regularly monitored and assessed using the same stages so that you finally keep the individual injury risk free. So the conceptual approach is given by Van Michelen et al. So in case of rehabilitation and injury prevention let us focus where these different four stages fit in in the phases of rehabilitation. In phase one there is acute management, the establishment of or the extent establishing the extent of the injury comes into play. So during the acute management phase you need to identify the extent of the injury using probably the clinical diagnosis or in some cases imaging modalities to exactly identify the extent of the injury.

The various factors and the mechanism which should have led to the injury have to be studied during phase two and have to be incorporated to address these factors during this rehabilitation program. So phase two and phase three will incorporate or address the issues that you have studied which would have led to the occurrence of that injury. In phase four when you plan for a return to sport decision, during this is the time when you introduce a preventive measure. So you already have a laid down structural criteria based preparation of return to sport decision

making process which we discussed in the previous part. So include the preventive measure that you have designed based on the various factors that would have caused the injury and then accordingly you will have to introduce that into this particular decision making process.

So that you already have an idea about how well the injury prevention program is kind of helping out in assessing the functional outcomes. And finally phase five would be assessing the effect of the effectiveness of the injury prevention program during the prevention of injury phase. So what are the various steps that you take or incorporate in your injury prevention program? First thing first, you always need to incorporate the general injury prevention principles. I am sure all these general injury prevention principles would have been covered in depth in the previous modules. However, I will just list out these important principles that one needs to know to reiterate and implement in the injury prevention program.

The first thing that one should consider is the playing field and the equipment, the surface environment and the sport equipment. All these have to be maintained and they should be injury risk free. Second important aspect is warming up before the session. So it is important that proper preparation of the organ system and the muscle and the region has to be undertaken following general warm up as well as the specific warm up principles, and that needs to be carried out before every session including the inputs of the strength and conditioning coach. Third important point is the decided level of conditioning.

So you need to have a base level of conditioning before progressing to sport specific demand. That needs to be there with respect to the strength, the agility and endurance or any other type of motor quality that is specific to the particular sport. And it is always and always important to reiterate to the athlete that the individual should always wear the protective equipment even if it is a practice session also. This will prevent the occurrence of an injury. And the most important is always obeying the rules and game safety, because it is easy to overlook these aspects during training sessions and these would end up in an injury or a risk of reinjury.

So this particular thing is very important. For example in combat sports like boxing, it is easier to get kind of because of the lack of pain, age and weight category opponents, you can have a different category person practicing with another different weight category. So this itself the imbalance or the inequality between these two skill sets can end up in occurrence of an injury as such. So such things should be avoided even though it is a practice session. And the last one is these programs have to be periodized with the training program and it is important that the major factors which contribute to the overall well-being of the athlete in terms of sleep and nutrition have to be monitored.

So by abiding by these simple practical considerations, one can easily prevent occurrence of injury. In addition to this, it is important that in the injury prevention programs, we need to plan

them to fit them into the regular training schedule. It is not that injury prevention programs or specific athletes who are injured and returned to sport should be treated separately. It also has a major psychological impact on the athlete as well. At the same time, it is important that it should be whatever the targeted approaches or the injury prevention program has to be part of the training program per se so that the injury and the individual themselves feel part of that program and then they abide by it and have a disciplined way of addressing to these programs during the regular training sessions.

They should be designed to address strength, coordination and clearly sport specific goals. So the injury prevention program that is being designed should address these basic qualities as well as the sport specific goals. And generally, they are given at an intensity slightly lower than the competition intensity, but then higher than the warm-up intensity. So that the individual at the same time is also prepared for the competition or for the main sport specific demand. The main aspect of this injury prevention program is to increase neuromuscular coordination.

So as we all know, scientifically with injury, there is deterioration in terms of the neuromuscular coordination as well. So even though we would have addressed these aspects during the rehabilitation program, and then only we would have taken a considered decision of returning the individual to sport again back to the sport, it is important that this particular part continues even after returning to sport. You could see in most of the athletes after returning to sport, they lose track of these drills and the programs that are incorporated during the rehabilitation. So that also predisposes them to re-injury chances. And the sport specific skills which we introduce in the injury prevention programs, they should be more concentrated towards the biomechanical factors which would have led to the injury or the mechanism.

So commonly it is the jumping mechanism in case of jump sports, landing techniques that needs to be integrated so that appropriate strength development as well as the reaction and coordination also happens when the individual actually goes for landing. Also side stepping maneuvers commonly seen in the FIFA program wherein you have the FIFA warm up program which includes all these drills which are specific for the sports as well as the post reaction that needs to be considered to negate the side to side difference. Another important aspect of injury prevention is cool down and recovery, whereas the cool down session should provide adequate time and circulation for clearing the waste products that are accumulated during the exercise period. And this would also prevent sudden blacking out and that itself could pave way for occurrence of an injury because of postural hypotension. So that can be avoided if there is a staged cool down session, gradually reducing the heart rate and the other physiological responses.

The advantages that I have listed here is you can use this particular cool down session as a time to interact with the athlete and get to know about the list of injuries that they would have

sustained during the practice session or in case any aggravation of any particular symptoms can be utilized as a debrief session also to increase the rapport between the athlete, and also can be used to provide appropriate nutritional support immediately post workout. So that is the thing that is related to the cool down session with respect to recovery. Obviously, the recovery part is important to keep the individual away from the injuries. So that includes your nutritional aspect, sleep strategies and other external aiding methods like massage, sauna and steam sessions. This can also help in rejuvenating and recovering from the stresses of the training.

For the use of right protective equipment. So you need to comply first of all with the rules of the sport, the protective equipment which you would be using to protect the injured part from getting re-injured as to comply with the rules of the sport. So that is first and foremost and accordingly a suitable equipment has to be chosen which is specific for particular sports size and age of the athlete. Sometimes it is seen that these are readily available over the shelf, over the counter. So you buy them and then you find that the relevant size is not there, it is not properly fitting. So such equipment is not going to protect further rather it would result in the occurrence of a new injury as such because of the improper size as such.

For example, footwear commonly happens with the choice of shoes. So it is important that these equipment should be properly fitted, and it should be to a major extent customized for that particular region and for that particular age and sport position the individual is playing. And it is also important to monitor the status or the condition of the protective equipment whether they are borne out and whether they require any replacement at crucial junctions that needs to be carried out. By using this appropriate equipment it is not only focused towards competition it should be used throughout the training. It should be used even during training as well as during the competition so that the individual can have comprehensive protection.

So the commonly used protective equipment are the tapes, adhesive tapes that are commonly used in case of various shoulder injuries or superficial ankle sprains grade 1 grade 2 ankle sprains. Even after rehabilitation to prevent reinjury of ankle sprains over the shin and the leg you use guards over the wrist and elbow in cricket you use guards, gloves you know you also have specific guards to cover your shoulder and the chest. So in sports like rugby or American football eye protectors say to get the protection of the eye from sudden impact of the ball, say for example in squash or in case of cycle riding. You have helmets again, commonly used protective equipment, as well as the gloves and mouth guards. Mouth guards are again an important aspect especially in combat sports like boxing where the mouth guards has to be generally available over the shelf but then they may not be of right fit.

So it is important that you need to have customized or right fit mouth guards which should be used, same goes with the gloves as well as the footwear. So why should the injury prevention focus be on? It's because the focus of this particular injury prevention program is on the

weakness. The weakness that you assess during the rehabilitation program and the weakness that has happened because impairment of the injury per say. The motor qualities also during the process would have degraded over a period of time, and because of the injury as I said earlier there will be alteration in the neuromuscular coordination and muscle activation patterns that needs to be addressed. The other risk factors that would have resulted in the injury like the improper landing technique or may be improper take off or improper maneuvering of the ball in footballers.

So these are the factors that need to be taken care of while addressing the injury prevention program. And the injury prevention program should be targeted towards the injury per say and as per the factors that are around the individual who is injured. So to summarize the RTS decision making is as such complex but then should be more athlete centric considering the physical as well as the mental state. The injury prevention program should be incorporated as a continuum in all the phases of rehabilitation.

Functional assessment: when you return to sports should also include the injury risk related activities. It is important to address the other risk factors that would have contributed to the injury in your injury prevention program. Injury prevention program is long term and it should not be short sighted with only focus during the rehab program. It should be continued with the individual even after returning to sport. And the program should also have a multi disciplinary approach so that you know most of the risk factors are addressed from various ends.

So for those of you who are interested in in depth study can refer to these resources which are available. Thank you.