Essentials of Sports Injury Prevention & Rehabilitation

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Lecture – 22

Periodisation of Rehabilitation - I

Good morning ladies and gentlemen, and welcome back to week 5 of the course on sports injury prevention and rehabilitation. This is lecture 3, and we will be covering a very important topic which is called periodization of rehabilitation. This topic will be covered in two lectures and this is the first part of the two lecture series. I am Col. Dr. Anup Krishnan, and thank you and welcome back to this course.

I will be covering this topic under the following headings, definition, periodization, types of periodization, needs analysis, stages of rehab and conclusion. Sports rehabilitation aims to enable the athlete to return to sport with full function in the shortest possible time and comes into effect after the athlete has sustained an injury. It should begin as soon as possible after the initial treatment of the acute injury. It aims to return the sports person to their pre-injury level of performance.

After return to play, rehabilitation will adopt a preventive approach. Rehabilitation and strength and conditioning are often seen as two separate entities in the athletic injury recovery process. Traditionally, an athlete will progress from a physical therapist and athletic trainer to the strength and conditioning coach for specific return to sport training. These two facets of return to sport are often considered to have separate goals. The initial goals are also different due to the timing of their implementation.

Their strategies are different, their different stages of post injury recovery, their skills are different, their drills are different. So what we are trying to say here is strength and conditioning and physical therapy, both of them have got two different approaches to sports rehabilitation. Exercise programs, they form a large component of the athlete's rehabilitation, and typically aim to address the following muscle activation and muscle control, muscle strength, power, endurance, flexibility of the joints and muscles, proprioception, cardiovascular fitness, functional exercises, sport specific skills and correction of biomechanical abnormalities. Depending upon

the type of the injury and the type of the athlete, these factors may be moved up or down as required.

So let us talk about periodization. It is nothing but the planned manipulation of training variables, that is load, sets and reps in order to maximize training adaptations and to prevent the onset of overtraining syndrome. What is the load? How much weight did I lift today in the gym? That is the load. How many number of times did I lift that load? That is the repetition. And how many times did I do 10 repetition sets? Those are sets. These are as simple an explanation as can be given.

So basically in periodization, you are playing around with load, the number of sets and the number of repetitions. There are different types of periodization. Most common one is called linear or classical periodization. In this, you have a high initial training volume, and intensity is low. Now the next question you will ask is what is volume and what is intensity? Volume is nothing but how much weight you are lifting and how many times you have lifted it.

I repeat; volume is how much weight you can lift and how many times you can lift it. Intensity is how much? Let us talk about the types of periodization. There are different types of periodization, and the simplest is linear periodization. Linear periodization is characterized by high training volume initially and low intensity. That means basically you are giving more number of repetitions and more number of sets, but the weight is low.

So reps and sets is the training volume and the weight lifted is the training intensity. As you progress the training, you reduce the volume and you increase the intensity over several meso cycles. Now what are these? A training program which is designed for a 12 month period is called a macro cycle. If you break down a macro cycle into 3 or 4 month breaks, these smaller 3 or 4 month breaks are called meso cycles. And if you break down a meso cycle into a weekly or a fortnightly training program, this is called a micro cycle.

So in a linear periodization or a classical periodization, initially you will start with high training volume but intensity will be low. And later you will reduce the volume, and you will increase the intensity. In a nonlinear or undulating periodization, the load and the volume are altered more frequently. It may be daily, weekly or bi-weekly. This is done to vary the periods of recovery for the neuromuscular system.

And the phases are much shorter. Basically, if you are into strength training or if you are into anaerobic sports, you may use something called a nonlinear periodization. There is something called a reverse periodization. This is the inverse of the linear model in which you will start with a high intensity that means weight will be high and the number of reps and the number of sets

will be very low. So these are the different types of periodization which are available, and you may modify them according to the situation you find yourself in.

Before we start any rehab program, we have to do something called a needs analysis, and this has the following components. General biomechanical analysis of the sport, analysis of the energy sources utilized in the sport whether it is an aerobic sport, whether it is an anaerobic sport, whether it is a mixed sport, whatever. Analysis of the common injury sites and the injury patterns for the sport, you have to do that. You have to analyze the specific strength, range of motion, flexibility, power, endurance and speed requirements for the sport. Once you are through with your needs analysis, you can progress to the next stage, which is this is a comparison of the needs analysis for a male football player versus a female soccer player.

Now football in this is American football and soccer is the football which the rest of the world knows. So, if you look at the biomechanical analysis in football, multidirectional, multijoint, explosive movements that vary with position. It requires multiple starts and stops. In soccer, multidirectional movements with varying degrees of intensity, however, a ball has to be manipulated along with these movements. So, you have to have good eye foot coordination and your foot or your body is often in asymmetry.

Energy requirements: football is primarily anaerobic, soccer is primarily aerobic. Physiological analysis: football has we need maximal power and strength, we need flexibility, we need balance. Soccer you need strength, you need endurance, you need flexibility and balance. Football you have maximum one game a week, soccer you have several games a week. Football you have to look at environmental acclimatization, soccer you have to look at female athlete triad concentration because the athlete in this case is a female.

The female athlete triad consists of amenorrhea, osteoporosis and reduced nutritional state or nutritional deficiency state with or without an eating disorder. Injury patterns in football, there are soft tissue injuries like sprains, muscle strains, etcetera. However, in soccer, females have a high risk of ACL injury in soccer. So, this is how you do a needs analysis for a sport.

Let us talk about the stages of rehab.
Phase one: immediate rehabilitation. It is characterized by tissue or joint inflammation, there will be pain, there will be disuse of the tissues surrounding the joint. The athlete will be detrained, there will be loss of muscle performance. You may have to immobilize the athlete or the joint depending upon the injury and initiation of tissue repair or regeneration will start in this phase. The primary goals during this phase are protection of the integrity of the involved tissue, restoration of range of motion within the restrictions, reduce the pain and inflammation and prevent muscular inhibition.

If you have done your rehab properly, then there are certain criteria which you have to use to progress this athlete to phase two. Minimal pain with all phase one exercises. Range of motion more than 75 percent of non-involved side, that means range of motion of the involved side as compared to the other side which is non-involved. And proper muscle firing patterns for all the initial exercises.

Let us talk about the periodization in phase one.
If your training emphasis is on low intensity endurance of the stabilizers, you will do endurance on Monday, hypertrophy on Wednesday and strength on Friday. At the same time, you will tell the athlete to train with the team in terms of improving the endurance. That is if the lower limb is injured, you will tell him to do an upper body ergometer. If the upper limb is injured, you will tell him to use a lower body static cycle. You will always train the joint above and below for stability and endurance. You can use weight training, you can use static skills like throws, kicks, etcetera which will not strain the injured part.

Phase two: intermediate rehabilitation. This is characterized by continuation of tissue repair, horn regeneration, increased use of the involved body part or region, decreased inflammation and improved muscle performance. The primary goals are continued protection of the involved tissues or structures and restoration of function of the involved body part or region. If you have done your rehab well in phase two, the criteria for progression to phase three are: close to full range of motion, good muscle length and full joint range of motion, 60 percent of strength as compared to the uninjured side.

If you are happy with this, if the athlete is able to clear these criteria, you can progress him to phase three. In phase two, what are we looking at? We are looking at low to high intensity endurance of the stabilizing muscles. So, on Monday, hypertrophy, Wednesday, strength, Friday, hypertrophy again. You can continue weight training, continue cardiovascular endurance and you can progress to interval training. Then, you progress from low to high intensity strength for the muscles responsible for the movement of the affected area.

So, Monday you need strength, Wednesday you will do endurance and Friday you will go back to doing strength. You can do interval cardiovascular activity gradually increasing the exercise intensity. That means, you can increase the intensity, but reduce the duration. Please focus on sports specific drills also because you need to get the injured area working on sports specific drills.

Phase three: advanced rehabilitation.
It is characterized by restoration of normal joint kinematics. Improving normal range of motion and continue the improvement in muscle performance which you have gained. The primary goals during this phase are restore the muscle endurance and strength, improve the

cardiovascular endurance, improve neuromuscular control, balance and proprioception. If you have done this phase well, what are the criteria for progression to phase four? Strength more than 80 percent of non-involved site, demonstration of agility drills with proper form, coordinated and symmetrical movements of all extremities and controlled movement of the entire body. You are looking at continued endurance emphasis for the stabilizers wherein you will be doing strength on Monday, endurance on Wednesday and strength on Friday.

Increase the interval training after knowing the proper energy system, and incorporate total body movement patterns in this phase. Increase the high intensity strength and begin transition to power. That means, on Monday you will do strength, Wednesday you will do power and Friday you will do strength again. Make sure you progress the sports related skills to game intensity.

Stage four: return to function or return to play.
Address by activities that focus on returning the athlete to full function. The primary goals to be addressed during this phase are successful return to previous functional level and prevention of reinjury. You will continue as in phase three, but you will increase the emphasis on the functional requirements. Monday, power. Wednesday, strength and hypertrophy. Friday, power again. Increase the sports related skills to game intensity and start normal practice and eventually return the athlete to normal game or competition. Sports rehabilitation involves the medical team and the SNC coaches at different periods. We are trying to apply periodization principles to sports rehabilitation, so that faster return to play can be achieved. We must be aware of the different types of periodization and we should be able to use them judiciously.

That means, we must be able to play with linear periodization, nonlinear periodization or other different types of periodization in the interest that we can tweak the training programs, the rehab programs for the athlete so that he can come back to RTP much much faster. We should not be working as physiotherapists, sports medicine doctors or SNC coaches in isolated silos. Prior to starting the rehab process, please start or perform a proper needs analysis according to the sport and progress the athlete as per scientific criteria only. These are the references ladies and gentlemen. We really urge you to go through them in the interest of improving your knowledge or learning more about the knowledge which this lecture could not provide due to time constraints.

I have finished. Ladies and gentlemen, thank you for listening. Do let us know your comments and your questions and we will do our best to get back to you as soon as possible. Thank you ladies and gentlemen and Jai Hind.