Essentials of Sports Injury Prevention & Rehabilitation

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Lecture – 23

Periodisation of Rehabilitation - II

Good morning ladies and gentlemen, and welcome back to lecture 4 of week 5. This is the second lecture of a two part series and here we will be discussing periodization of rehabilitation part 2. Let us have a small recap of part 1. We did discuss that sports rehabilitation involves the medical team and the S&C coaches at different periods of time. We also saw that periodization principles can be applied to sports rehabilitation for a faster return to play. Periodization is a technique used by the S&C coaches and the skill coaches to design and monitor a training program for an athlete over 1 year, 3 to 4 months or 1 week.

We did discuss the types of periodization, and how they could be used in rehabilitation. We discussed the need to do a needs analysis prior to the rehabilitation process. We discussed the salient features of the different stages of rehab process, and we discussed how to progress the athlete through the different stages and how to take the athlete from stage 1 to stage 2 to stage 3 etcetera in a criteria based manner rather than a time based manner. I will be covering this lecture as per the following outline: We will talk about training program design. We will talk about selection of the exercises. We will talk about selection of equipment. We will talk about how to decide the training frequency. We will talk about how to decide the exercise order, how much rest period to be given, load and program monitoring and conclusion.

A lot of you will realize that these are things, these components are more in line with what an S&C coach or a coach will be dealing with rather than what a sports medicine doctor or a physiotherapist will be dealing with. And the background of this is, we are trying to use the principles of periodization and the techniques of periodization in sports rehabilitation.

So, design of training program and how to use these principles. What are the manipulations which you can do in the program principles? You can manipulate exercise selection. You can look at training equipment availability. You can manipulate training frequency. You can manipulate exercise order. You can manipulate the rest interval. You can manipulate the resistance and the training load. Please note, I am not using the word manipulate in a derogatory fashion. Manipulation of these variables are done to improve the rehab process for the athlete and to shorten the return to play times.

Exercise selection: It is a critical program principle which the clinician should account for. During the training session, try and do the multi joint exercises first, because they are the most fatiguing and they also increase the muscle and strength muscle and bone strength the most. Isolation exercises which are single joint exercises are a good choice if the athlete is untrained or inexperienced in a particular exercise or drill.

Progression to the multi joint exercises can be done after the athlete has got good instruction, and he has got adequate time to practice because unless the necessary coordination is developed, these multi joint exercises cannot be performed safely and effectively. Performing large muscle mass, multi joint exercises early in the workout has been shown to produce significant elevation in anabolic hormones which is required for the injury rehab process.

Quality of equipment: Equipment necessitates changes or it may not allow the performance of some exercises. Lack of floor or ceiling space may hamper overhead lifts. Some machines which are available to you may not be sport specific for that particular athlete. So, you may need to supplement training programs with the adequate appropriate exercises. If you feel that this particular gym is not able to give your athlete the sport specific drills which are required, you may need to give sport specific free hand or other on body weight exercises. Please remember, tailor rehab to available equipment. It is not the other way round. Equipment should not decide the rehab drill. Your rehab drill should decide and your rehab end point should decide what you want to do.

Let us talk about training frequency. What does it mean? It means volume and load of the exercises, type of movement single joint or multi joint. Look at the training level of the athlete. Look at the goals of the training of that particular day, that particular week, that particular month, that particular 3 to 4 months. Look at the health status of the athlete. Traditionally what we used to do is, resistance training on alternate days during early stages of rehab to ensure recovery. That means, if you are doing resistance training on one day, the next day you will not do resistance training of that same muscle group to ensure that that particular muscle group has recovered well. However, if you are using near maximal resistances that means, you are using weights close to 1RM, then more recovery time is indicated.

When you are giving a training load or a training program to an athlete, please consider that his skill coach or his S&C coach or his main coach may be also giving him concurrent training. So, you must also factor that into the training load which you are giving the athlete. You may need to alter the frequency of your training to accommodate the athlete schedule for proper rest and recovery. If he is also doing concomitant training, your training load may have to be reduced. You have to give him more rest, more recovery or you may have to give him recovery aids.

So, these things have to be tweaked to improve upon his recovery. If the athlete appears to be reaching a plateau, or the gains in strength, power or endurance are minimal, then increase the training frequency. There is something called the repetition maximum continuum. Basically, it means that if you are training for a particular motor quality, you have to give a particular number of repetitions of that particular exercise.

Let us talk about the motor qualities. We are talking about muscle strength and muscle power. If you are looking for muscle strength and muscle power, you have to give low repetitions that means, high weights and low reps, 0 to 6 reps only. If you are looking for strength endurance or high intensity endurance more than strength and power, reduce the weights but increase the number of repetitions to 12. If you are looking for low intensity muscle endurance more than high intensity endurance, reduce the weight further and go up to 20 reps. If you are looking for only low intensity endurance, reduce the weights further and you can go up to 20 to 30 repetitions. How much weight will be decided by how much the athlete can perform during a 1RM test.

Exercise order: The ability to perform the desired load and volume of each exercise is dependent on proper order of the exercise. Because multi-joint exercises require the most coordination skill and good energy levels, you should encourage this athlete to perform them first during the training session. If you feel the athlete is getting bored and if you want to challenge the athlete and if you want to increase muscle endurance and hypertrophy, you can use certain training techniques such as pre-exhaustion.

It's a training technique in which you fatigue the muscle in a single joint isolated movement prior to performing a multi-joint exercise involving the same muscle. Simple. If he is going to do a squat or a deadlift, make sure he has fatigued his quadriceps using leg curls or fatigue using leg extensions. If you want to make the athlete perform an exercise such as a squat or a deadlift and you want to use pre-exhaustion techniques, make sure he performs leg curls or leg extensions to fatigue his hamstring or quadriceps prior to performing this back squat or deadlift. This is how you do a pre-exhaustion technique.

The other method is called supersetting. Use alternating agonists and antagonists with minimal rest periods between the exercises. Example, do a bench press followed by a seated row or a bicep curl followed by a triceps push down. So, this would be examples of supersets and when you are doing these sets, make sure the rest period which you give between the exercises is really minimal. Compound setting, perform two different exercises of the same muscle group in alternating fashion with little or no rest between the exercises.

You can do lunges followed by squats or biceps curls followed by dumbbell curls. So, these are compound setting exercises in which the same muscle group is given two different sets of

exercises in an alternating fashion and limited rest between the two exercises. Please note: athletes who are in poor physical conditions may not find these techniques appropriate and these techniques may be too strenuous for them in the early stages of training.

Exercise order: if you want to manipulate exercise order, you can have the athlete do something called a push-pull routine. That means he can do a front squat followed by a deadlift or you can do an exercise which is an upper body push and a lower body pull exercise or an upper body pull followed by a lower body push exercise.

Rest periods, very important. Make sure your athlete has at least 24 hours of recovery between sessions and 48 hours in between sessions working the same muscle groups. That means exercise sessions should be there every 24 hours, but if you are working the same muscle groups it should be only after 48 hours. If you are seeing the rehabilitating athlete only once or two times a week make sure to give him a full body routine. If you are doing training four to five times a week with him you can give him a split routine so that adequate recovery between the muscle groups can be done. An athlete who is rehabilitating three to five days per week can be prescribed activities on off days like flexibility drills, yoga, balance and proprioceptive exercises and core and abdominal training.

Again, these are important because you don't want the athlete to get bored, you don't want the athlete not to do his drills, you want the athlete to, you want to introduce variety in the exercises and you want to do something called cross training. The length of the rest period depends upon the training goal, the load which you are putting on the athlete, the sport of the athlete and the training status of the athlete. If you want to determine the overall intensity of the exercise you have to look at the rest periods, because rest period length is strongly related to the load lifted. That means if you have an adequate rest period or if you do not have an adequate rest period the ATP-PCR energy system and the post energy lactate concentration in the blood will be affected. Basically ATP-PCR has to be regenerated and lactate in the blood has to be removed from the body so that the athlete can be fit enough to do a subsequent exercise session.

So you have to be very careful with the rest periods which you give the athlete. There is something called a rest period continuum. If you are training the muscle for muscular power give high training load or high intensity or high weights and give a rest period of five to eight minutes. If you are looking at maximum muscular strength, give a rest period of three to five minutes. If you are looking for muscular hypertrophy, one to two minutes and if you are looking for muscle endurance, then the rest period should not be more than one minute.

Training loads: It is prescribed in terms of number of repetition per set, number of sets per session and the number of sessions per week. It is important for maximal strength and hypertrophy grains during the early phases of resistance training. You have to give a proper

training volume when the athlete is in the early phases of his rehab so that you can develop the strength faster. Untrained novel individuals are shown to experience maximal strength gains when the training intensity is around 12 RM, while trained individuals demonstrated these gains with a mean training intensity of 8 RM. Training load is usually determined with a 1 RM or isokinetic testing.

These are techniques which are used to load the athlete on a machine, and to test what is called one repetition maximum or you can use an isokinetic dynamometer. However, the problem is these techniques are often disadvantages for the rehabilitating athlete. They are unable to perform these tests because of pain, lack of muscle strength and lack of muscle endurance and lack of joint range of motion. So, what do we do for these guys? There are other techniques for determining training load like the Delorme technique, the DAPRE technique, the OMNI-RES technique or the Odvar Holten method. Any of these methods can be used to determine the training load on these rehabilitating athletes.

These are to be used as a guide until the athlete has developed the muscle qualities and the neuromuscular capabilities to safely and effectively perform a 1 RM or isokinetic test. What did we learn from today's lecture? We learned how to design a scientific training program. We learned how to select a proper exercise for a rehab program. We learned to tailor the rehab to the available equipment and not the other way around. We learned how to identify and to tweak the frequency of exercise in order to maximize gains from a particular exercise session.

We learned how to modify an exercise order to maximize our athletes gains. We learned how to manipulate the exercise rest periods so that we can develop the motor qualities which we want the athlete to develop as per his rehab status and sport specific skills. We learned about training loads and we learned about how to monitor the training loads. These are the references. I strongly urge you to go through them in the interest of more detailed study of the topic.

Thank you for your time and your patience ladies and gentlemen. Do let us know your comments and your remarks and your questions as per the email supplied. We will get back to you as soon as possible. Thank you ladies and gentlemen and Jai Hind.