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Masterclass

Position specific rehabilitation for rugby union players. Part II: Evidence-based examples

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Abstract

It has been stated that a rehabilitation programme should incorporate sport-specific exercises and subject a player to at least as hard demands as they will encounter on return to competition. Research has empirically demonstrated the quantities, times spent, and work to rest ratios for the demands of rugby and report that they do vary between positions. Utilising this information, this article has provided evidence-based examples of how sport-specific exercises can be progressed. The aim of these exercises is to provide the physiotherapist or conditioner with a means to ensure the safe return to optimum competition. The examples have concentrated on the high-intensity (HI) activities of rugby such as running, tackling and scrummaging as these have been shown to vary most between positions. The article also provides an example of how the HI activities can be combined with the low-intensity (LI) activities of the game, e.g. walking or standing, to reflect the work to rest ratios experienced by each playing position. In conclusion, this article recognises that data are not currently available for all the demands of rugby union and that this needs to be addressed before a fully evidence-based programme can be achieved.
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1. Background context

Rehabilitation accounts for fifty percent of a successful result after injury or surgery (Hughston, 1980).

If rehabilitation simply provides a means for the reduction of signs and symptoms, associated with an injury, the player will not return to a safe and effective level of activity (Tegner, Lysholm & Lysholm, 1986). Therefore, the clinical rehabilitation of a player should be augmented with a functional progression of sport-specific tasks. The physiotherapist should use their knowledge of these tasks to devise a rehabilitation programme that will gradually increase the demands on the injured tissue. The use of progressive increases in demand adheres to the Specific Adaptations to Imposed Demands (SAID) principle advocated by Kegerreis (1983). The principle states that when tissue is stressed, it will adapt to the specific training activity. A rehabilitation programme that incorporates progressive sport-specific exercises will ideally, over a period of time, subject the player to at least as hard demands as they will encounter on return to competition (Beam, 2002). When the player attains this level, the physiotherapist can be assured that they have potentially minimised the risk of recurrence on return to competition.

Rugby Union is a field-based team game involving two sides of 15 players, competing over two 40 min halves with a 10-min interval. Research has demonstrated the varying physical attributes required to fulfil the demands of each playing position (Quarrie et al., 1996). A match involves intermittent high-intensity (HI) activities, such as sprinting, rucking, mauling, and scrummaging with recovery periods of low-intensity activity (LI). The recovery periods involve not only standing but also include jogging and walking activities. Research has demonstrated the quantities, times spent, and work to rest ratios for the demands of rugby

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and report that they do vary between positions (Deutsch et al., 2002; Eaton & George, 2006). While it is accepted that these will not remain contemporaneous, the notational data can provide the physiotherapist or conditioner with information to devise a position-specific rehabilitation or fitness programme.

The positional demands referred to in this study will be determined from the data provided by Eaton and George (2006) who used video analysis to compile a time-motion study on player's demands during six English Premiership matches. An incidental sample of 35 professional rugby players was used from Northampton RFC England, with an age range of 20–34 years. There is some variation in terminology among researchers for the players, depending on the demands placed on the individual positions (Duthie et al., 2003). The study grouped players into Props, Hooker, Locks, Loose Forwards, Scrum Half, Inside Backs and Outside Backs. The positional demands were divided into HI activities, or work, and LI activities, or recovery. The analysis of rugby movements was based on a modification of the classifications of Docherty et al. (1988) and more recently Deutsch et al. (2002). The HI were defined as sprinting (>7 m s^{-1}), high speed runs (>5.5 m s^{-1}), runs (>4 m s^{-1}), rucks and mauls, tackling (tackler or tackled) and lineouts (jumper or lifter). The classification for LI was jogging (>2 m s^{-1}), walking (>0.5 m s^{-1}) and standing (<0.5 m s^{-1}).

2. Comparison of positional and/or task demands

The primary purpose of this article is to facilitate the concept of position-specific rehabilitation programmes supported by the available evidence. Examples of rehabilitation will be provided reflecting the demands of each playing position. It has been shown that the differences between positional demands were most obvious in the HI activities. The rehabilitation examples have reflected this finding and concentrate on the individual skills of each position. The LI activities were common to all positions but there were variances between positions in the time spent on each demand (Eaton & George, 2006). This finding was relevant when the work to rest ratios were considered for the rehabilitation or fitness programmes.

The set scrum has now become an integral part of the battle for physical supremacy over the opposition (Quarrie & Wilson, 2000). The 'tight five' of a scrum comprises of the Front Row (Props and Hooker) and the Locks. These players are exposed to high-impact forces in the scrum (Duthie et al., 2003). The Locks are generally considered to be the 'engine' of the scrum, producing 42% of the forward force (Quarrie & Wilson, 2000). The same authors found that maximal anaerobic power and maximal knee extension strength correlated significantly with individual scrummaging force. Therefore, during the clinic-based phase of rehabilitation, or for an individual fitness programme, these factors should be considered. Both of the factors can be measured using a cycle ergometer and an isokinetic dynamometer using the parameters set out by previous studies (Hislop, 1982; Ueno et al., 1988; Quarrie & Wilson, 2000). However, one might question the sport-specificity and validity of cycle or isokinetic tests for power generated in running and in closed chain. The Locks have been shown to produce horizontal forces of 1450 ± 270 N (Duthie et al., 2003). These forces are transmitted through the spines of the Front Row due to their positions in the scrum. Eaton and George (2006) found that there were 29 ± 6 scrums in a game of rugby. Therefore, the cumulative amount of force transmitted is immense. Consequently, it is suggested that players who have not been exposed to these forces for a time should be reintroduced gradually. Clinic-based exercises should also prepare the players for these forces and should include spinal stability training. During field-based rehabilitation, the player should be encouraged to use a scrum machine or a similar immovable object. Progression can be made by starting with the player pushing against the machine on his own. Then introducing a 'pod', e.g. a Prop, Hooker and a Lock and gradually increasing the number of players until a full scrum is used.

Each playing position in rugby requires some specialist skills and tasks and has been outlined by Nicholas (1997). The Locks are heavily involved in lineouts completing 8 ± 3 jumps each during a match. During these activities, they are required to jump vertically, supported by 'lifters', to catch a ball (see Fig. 1). Once the ball is caught, the lifters generally let go of the jumper resulting in a fall to the ground from a height of between 1 and 1.50 m. This will have an obvious impact on the player's joints and their ability to sustain the resultant forces should be considered. Ultimately this must be done with the assistance from the player's colleagues. However, initially it would be prudent to gradually increase the strain placed on recovering tissue. This can be achieved by asking the player to jump off progressively higher boxes before practising an actual lineout jump. While the Locks are the most frequent jumpers in the lineouts, the Props perform the most lifts (11 ± 4). This demand requires the availability of a full range of movement in the shoulder and elbow joints as well as strength and proprioception. In the gymnasium, this can be facilitated by practising the technique using dumb-bells or a water filled gym ball. A progression can be made by using a tackle bag and if this is weighted at the top, it makes for a more realistic lift (see Fig. 1). Physiotherapists or conditioners working with professional teams should have access to specialist equipment to mimic this demand. Those who do not, have to think of alternative ways to incorporate this skill. One suggestion would be to source an Army or Navy kit bag, which are generally cylindrical, made of canvas and are around 1.2 m long. These can be filled with sand, old clothes or some alternative soft filling and can then be used, by the player, to practice their lifting skills.

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