



PREVENTATIVE REHABILITATION FOR RUGBY INJURIES TO THE LOWER LIMB

Kim Murphy

Kim Murphy Biokinetics,
Vincent Pallotti Hospital,
Alexander Rd,
Pinelands,
Cape Town
Tel: 27 21 5323203
Email: biokinetics@vincentpallotti.com



Providing coaches, referees, players, and administrators with the knowledge, skills, and leadership abilities to ensure that safety and best practice principles are incorporated into all aspects of contact rugby.

INTRODUCTION

The lower limbs are highly susceptible to injuries, with the knee being the most injured body part ^{1,2,3}. With as many as 1 in 4 players per team being injured during a season and up to 18% of any squad will at some stage of the season not be available for selection due to injury ⁴, it is imperative that measures are taken both to prevent first-time injuries, and reduce the risk of recurrent injuries.

MOST COMMON RUGBY INJURIES

The knee is the area most commonly injured, followed by the hip and pelvis ^{5,7}. Below is a brief description of the most common lower-limb injuries.

Groin and adductor strain injuries:

Pain is located in the groin area, ranging in severity from mild (discomfort when walking and exercising) to severe (unable to move the affected area or partake in sport). This area is normally injured with a sudden change in direction.

Thigh muscle haematomas:

Direct blows to the thigh as a result of a tackle or kick cause immediate bleeding in the muscle belly. A surface bruise may become evident but often the area appears to be swollen with no visible bruising but with much pain and discomfort.

Hamstring strains and tears:

Hamstring strains and tears normally occur as the foot hits the ground in the running cycle, often with sudden acceleration or deceleration. The tears are normally located in the middle of the muscle belly but can also occur where the muscle inserts in the buttock area. These injuries often occur.

Knee ligament injuries:

There are 4 ligaments in the knee, any of which can be damaged when the knee undergoes extreme force. There are two on either side of the knee (MCL – medial collateral on the inside of the knee, LCL lateral collateral on the outside of the knee) and two within the knee joint (ACL anterior cruciate ligament and PCL posterior cruciate ligament). Complete tears or ruptures of these ligaments will require surgery.

Knee meniscus and cartilage injuries:

The bones making up the knee joint are covered in cartilage and between the bones lie “half moon”-shaped structures called the meniscus. The cartilage or the meniscus can be damaged by a forceful movement. This can give rise to a flap-shaped tear, which causes pain as well as a locking sensation in the knee.

Lateral ankle sprains:

“Going over” or twisting the ankle causes damage to the ankle ligaments and other soft tissue. The outside of the ankle joint is the most common ankle sprain. This can result in mild damage or severe injury, where the ligaments are damaged, torn or where a bone can even fracture.

MECHANISMS OF INJURIES

Most rugby injuries occur in the tackle situation ^{1,8}. The person being tackled is the most likely to be injured, followed by the person doing the tackling. Rucks and mauls have also been shown to be a mechanism of injury.

However, injuries can also occur when the player does not have the ball, is not being tackled, or even just during training.

PREVENTION

Strategies to prevent injuries are very important as once a player is injured he/she has an increased chance of sustaining another injury. Prevention strategies need to consider when and where injuries occur.

Most injuries occur in the second half a match ^{1,3,12}. This means that players are more likely to become injured when they are physically and mentally tired. Thus it is important that all players are fit enough to play an entire match.

A varied warm-up has also been shown to reduce the risk of injuries ^{9,10,11}. A traditional warm-up of a jog around the field is inadequate. Warming up does not just mean feeling warmer but also means getting the body and mind sharp and ready to play – and ready to react to the sudden forces imposed upon it in a game.

Resistance training designed to improve strength, balance and proprioception will round off a well designed preventative programme. Balance and proprioception basically depend on a good “communication” between the brain and body so that it can react to outside forces imposed upon it. This is also referred to as neuromuscular training. Reductions in injuries, specifically ACL, hamstring and lateral ankle sprains, occur following the incorporation of proprioceptive training into a programme and in the warm-up ^{6,7,13}.

EXERCISE EXAMPLES

Straight leg raises



Lying flat on his back, the player must bend one leg up so that the foot is flat on the floor. The other leg must be extended with the foot pulled back. The player must slightly turn out the leg and think of “*pulling up the kneecap*”. Keeping the leg straight, the leg must then be lifted to no higher than the other leg. This position must be held for a count of 5 and lowered. This exercise can be progressed by increasing the length of time the leg lift is held or by adding ankle weights. A further progression is to get the player to lean up on their elbows.

Wall squats with ball squeeze



Use a big ball placed in the small of the back and a “soccer” size ball between the thighs. Feet must be placed ahead of the body such that on bending, the knees move over the toes. Squat down to an angle of no more than 90 degrees. Hold this position for a count of 5-10.

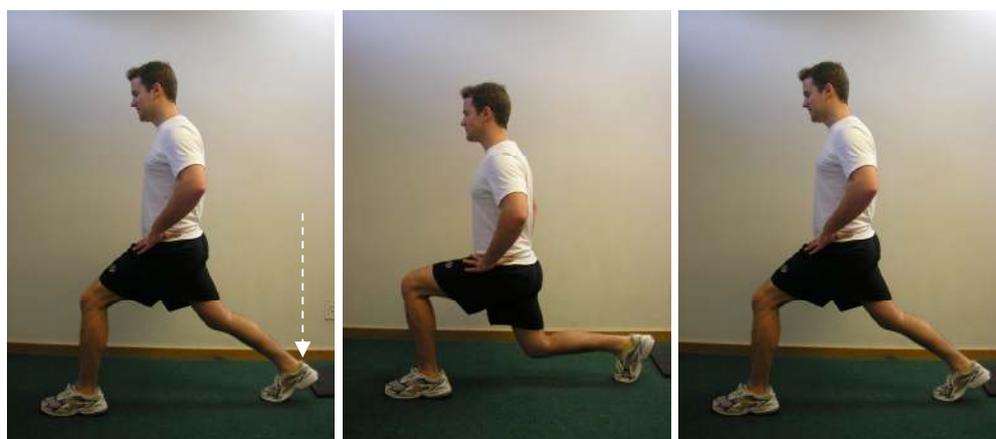
Progression: the addition of hand-held dumbbells can increase resistance.

Squat and thrust



A variation is to use the squat and thrust/shoulder press. Use either a medicine ball or a set of handheld weights. The player squats down to the ground as above, except the ball/weights must start on the ground and then on returning from the squat, they must be pushed to the ceiling.

Static Lunges



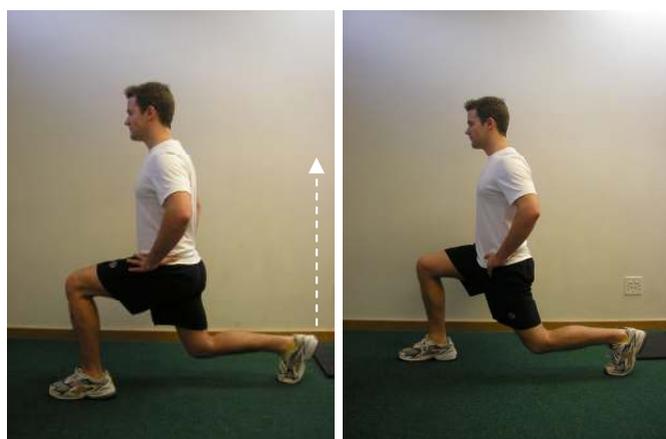
Standing with one leg in front of the other, the front foot should be flat and the back heel raised. The player bends both knees equally so that the back knee moves towards the floor. Both knees should move into a 90-degree position. Do not allow the front knee to move past the toes.

Stepping Lunges



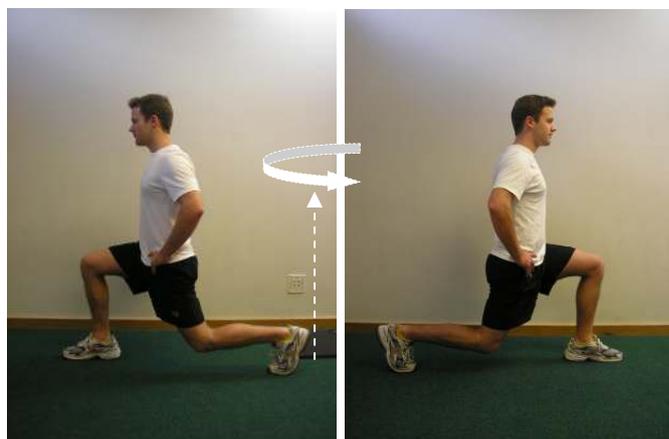
A progression from the above is to a stepping lunge where the player steps from a starting position into a lunge and then back to the return position, and then repeats the movement with the other leg. One could also do a walking lunge where instead of returning back to the starting position, one walks forward.

Jumping Lunges



A further progression is to do a jumping lunge. Starting in a lunging position, the player then jumps, changes legs and lands on the other leg. The focus is to land on a bent knee, like a spring.

Jumping with a twist



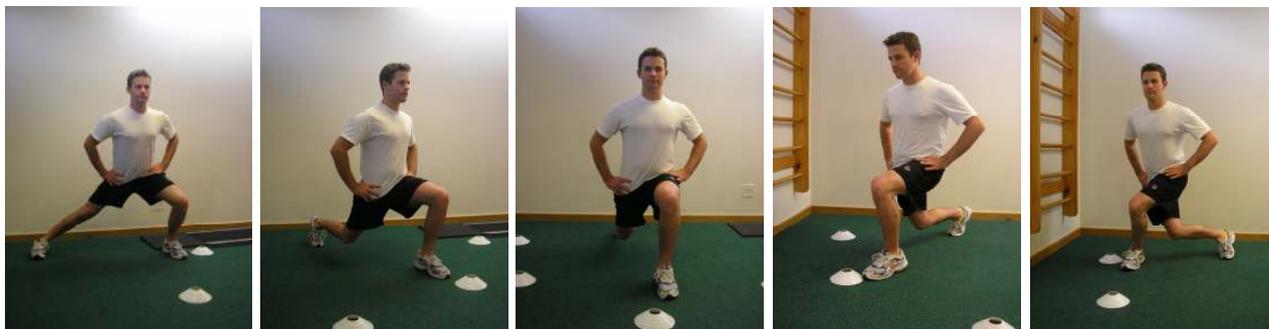
A progression of the jumping lunge is the jumping lunge with a twist. On jumping the player turns 180 degrees in the air and lands with the opposite leg in front.

Lunges with a twist



To make the lunge more functional, one could then add a twist with a ball. The player holds the ball and twists the upper body, moving the ball to the same side as the front leg. This could be used with a static lunge or a stepping lunge. To start with, a rugby ball could be used, with the aim of eventually using a medicine or big ball.

Star or multi-directional lunges



Lunges can be progressed by making them multi-directional. This can be started by stepping to one corner, to the front, and then the other corner and progressed to clock lunges so that 5 stepping positions are used.

Single leg bend /running man



Stand with one leg resting on a chair/bench or against a wall. The front leg should be moved ahead of the body so that when flexing the knee it should not go past the foot. The player then bends down to an angle of about 40-60 degrees. This can be progressed by using a hand held weights or by placing the back leg on a big ball.



One leg bend on a step



The player stands on a step. The supporting leg is bent while the other leg is brought in front of the step. On returning it is brought up and then on bending again, it is moved behind the step. This can be progressed to include throwing a ball at the player during the movement.

Ball curl



A good exercise for core stability and hamstring strength. The player lies with heels on the ball. His pelvis is lifted off the ground. The knees are bent and the ball is drawn in and under.

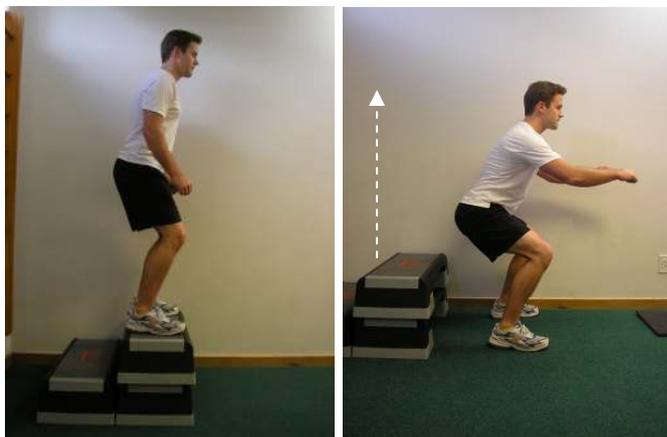
Throwing a ball on one leg



The most simple balance exercise is standing on one leg and getting players to throw a ball to one another or against a wall. This can be progressed to standing on an unstable surface such as a wobble mat, rotating discs or a wobble board, or by using a heavy medicine ball. Another progression is for one player to stand on one leg. The other player must then tap the player on different body parts with enough force to unsettle them. This too can be progressed to eyes closed.

Pushing each other on one leg: Two players stand opposite each other, just less than an arm's length away. Standing on one leg, they attempt to push each other over. This can be progressed to standing on an unstable surface such as a wobble mat, rotating discs or a wobble board.

Jump and land



Taking off on both legs, jump, land and balance for 10 seconds. This can be progressed to landing on one leg, and also having a ball thrown at the player whilst in the air.

SAMPLE PROGRAMMES

Below are generic sample programmes. Please note that these should be used under guidance and adjusted according to each player's previous injuries.

Basic guidelines:

- Do not make any player work through pain.
- Work according to each player's capability.
- Progression is important in preventing injuries. One cannot start working a player at 100%. Weight training should be started at a light resistance and as players become stronger the resistance can be increased.
- Ensure that players have adequate rest. Children or young players should only train twice a week and play once a week. Once players reach senior level, they may need to train every day but they should have at least one rest day a week.
- Training programmes should be periodised. The player's programme should be broken into: pre-season, in-season and off-season.
- Players must play. Even though this document focuses on training outside the game, playing the game in training is invaluable.

SAMPLE PROGRAMME ONE: U/14—U/18 PLAYERS

EXERCISE TYPE	SETS	REPS	REST	PROGRESS
Warm up				None.
Straight leg raises	2	15		Increase the length of time the lifted leg is held.
Wall squat with ball squeeze	3	15	1 minute	Reduce rest period to 30 seconds. Add a light medicine ball –5kg
Walking lunges	3	20	1 minute	Reduce rest to 30 seconds. Add a ball throw and catch.
Jump and land	3	10		
One leg stand and ball throw	10 each side		None needed	Unstable surface.

SAMPLE PROGRAMME TWO: U/18-U/21

EXERCISE TYPE	SETS	REPS	REST	PROGRESS
Warm up				
Wall squat with ball between knees	3	8	30 seconds	Add handheld dumbbells. Increase the amount of time each squat is used.
5 directional lunges	5 each leg		None	Add handheld dumbbells.
Single leg bend on a step	20x each leg	2	30 seconds	Add a ball throw.
Jump and land	10x each leg	2		Land on a wobble mat. Add in a ball throw.
Ball hamstring curl	15	2	1 minute	Increase sets to 3.
Standing on one leg and push over	1 minute each leg			Stand on an unstable surface.

SAMPLE PROGRAMME THREE: SENIOR PLAYER

EXERCISE TYPE	SETS	REPS	REST	PROGRESS
Warm up				
Squats with thrust	3	8	30 seconds	Increase with weight. Stand on a wobble board.
Lunges with a twist	20 forwards	2	None	Add a heavy medicine ball. Increase number or steps to 30.
Running man on the wall	20x each leg	2	30 seconds	Place foot on a big ball. Stand on an unstable surface.
Jumping lunges	10x each leg	3		Use handheld dumbbells. Progress to a jumping lunge with a turn.
One leg throws standing on wobble board, mat or rotating discs	1 minute each leg			Use a heavy ball. Throw sideways.

REFERENCES

1. BATHGATE A, BEST J, CRAIG G, JAMIESON M, WILEY J. A prospective study on injuries to elite Australian rugby union players. *Br J Sports Med* 36(4) 265-269. 2002
2. BIRD YE, WALLER S, MARSHALL SW, ALSOP, CHALMERS DJ, GERRARD DF. The New Zealand Rugby Injury and Performance Project V. Epidemiology of a season of rugby injury. *Br J Sports Med.* 32: 319-325. 1998
3. BOTTINI E, POGGI EJ, LUZURIAGI SECIN FP. Incidence and nature the most common injuries sustained in Argentina 1991-1997. *Br J Sports Med* 34: 94-97. 2000
4. BROOKES JH, FULLER CW, KEMP SP, REDDIN DB. Epidemiology of injuries in English Professional Rugby Union. Part 1. *Br J Sports Med* 39(10) 757-66. 2005
5. DALLALANA RJ, BROOKS JH, KEMP SP, WILLIAMS AM. The Epidemiology of Knee Injuries in English Professional Rugby Union. *Am J Sports Med.* 35: 818-830. 2007
6. EMERY CA, CASSIDY JD, KLASSEN TP, ROWE EL. Effectiveness of a home based balance training program in reducing sports related injuries among healthy adolescents. *CMAJ* 172: 749-54. 2005
7. GIANOTTI SM, QUARRIE KI, HUME P. Evaluation of RugbySmart: A rugby union community injury prevention programme. *J Sci Med Sport*
8. JAKOET I, NOAKES TD. A high rate of injury during the 1995 Rugby World Cup. *S Afr Med J.* Jan : 88(1) 45-7. 1998
9. JUNGE A, ROSCH D, PETERSON L, GRAF BAUMANN T, DVORAK J. Prevention of soccer injuries a prospective intervention study. *Am J Sports Med* 30: 652-9. 2002
10. MANDLEBAUM BR, SILVERS HJ, WANTANABE DS, THOMAS SD, GRIFFIN LY, KIRKENDALL DT, GARRET W. Effectiveness of a neuromuscular and proprioceptive training programme in preventing anterior cruciate ligament injuries in female athletes: 2 year follow up. *Am J Sports Med.* 33(7) : 1003-10. 2005
11. OLSEN OE, MYKELBUST G, ENGBRETSSEN L, HOLME I, BAHR R. Exercises to prevent lower limb injuries in youth sports: a cluster randomised control trial. *Br Med J.* 330:449 2005

12. REILLY T, HARDIKER R. Somatotype and injuries in adult student rugby football. *J Sports Med Phys Fitness*. 21:186-90. 1981
13. WEDDERKOPP N, KALTOLFT M, HOLM. Comparison of two intervention programmes in young female players in European handball: with and without ankle disc. *Scand J Med Sci Sports*. 13: 371-5. 2003

