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NECK INJURY PREVENTION

Dr Wayne Viljoen, BSc., BA Hons (Biokinetics), PhD, CSCS

General Manager: BokSmart National Rugby Safety Program
Sport Science Institute of South Africa (SSISA), Private Bag X5, Newlands, 7725
Tel. +27 21-659 5616, Email: wviljoen@ssisa.com, Fax: +27 21-659 5659

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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

Sports injuries are one of the most common forms of injury that are sustained in modern Westernised societies, and the treatment of these injuries can be quite expensive. As a result, injury prevention strategies have become very useful from both a medical and financial point of view [12]. Not many randomised, controlled clinical trials (studies with the highest scientific credibility and impact) have been performed to investigate the effectiveness of injury prevention strategies in sport. However, the general conclusions from the research out there are that a multi-faceted injury prevention approach can be effective in reducing injury rates.

Albeit a very rare occurrence [2;13], severe neck injuries are the most devastating form of rugby injury and most often have life-changing consequences [14]. These injuries hold a high personal burden on all levels. They are financially draining, and the treatment as well as the management of personal care is often extensive [1]. Even though not many severe and/or catastrophic neck injuries occur in relation to the number of players involved in, or the number of hours that players are exposed to, the game of rugby, any severe and/or catastrophic neck injury incurred is unacceptable. Those that do happen can sometimes result in extreme functional disability and/or death.

Everyone who is a keen follower of rugby over the years knows about the Chris Burger/Petro Jackson Fund (http://www.playersfund.org.za/). The Fund was originally established to assist those players who experienced severe and debilitating injuries playing rugby. The Fund was initially named after the Western Province rugby player, Chris Burger, who died as a result of a neck injury in a match against Free State in 1980. When the various previously divided South African rugby unions united in 1992, the fund merged with the Petro Jackson Fund, which was formed in memory of another young rugby player, Petro Jackson, who was also fatally injured in 1989. This is a sobering reminder that the contact sport of rugby we all enjoy so much carries a high risk of catastrophic injury [9]. These incidents reinforce the fact that one cannot overstate the need for active prevention of neck injuries and moreover cannot neglect the issue of promoting safety in rugby.

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Paul Haylen [8] in the Medical Journal of Australia highlights 5 great pillars to reduce the incidence of neck injuries in rugby union: (i) the creation of awareness programs and courses for coaches, referees, medical support staff and most notably the players, (ii) astute player selection, e.g. do not choose someone to play in the front row if they are not physically suited, conditioned or adequately coached for it, (iii) constantly assess and amend the rules of the game, especially in the contact situations, e.g. rucks, mauls, scrums and tackles, (iv) impose the rules – referees have to be ultra-strict with these

infringements and players should be punished for contravening them, and lastly (v) emphasise strength and conditioning of the players with specific attention to neck strengthening exercises.

Although injury prevention research in rugby is limited [2], one should continue to try and intervene using current best practice in preventing serious and/or catastrophic neck injuries, and one way of doing this is conditioning the neck musculature appropriately. Strength or resistance training strengthens the bones, muscles and other connective tissue structures such as tendons and ligaments, and therefore makes the joints stronger, more stable and resistant to injury [6]. Unlike the brain in for example concussion injuries, the risk of neck injury can be reduced by strengthening the neck [3]. Albeit that this has not yet been formally addressed via any controlled research to date [10], strength training and increasing the muscle bulk of the neck muscles may in fact help prevent severe neck injuries [1;3;15;16]. Strengthening and conditioning of the neck muscles can assist the neck in resisting extreme forced hyperflexion (forward bending) and thereby reduce the chances of developing a severe and/or catastrophic neck injury [7]. Strength training may also reduce the severity of such an injury [4].

Preventative conditioning is a systematic approach to identifying problematic or high-risk injuries in a sport, and then designing an appropriate exercise strategy to try and reduce the incidence of these injuries [11]. In most cases, the exercises are similar to those provided post-injury, but the focus has shifted towards prevention. This form of conditioning is performed in a systematic way by training the body within a more controlled environment to respond functionally and reactively to any situation, and thereby attempts to prevent injury on the field [11]. Preventative conditioning of the neck musculature should be seen as an important add-on to the normal off-, pre- and in-season physical conditioning programs.

One should initially focus mainly on training strength and then move towards training endurance [15]. Following strength development, endurance training becomes equally important as the match environment requires neck control and stability under fatigued conditions – this is especially important in the front row. Appropriate strength and endurance training of the neck musculature may prevent and/or reduce the number of severe neck injuries, by protecting the neck against any excessive movement [4].

Most of the conditioning and preventative strengthening should be performed around the off- and pre-season phases. However, with regards to the neck or cervical spine, I do not believe this process should stop during the in-season. At least 1 to 2 sessions per week should include neck strengthening exercises or preventative rehabilitation in some format. After performing a focused 6-9 week progressive neck injury prevention training cycle, one can integrate these exercises as part of one's normal training schedule [11]. These can also be done on your own time – it does not matter whether you are a backline

player or front-row forward. Because of the nature of a contact sport such as rugby, rather be safe than sorry.

Preventative conditioning of the neck should be performed as a matter of priority and should form part of most preventative rehabilitation programs in rugby. It should however simultaneously emphasise both strengthening and stability exercises, and progressively expose the player to increases in both strength requirements and more unstable conditions, e.g. an unstable surface such as a Physio ball [4;11]. Exercises that develop neuromuscular control and stability are crucial in maintaining joint integrity, and should form part of all preventative rehabilitation programs [5].

One additionally needs to progressively move from static strengthening exercises and control to dynamic strengthening exercises and control to be most effective in preventing neck injuries on the field [4]. Ideally, one should also try and avoid performing focused neck strengthening exercises on the same day as rugby-specific training or competition, because of the risk of fatigue-related injury [15].

Here are a couple of exercises requiring basic equipment (if any) that I highly recommend for neck strengthening, which can effectively lessen the chance of severe neck injury. (AE) = advanced exercise. If at all unsure, please consult a competent professional before attempting any of the exercises described in this section. Also, if you are currently injured or recovering from a neck injury, please consult with a medical professional before considering any of these exercises.

Unless otherwise specified, build up to 10 repetitions each set. An extremely important technical point: If you have reached fatigue in a set and can no longer perform the exercise with good control and technique, you should stop the set regardless of whether or not you have completed the number of repetitions allocated [11]. Exercises are arranged from beginner (easy) to advanced (difficult).

Isometric holds (lateral flexion to the left and right, forward flexion, extension, left and right rotation): Sit or stand while performing the following:

- **Isometric flexion (forward bend):** Apply resistance with one or both hands to the forehead. Without causing any movement, discomfort or pain, gently apply pressure, and then progressively increase this pressure while resisting and at the same time attempting to bend the neck forwards and place the chin on the chest. Once maximal tolerable resistance has been applied, hold for 5-10s, and relax. This is one repetition.

- **Isometric extension (backward bend)**: Apply resistance with one or both hands to the back of the head. Without causing any movement, discomfort or pain, gently apply pressure, then progressively increase this pressure while resisting and at the same time attempting to bend the neck backwards and place the top of the head on the back. Once maximal tolerable resistance has been applied, hold for 5-10s, and relax. This is one repetition.

- Isometric lateral flexion (sideward bend to the left): Apply resistance with one or both hands to the left side of the head. Without causing any movement, discomfort or pain, gently apply pressure, and then progressively increase this pressure while resisting and attempting to place the left ear on the left shoulder. Once maximal tolerable resistance has been applied, hold for 5-10s, and relax. This is one repetition.

- Isometric lateral flexion (sideward bend to the right): Apply resistance with one or both hands to the right side of the head. Without causing any movement, discomfort or pain, gently apply pressure, and then progressively increase this pressure while resisting and attempting to place the right ear on the right shoulder. Once maximal tolerable resistance has been applied, hold for 5-10s, and relax. This is one repetition.

- Isometric rotation to the left: Apply resistance with one or both hands to the left side of the forehead. Without causing any movement, discomfort or pain, gently apply pressure, and then progressively increase this pressure while resisting and attempting to rotate the head to the left. Once maximal tolerable resistance has been applied, hold for 5-10s, and relax. This is one repetition.

- Isometric rotation to the right: Apply resistance with one or both hands to the right side of the forehead. Without causing any movement, discomfort or pain, gently apply pressure, and then progressively increase this pressure while resisting and attempting to rotate the head to the right. Once maximal tolerable resistance has been applied, hold for 5-10s, and relax. This is one repetition.

Prone neck lifts: Kneel on all fours. Relax your head down. Attempt to curl your head upwards and backwards towards the base of your neck, hold briefly and control back to the starting position. Aim for 20-30 repetitions per set. Variation 1: Have a partner apply hand resistance throughout the movement, but still enabling the player to move his neck through the normal range of motion (aim for 10 reps).

Supine neck lifts: Lie on your back, with your knees and hips bent. Raise your head about 5cm off the floor. Maintain this raised position throughout. Attempt to curl your head upwards and place your chin onto your chest, hold briefly and control back to the starting position. Aim for 20-30 repetitions per set.

Supine lateral rotations: Lie on your back, with your knees and hips bent. Raise your head about 5cm off the floor. Maintain this raised position throughout. Rotate your head through its full range of motion from left to right without losing control. Aim for 20-30 repetitions per set.

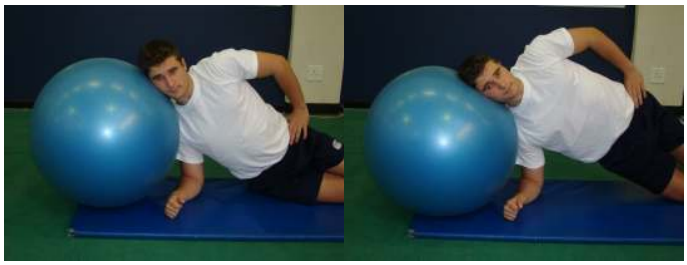
Buddy scrums: Have 2 players starting on knees opposite each other. Get them to engage while supported on hands and knees. Once they have engaged, ask them to scrum against each other. Gently and with control scrum forwards and backwards against each other, after each set swap sides with the head position.

Theraband prone deep neck flexion: Take a strip of Theraband and wrap it around the back of your head just above the ears. Hold the Theraband in both hands, pull it tight enough to provide resistance and kneel on all fours. Keep the chin tucked in at all times, lift your head upwards against the resistance as far as you can, hold it briefly, control back to the starting position and repeat. Variation: Perform without the Theraband.

Theraband neck flexion (with partner): Lie on your back with knees and hips bent, have a training partner take a strip of Theraband and hold it tightly over your forehead. Attempt to curl your head upwards against the Theraband and place your chin onto your chest, hold briefly and control back to the starting position.

Theraband lateral flexion (with partner): Lie on your side, with your head relaxed to the side. Have your training partner hold a strip of Theraband tightly over your head just above the ear line. Attempt to curl your head upwards and sideways against the Theraband and place your ear onto your shoulder, hold briefly and control back to the starting position.

Side-bridge on Physio-ball: Lie sideways on a mat with knees bent, supported on your elbow and forearm, and your head resting sideways on the Physio-ball. Attempt to raise yourself off the floor by pressing your ear down against the ball.



Neck extension (using a leg-extension machine or neck harness) (AE): Kneel prone on all fours (hands and knees) with your head resting under the leg extension machine cushion with the chin on the chest. While maintaining the four point kneeling position, curl and raise your head upwards against the resistance of the machine. You should attempt to lift a weight that allows you to perform 8-10 repetitions.

Physio-ball neck-bridge (AE): Sit down with your back against the Physio-ball, head resting on it and your knees and hips bent. Maintain and contract your neck muscles and bridge up until your thighs, torso and neck form a straight line. Hold momentarily, and lower yourself back down. Variation 1: When in the top position, rotate the neck slightly from side to side with each repetition. Variation 2: When in the top position, extend arms to the sides and perform random arm movement patterns (with and without dumbbells), e.g. alternate flexion and extensions, crossing over the chest in a “pectoral fly” movement, bilateral (both arms) flexion.

Lunges with neck harness/Theraband control (forwards, backwards, sideways) (AE): Whichever may be available, use either a neck harness or Theraband tubing. Use a partner to perform the following:

- **Forward lunge:** Have your partner stand behind you with the Theraband placed over your forehead, and angling slightly downwards. Keeping your neck strong and stable, step and lunge forward against the resistance of the Theraband. Hold briefly and return to your starting position.

- **Backwards lunge:** Have your partner stand in front facing you with the Theraband placed over the back of your head, and angling slightly downwards. Keeping your neck strong and stable, step and lunge backwards against the resistance of the Theraband. Hold briefly and return to your starting position.

- **Side lunge:** Have your partner stand next to you with the Theraband placed over the side of your forehead, and angling slightly downwards. Keeping your neck strong and stable, step and lunge sideways against the resistance of the Theraband. Hold briefly and return to your starting position.

Diagonal lunges with neck harness/Theraband control (AE): Have your partner stand behind you with the Theraband placed over your forehead, and angling slightly downwards. Keeping your neck strong and stable, step and lunge diagonally against the diagonal resistance of the Theraband. Hold briefly and return to your starting position. Vary your angles and forward direction of lunging for each repetition.

Deep neck Physio-ball stabiliser (AE): Kneel on all fours, with knees slightly behind the hips. Rest your forehead on the ball and place your hands on either side of the Physio-ball to provide lateral support. Contract the neck muscles and take some of the load (your supported body mass) onto your neck. Keep your chin tucked in, at all times. Hold the contraction for 5s progressing gradually to 10s per repetition. Variation 1: Once you are comfortable supporting the load on your neck muscles, rotate your neck slightly to the left and to the right on the ball with each repetition. Variation 2: Once supporting the load, lift your hands at first singularly, alternating hands, and then progress to lifting both of them off simultaneously.

Wrestler's bridge (AE): Lie on your back with your knees and hips bent. Keep your chin tucked in at all times. Maintain and contract your neck muscles and bridge up until your thighs, torso and neck form a straight line. Hold momentarily, and lower yourself back down (2s up and 2s down). Variation 1: Allow your neck to extend the whole way to the top support position, i.e. do not keep your chin tucked in, but perform very slowly and controlled. Variation 2: Hold on the top position for 2s progressing gradually to 5s and then to 10s.

Partner scrums with a squeeze (AE): Have 2 players starting on knees opposite each other. Get them to engage and bind properly. Once they have taken the hit and bound, ask them to scrum against each other. The focus of this exercise is to scrum and at the same time squeeze, and raise the knees off the ground, hold briefly, lower and repeat while remaining stable and in control at all times. Alternate which side your head goes after each set, i.e. if you went in with your head on the right side for the first set, place your head on the left side for the second set. Start with 2 repetitions per set, and as you become better at it, progress gradually to 5 repetitions per set.

NOTE:

1. For children aged 13 years old and below, do not perform any exercises beyond the beginner level program! Continue with the "Beginner" program exercises.

2. For players 14-16 years old, do not perform any exercises beyond the intermediate level program! Build up to the "intermediate" level, and maintain this level for the remainder of the 8 weeks.

3. Players 17 years and older can progress through all three levels, but if unsure of the correct execution and technique in any way, they should always consult with an appropriately trained exercise professional. If this is not possible or if still unsure then do not perform the exercise at all.

4. Perform session 1 and session 2 on two different days in the week, separated by at least 48 hours.

5. If you do not have dedicated time set aside for neck exercises only, then incorporate and spread the neck exercises out evenly in between your current strength training program exercises on these two days.

AUTHOR BIOGRAPHY:

Dr Wayne Viljoen is the General Manager of the BokSmart National Rugby Safety Program. He is registered Biokineticist, holds a PhD in Exercise Physiology from the University of Cape Town, and is also as an international NSCA Certified Strength and Conditioning Specialist.

TABLE 1: BEGINNER PROGRAM SESSION 1 (2 WEEKS)

EXERCISE	SETS	REPETITIONS	REST
Isometric holds • Flexion • Extension • Lateral flexion to the left • Lateral flexion to the right • Rotation to the left • Rotation to the right	2	2 x 5-10s holds	30s
Prone neck lifts	3	20-30	30s
Supine neck lifts	3	20-30	30s
Buddy scrums	3	10	30s

TABLE 2: BEGINNER PROGRAM SESSION 2 (2 WEEKS)

EXERCISE	SETS	REPETITIONS	REST
Isometric holds • Flexion • Extension • Lateral flexion to the left • Lateral flexion to the right • Rotation to the left • Rotation to the right	2	2 x 5-10s holds	30s
Supine lateral rotations	3	20-30	30s
Prone neck lifts (Variation 1/Partner-resisted)	3	10	60s
Theraband neck flexion	3	10	60s
Buddy scrums	3	10	30s

TABLE 3: INTERMEDIATE PROGRAM SESSION 1 (3 WEEKS)

EXERCISE	SETS	REPETITIONS	REST
Theraband neck flexion	3	10	60s
Theraband prone deep neck flexion	3	10	60s
Theraband lateral flexion to the left	2	10	60s
Theraband lateral flexion to the right	2	10	60s
Deep neck stabilisation	3	3 x 5s holds	60s

TABLE 4: INTERMEDIATE PROGRAM SESSION 2 (3 WEEKS)

EXERCISE	SETS	REPETITIONS	REST
Neck extension on leg extension machine	3	8-10	60s
Side bridge on Physio-ball	1 each side	10	60s
Physio-ball neck-bridge	2	10	60s
Lunges with Theraband control: • Forward • Backward • To the left • To the right	1 each direction	10	60s

TABLE 5: ADVANCED PROGRAM SESSION 1 (3 WEEKS)

EXERCISE	SETS	REPETITIONS	REST
Physio-ball neck-bridge (Variation 1 – rotate slightly to the Left and Right)	3	10	60s
Diagonal Theraband Forward lunges	3	10	60s
Deep neck stabilisation (Variation 2 – Alternating single arm raise)	3	3 x 5-10s	60s
Wrestler's bridge	3	10	60s

TABLE 6: ADVANCED PROGRAM SESSION 2 (3 WEEKS)

EXERCISE	SETS	REPETITIONS	REST
Deep neck stabilisation (Variation 1 – rotate slightly to the Left and Right)	2	3 x 5s	60s
Physio-ball neck-bridge (Variation 2 – alternate arm flexion and extensions)	2	10	60s
Deep neck stabilisation (Variation 2 – Bilateral arm raise)	1	3 x 5s	60s
Wrestler's bridge (Variation 2 – hold for 5-10s)	3	5	60s
Partner scrums with squeeze	3	2-5	60s

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