

Remedial exercises for the prevention of shoulder injuries in the Javelin Throw

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by Vern Gambetta

“ *The release phase of the Javelin Throw places enormous stress on muscles, tendons and ligaments which can lead to injuries. The author believes that to avoid injuries, more attention should be paid to training the force reduction phase of the throw. In this article he looks briefly at the structure and function of the shoulder joint before presenting a remedial exercise programme. With the aid of photographs, the programme is described in detail.* ”

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1 Introduction

The ultimate objective in javelin throwing is to generate the highest release velocity possible. The majority of conditioning activities and technique work are directed toward increasing force to achieve this objective. My concern is that not enough attention has been directed toward training the force reduction phase of the throw.

Due to the high deceleration forces in this phase of the throw, great stress is placed on the muscles, tendons and ligaments. The better the thrower, the greater the force produced. On the other hand, better throwers can reduce the force and acceleration produced more quickly. According to Kreighbaum and Barthels "the velocity of release and the reduction of hip, shoulder and elbow velocity were significantly higher for the good throwers. The good throwers also reduce the speed of the hip earlier" (Kreighbaum and Barthels 1990).

Thus, any improvements that throwers make increase the stress they are exposed to as well as the possibility that they will suffer one or more of the common injuries which occur in javelin throwing, particularly those of the shoulder.

It has been my experience that a few simple exercises integrated into the total training programme can help prevent many of the shoulder problems that occur in javelin throwing.

The same exercises can also help to reduce elbow injuries. This is because a weak shoulder joint complex – including the vital scapular musculature – is the ultimate cause of many elbow problems. Greater forces will

be transferred to the next link in the kinetic chain, in this case the elbow, by a weak shoulder. The elbow is not designed to handle these excessive forces. A weak shoulder, along with any technique flaws, will lead to the common injuries we see in a javelin thrower's elbow.

In this article I will focus first on the shoulder joint complex and then on a programme of remedial exercises.

2 The Shoulder Joint

The shoulder joint is very flexible because of the structure of the head of the humerus which rests in a very shallow cavity, the glenoid fossa. The dynamic stability of the shoulder is controlled directly by the rotator cuff muscles as well as the structure of the allied ligaments and tendons. Due to the very mobile nature of the joint, maintaining its stability and integrity is a prime consideration. This function is aided by the musculature of the scapulathoracic region. The movement of the scapula controls the movements of the shoulder and the arm and serves as an anchor for the glenohumeral joint. Therefore, it is important to train the muscles that control the movement of the scapula.

The key movements at the scapula are those of protraction and retraction which are involved in most pushing and pulling movements. It is also important to understand that the shoulder is inherently stronger in internal rotation. Once again, this is due to the structure of the internal rotators which come into

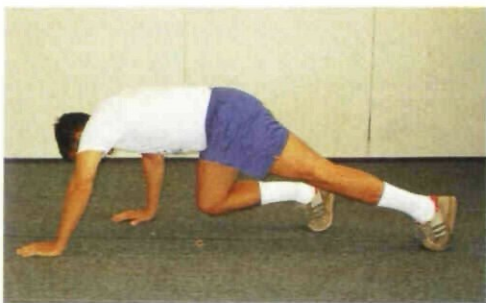


Figure 1: Crawling forward and back

play during the force production phase of the throw. These consist primarily of the pectoralis and the latissimus dorsi.

3 The Remedial Programme

3.1 Objectives

Shoulder structure and function dictate that the focus in the remedial programme should be placed on the scapulathoracic area because of its function as an anchor. The remedial programme is designed to reinforce proportional development between the posterior and the anterior areas of the upper extremity. In addition, the remedial exercises are designed to reinforce the kinetic link principle, enhance joint proprioception and body awareness. These are important considerations throughout an athlete's career, but should be especially emphasised during an athlete's development years.

None of the exercises are particularly new and innovative but what makes them unique



Figure 2: Crawling Sideways

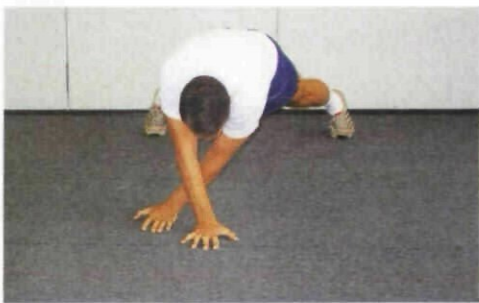


Figure 3: Crossover Crawl

is their application and sequencing as part of a total programme.

3.2 Crawling

When to use: As part of the warm up before throwing. Start with one set of 10 crawls forward and back and progress to three sets of 10 forward and back. Then add one set of 10 of crawling sideways right, progressing to three sets of 10.

With regard to the crossover crawl, one set of 10 in each direction is adequate.

How to: Support the weight evenly between the hands and knees. Reach out – stretching the arm.

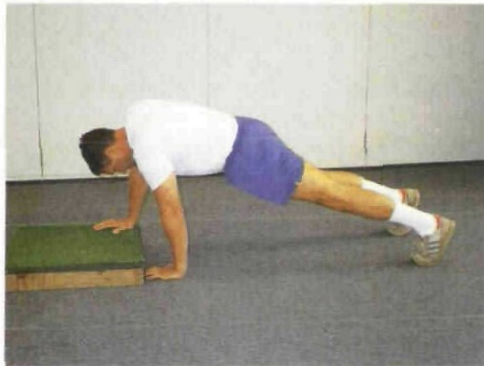


Figure 4: Arm step up – forward and back



Figure 5. Arm step up – side to side

3.3 Arm step up

When to use: It is best to place this exercise at the beginning of an upper body weight training session. Start with one set of 10 of the forward and back movement and one set of 10 of the side to side. Progress to three sets of 10 of each exercise. One repetition consists of right arm up on to box, left arm up on to box, right arm down off box, left arm down off box.

How to: This exercise starts with shoulders directly over the hands and body weight supported on the hands in a front support position as illustrated. A 10-15cm high box should be used.

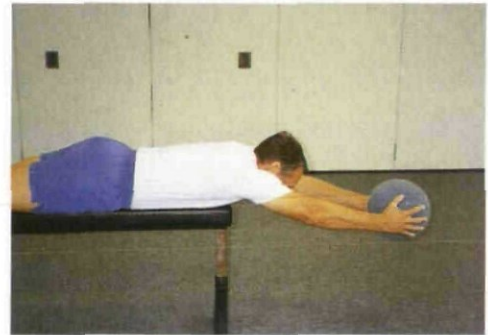


Figure 6. Reach outs.

3.4 Reach outs

When to use: As part of a weight training session or immediately after throwing. Do three sets of eight reps.

How to: From a lying position on a bench a two or three kilo medicine ball should be held close to the chin. Arms should then be extended slightly down and straight ahead. The ball should then be moved to the right, returned to centre, and then moved to the left.

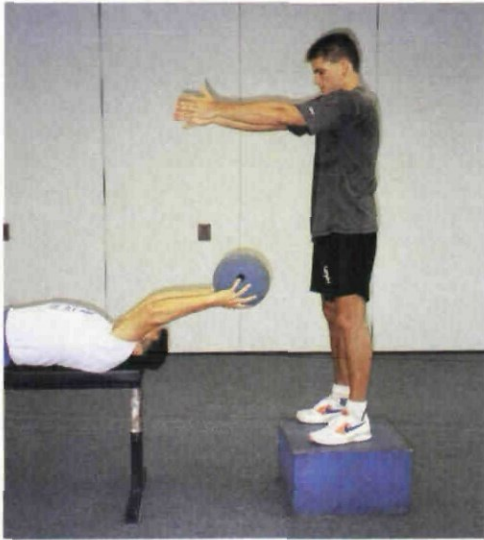


Figure 7: medicine ball exercise – two arm

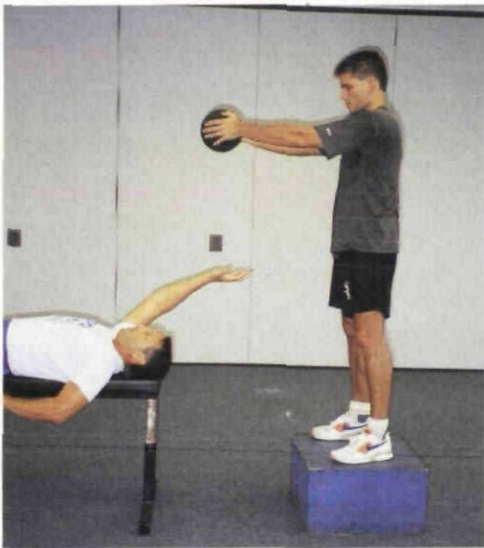


Figure 8: medicine ball exercise – one arm

35 Eccentric Medicine ball drop

When to use: As part of the weight training session immediately after an exercise like bent arm pullovers. Three sets of eight reps should be done.

How to: From a lying position (supine) on a bench, arms should be extended back, palms upwards, ready to catch a ball. A partner should stand on another bench or a high box and drop the ball down into the hands of the athlete's outstretched arms.

The ball should be allowed to stretch the arms down and then be immediately thrown back up to the partner. A two or three kilo medicine ball should be used for the two arm exercise and a one kilo medicine ball for the one arm exercise.

3.6 Tubing

External rotation

When to use: As a warm up before throwing. Three sets should be done (to burnout).

How to: The exercise begins from the '90/90 position' – with the upper arm at 90 degrees to the torso and forearm. The tubing should be attached in front of the athlete at shoulder height. It is important to stand far away enough from the tubing attachment so there is adequate tension. The tubing should be stretched in a controlled manner to external rotation while the 90/90 position is maintained. The starting position should then be returned to slowly (six seconds).

External rotation flicks

When to use: As a warm up before throwing. Three sets to burn out.

How to: 90/90 position (same as ending position of previous exercise). Upper arm at 90 degrees to the torso and the forearm. Tubing should be attached in front at shoulder height. Again, it is important that there is tension on the tubing. External rotation should be extended back into and the tubing moved forward and back rapidly through the last 15 to 20 degrees of movement until fatigue prevents further exercise.

Diagonal pattern

When to use: As a warm up before throwing. Two sets of 10 reps are adequate.

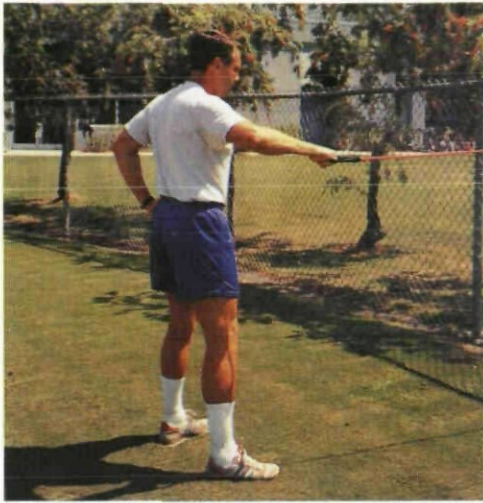


Figure 9A: External rotation – starting position

How to: The tubing should be attached just below waist height. There should be tension on the tubing and the arm should be held overhead in imitation of the release position. The tubing should be allowed to pull the arm and hand to the follow through position in a controlled manner.

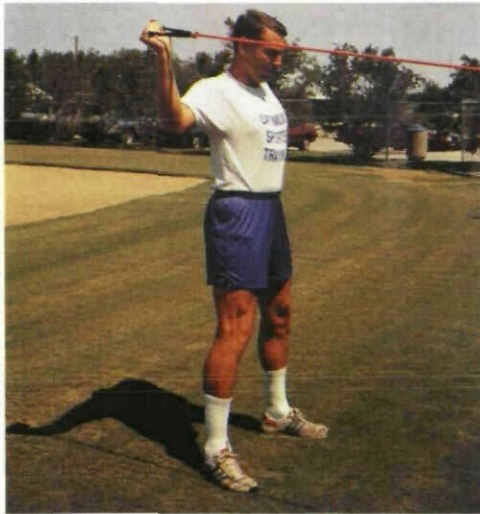


Figure 9B: External rotation – ending position



Figure 10. Diagonal pattern

2.6 Flips

When to use: As a warm-up before throwing or a cool-down after throwing. Two to three sets of 10 of each exercise would be adequate using an 800 gram or 1 kilogram javelin training ball.

How to: (Straight arm) Facing the direction of the throw the ball should be held in a pronated position. With a slightly bent arm, the ball should be flipped back up and over the throwing shoulder (see figures 11A and 11B overleaf).

How to: (Bent arm) Facing the direction of the throw the ball should be held in a pronated position with the upper arm parallel to the ground. The forearm should be at right angles to the upper arm and internally rotated. The ball should be flipped back up and over the throwing shoulder. (see figures 12A and 12B overleaf)

REFERENCE

KREIGHBAUM, E, BARTHEL, K.M. *Biomechanics - A Qualitative Approach for Studying Human Movement* (1990). Third edition. New York: Macmillan Publishing Company.

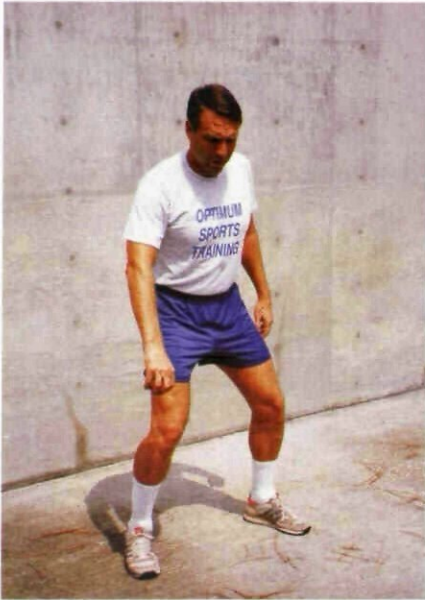


Figure 11A. Straight arm flip – starting position



Figure 11B. Straight arm flip – ending position



Figure 12A: Bent arm flip – starting position

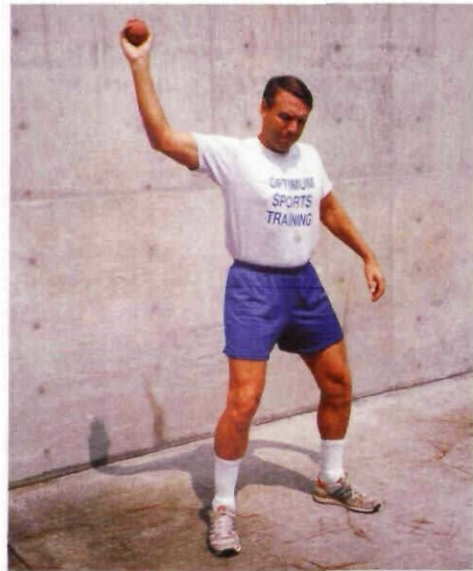


Figure 12B: Bent arm flip – ending position