Massage

Diagnosis and Management Dr. Benjamin Weeks & Sean Horan

Dr Benjamin Weeks:  Sean A. Horan
BPhty(Hons), BExSc, PhD  BExSc, MPhy

Dr Benjamin Weeks is a university lecturer and physiotherapist with a research interest in musculoskeletal injuries and bone disease. Benjamin has a personal interest in Track and Field Athletics stemming from his early years as a ‘Little Athlete’ and more recently as a Decathlete. He is a member of the Australian Physiotherapy Association, Sports Medicine Australia, and the American College of Sports Medicine.

Sean Horan is a physiotherapist with a research interest in the prevention and management of sports injuries among various athletes. Sean has worked as a physiotherapist in a variety of settings including private practice, private and public hospitals, and for various sporting teams including the British Olympic Team, Australian Baseball Academy, and the Professional Golfers Association of Australia.

Introduction

Massage can be defined as ‘manipulation of body tissues (i.e. by rubbing, kneading, or tapping) with the hand or an instrument for therapeutic purposes’ (Merriam-Webster, 2003). It is a technique that can be traced back thousands of years and is still widely employed today for myriad applications. In fact, the Bible explains that daily massage with olive oil and myrrh was undertaken as part of the beauty regimen of the wives of Xerxes (Esther 2:9-12) – a passage written in 493BC. Not long after in 460BC, Hippocrates wrote in his doctrine that ‘The physician must be experienced in many things, but assuredly in rubbing’. Interestingly, it is said that the ancient Greeks used massage as a means of inducing evil spirits to leave the body when one became ill (Calvert, 2002).

Despite its long history and frequent use by present day athletes, empirical support for the application of massage is limited, particularly in reference to sports performance. Moreover, the physiological mechanisms that might facilitate improved athletic performance are poorly understood. Given the often substantial time commitment required to incorporate massage into an athlete’s training schedule, it is appropriate that we question its efficacy beyond anecdotal observations.

It is the conviction of this article to evaluate the application of massage in the sporting context. We will firstly summarise the different types of massage before reviewing current knowledge of its effectiveness for improving sports performance and aiding recovery. Furthermore, practical key points for the athlete and coach will be highlighted.

Types Of Massage

Although the evolution of massage technique has been relatively stable over time, it was in Europe in the late 1800’s where it became systematised (Callaghan, 1993). Most western massage techniques used in sport today are based on this system (commonly referred to as ‘Swedish massage’). Of the many practiced massage techniques, the following are most commonly used in the application of a sports massage:

Effleurage: Slow rhythmic sliding or stroking movements over the skin with a smooth, continuous motion. It is performed in the direction of the venous and lymph systems and is commonly used to initiate and finish a session (Callaghan, 1993). Although hand contact should be broad and uniform, the pressure and tempo can be customised to the intention of the therapist. For example, when an athlete is about to compete, a firmer, more rapid technique may be employed.

Petrisage: A deeper technique that involves a variety of hand motions directed across the muscle – usually comprising the larger part of a single session. Soft tissue is compressed in small circular motions, from distal to proximal parts of a muscle. ‘Wringing’, ‘picking up’ and ‘kneading’ are specific petrisage techniques that involve the application of compressive and stretching forces to the larger, flesher areas of the athlete (Goats, 1994; Weerapong, Hume et al., 2005).

Frictions: A smaller amplitude motion, specifically directed at particular areas of a muscle with a penetrating pressure. The technique is normally applied with the therapist’s finger tips. It has been suggested that frictions be applied to the ‘damaged part’ of a muscle to assist in breaking down hardened and contracted areas (Goats, 1994). Frictions begin superficially and progress deeper over approximately 5-10 minutes.
Tapotement: Striking the soft tissue in a vigorous and rapid manner, generally with the lateral aspect of the hand. Although the physiological merit of this technique is questionable, anecdotally, the aim is to trigger cutaneous reflexes, increase vasodilation, and reduce swelling (De Domenico and Wood, 1997). Brisk tapotement or ‘hacking’ as it is sometimes called is commonly used as the final technique of a pre-event massage to prepare the athlete’s body and mind for competition.

Prior to performing massage on an individual, several important contraindications must be excluded. Although there are relatively few, applying massage when they are present can result in potentially damaging effects. Common contraindications to massage include malignancy, general illness, pregnancy, skin disease, acute infection, open wounds, soft tissue calcifications, and acute (or active chronic) inflammatory conditions (e.g., cellulitis) (Goats, 1994; De Domenico and Wood, 1997). These contraindications should be considered carefully prior to every application of massage.

Massage And Sports Performance

The use of massage as a recovery strategy is well known to most athletes and coaches; however, its application and usefulness for improving sports performance is not well recognised. Accordingly, few studies have investigated the effect of massage on measures of performance.

Proposed mechanisms by which massage results in improved performance include: enhancing blood flow to exercising muscles to improve oxygen delivery; increasing muscle temperature; and facilitating the buffering of blood pH and clearance of lactate (Goats, 1994; Weerapong, Hume et al., 2005). Direct measures of these physiological changes following massage are yet to be adequately substantiated.

Recently, Ogai and colleagues (2008) examined the effect of massage (i.e., petrissage) on cycling performance in a group of active female cyclists. Subjects performed two three minute high intensity sprints, separated by 35 minutes of rest. During the rest period subjects received either 10 minutes of petrissage-type massage or no massage at all. Interestingly, while massage did not lower blood lactate levels, it did significantly enhance power output (watts). Cyclists in the control group experienced no change in power output. Moreover, muscle stiffness and perceived lower limb fatigue were also significantly lower in the massage group. The authors proposed that neural rather than metabolic mechanisms played a greater role in enhancing cycling performance in this instance (Ogai, Yamane et al., 2008).

In contrast to the findings of Ogai et al. (2007), several other studies have published negative findings (Goodwin, 2002; Hunter, Watt et al., 2006; Arabaci, 2008). Goodwin (2002) demonstrated a decrement in performance following the application of massage prior to a jumping task. Specifically, vertical jump performance was significantly reduced when 10 minutes of effleurage and tapotement was added to the warm up (including stretching). It was suggested that reduced muscle stiffness and lengthening of the massaged muscle may have contributed to reduced performance via an altered length-tension relationship (Goodwin, 2002).

Hunter and colleagues (2006) observed a reduction in knee extensor force following massage in healthy young adult men. Quadriceps strength was measured at four different speeds using an isokinetic dynamometer, before and after 30 minutes of petrissage-type massage. Force output was significantly reduced following the massage intervention at only the two lower speeds. More recently, Arabaci (2008) reported significant reductions in vertical jump, speed, and reaction time in a similar cohort following the application of 15 minute Swedish massage protocol. The length of time it takes for the effects of massage to ‘washout’, however, remains unknown.

When absolute performance is less critical, for example, during training, massage might be useful to minimise perceptions of muscle stiffness and fatigue. As we reported in a previous article (Horan and Weeks, 2008), the acute effects of stretching have also been observed to reduce force production and sports performance (Power, Behm et al., 2004; Rubini, Costa et al., 2007). Although a depth of research into the performance effects of such preparatory activities is lacking, caution should be exercised when including vigorous massage immediately prior to competition.

Key Points: Massage and Performance
- Massage during training may reduce perceptions of fatigue
- Vigorous or lengthy massage prior to explosive type events may reduce performance

Massage And Recovery

Most coaches and athletes would consider recovery as an important component of their training regime. In theory, an adequate recovery between training bouts and prior to competition will maximise the athlete’s potential to perform and prevent the occurrence of injuries (Brunkner and Khan, 2000). It is not surprising then, that a number of strategies are frequently employed with the aim to enhance the recovery period. Such strategies include massage, stretching, active ‘cool down’, cryotherapy or contrast bathing, and hydration and nutrition – massage being one of the most common.

Improvements in physiological and biochemical parameters (Boone and Cooper, 1995), clearance of blood lactate (Bale
and James, 1991), and a reduction in delayed-onset muscle soreness (DOMS) (Hilbert, Sforzo, et al., 2003) have been proposed to result from massage following performance. Despite its extensive use, evidence to support the efficacy of massage for sports recovery is scant. Of the small number of published studies, most have only small sample sizes or are limited by poor methodological design.

Several trials have investigated the physiological effects of massage in recovery (Balke, Anthony, et al., 1989; Boone and Cooper, 1995; Rinder and Sutherland, 1995; Hemmings, Smith, et al., 2000; Monedero and Donne, 2000), however, only two of these observed improvements in performance (Rinder and Sutherland, 1995; Monedero and Donne, 2000). Interestingly, although Hemmings and others (2000) found no significant effect of massage on physiological parameters or performance in their cohort of amateur boxers, an improvement in perceived recovery was observed. It may be that the greatest benefit of post-exercise massage is a psychological one.

To our knowledge, only one study has observed a significant reduction in blood lactate following the application of a massage treatment alone (Bale and James, 1991). This study, however, included only nine male subjects with no randomisation to groups, and as such, findings are of limited value. More positive findings were reported by Monedero and Donne (2000) in their study of male cyclists, whereby a combination of massage and active recovery increased blood lactate removal.

Furthermore, the findings of the effects of massage on post-exercise muscle soreness following intense (or eccentric-type) activity have been equivocal. Few studies have reported a reduction in muscle soreness (Rodenburg, Steenbekk et al., 1994; Smith, Keating, et al., 1994; Farr, Nottle, et al., 2002; Hilbert, Sforzo, et al., 2003). In each case, at least 15 minutes of effleurage and or pettrissage was applied and the treatments took place soon after cessation of exercise (i.e. within two hours). Perhaps the most promising results for massage for muscle soreness were reported by Rodenburg and colleagues (1994), who observed a reduction in delayed-onset muscle soreness (DOMS) and a concurrent improvement in maximal isometric force; however, warm up and stretching were also included in the treatment.

Weerapong and colleagues (2005) in their review of the effects of massage on recovery concluded that more research is required to determine if massage is truly beneficial in enhancing recovery. In fact, a more recent critical review of massage for muscle recovery suggested modest positive outcomes following very intense exercise, but similarly concluded that further investigation was needed (Best, Hunter, et al., 2008).

**Key Points: Massage and Recovery**

- Little evidence to suggest massage will increase lactate clearance
- Massage immediately after the event may reduce muscle soreness
- Massage in combination with an active recovery may be more effective than massage alone

**Massage And Psychology**

In recent times, the contribution of the modern athlete's psychological state to athletic performance has received increased recognition. The application of massage is thought to improve an athlete's psychological state by reducing anxiety, instilling relaxation, and improving recovery after exercise. Although sometimes only modest physiological effects are evident following massage, there are a number of reports of heightened perceived recovery and relaxation in athletic populations (Weinberg, Jackson, et al., 1988; Hemmings, 2000; Hemmings, Smith, et al., 2000).

As is the case for massage studies on performance and recovery, reports on the effect of massage on psychological measures are limited by small sample sizes and other methodological flaws. Several studies, however, maintaining at least a controlled or cross-over study design have been published. One of the largest massage trials was conducted by Weinberg and colleagues (1988) who reported significant improvements in mood and anxiety following the application of full body Swedish massage (mainly effleurage) in 279 university students participating in a variety of sports. A much smaller study, however, by Zeitlin and co-workers (2000) did not find any improvement in anxiety following the application of a similar massage technique in medical students. Hemmings and others (2000a; 2000b) have published several reports of greater perceived recovery in boxers who received effleurage and pettrissage. Further positive findings were observed by Leivadi and colleagues (1999) who found that massage improved mood and anxiety, and reduced salivary cortisol levels (a measure of stress) in a group of dance students.

In consideration of the necessary mental agility of the 'modern athlete', these positive psychological outcomes of massage should not be overlooked. Improvements in the breadth and quality of massage research are, however, critical to support firm recommendations of its use.

**Key Points: Massage and Psychology**

- Massage may improve mood, anxiety, and perceived recovery following strenuous physical activity

**Conclusion**

Positive support for the application of massage to improve performance and enhance recovery is not overwhelmingly apparent in the scientific literature. It appears that the most positive effects of massage are garnered following activity rather than before. With the exception of vigorous massage immediately prior to 'explosive-type' events, negative or deleterious effects of massage are also unremarkable. Nonetheless, it would be advisable that the introduction of massage into an athlete's program take place in the off-season and any change to massage type or dosage be done so gradually, such that its specific effect on the athlete is recognised prior to important events. Finally, it is important to consider the potential psychological benefits, as it may be via this mechanism that massage provides the elusive, but important 'edge' to an athlete’s performance.
References


