The Interest of Osteopathic Treatment for Performance Optimisation and Injury Prevention.

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Summary

Introduction

For centuries, athletes have been training in order to achieve the best performance. Coaches and scientists experimented and analysed all kind of exercises, programs, and methods to finally build a structured way to lead sportsmen to their peak of performance.

However, with the increase of training load for professional athletes, we could observe an increase of sport related injuries. Therefore, teams had to implement complementary services in the athlete's life, such as optimal nutrition, mental preparation, and manual therapy.

Along with the rise in demand for a way to answer to that problem, Osteopathy arouse a growing interest and the understanding of its mechanisms became more popular. A better understanding of the human body, a development of an integrative vision of the body and its physiology and an easier access to information where the foundations that brought Osteopathic treatment to a first plan and offered the opportunity to show great results with a wide scope of the population. From sedentary people to professional athletes, the knowledge provided by Osteopathy allowed adaptive and easily applicable treatments.

Quickly, Osteopathic treatments found a place among sport teams due to the preventive approach and the use of advanced manual therapy skills.

Within the field of athletics, osteopathic manipulative techniques allow for quick changes in improving movement competency with very little tissue work.

Also, Manual Osteopaths who integrated sports team and working with a scientific approach managed to show the efficiency of their treatment due to a proper understanding of human biomechanics and performance.

Maintaining connective tissue stiffness is as important as releasing certain muscles for effective force transfer and elastic energy storage. Understanding mechanisms for injury and limiters to performance add a significant value to the work done alongside with coaches and other medical practitioners in optimising performance.

As well as helping to reduce aches and pains, osteopathy could also assist in injury prevention. Professional athletes throughout the world now have osteopaths on their team, helping them to keep their body properly aligned and functioning optimally for competition, as well as recommending a range of stretching exercises to prevent injury through muscle or joint strain.

Osteopathy is based on the philosophy that the body functions most efficiently when it's in alignment. Microtraumas and light muscles strain, as much as very little attention is given to

them, can lead to imbalances, slight misalignment and a small difference in weight bearing posture. In most cases, the human body adapts and dysfunctional motor patterns become normal, however, when taking sport seriously, the physical demands involved can lead to susceptibility to injury or affect performance in some way. For professional athletes, even the smallest problem can be massively amplified.

Osteopathic Treatments approach mainly include:

Superficial Fascia Release: it helps to improve superficial fascia mobility, fluidity. It prepares the body for deeper manual treatment and decrease sensitivity in the soft tissue and myofascial trigger points.

Myofascial Release (Muscles and Tendons): technique targeting deeper tissues and trigger points, usually performed as strongly as the patient can tolerate. This technique enhances muscles and tendon flexibility, blood supply, lymphatic system circulation and muscle oxygenation. It definitely plays a strong role in positive changing in the central nervous system and return normal balanced neurophysiology of the muscles and tendons.

Diaphragms Release: It is indirect technique that could be considered as a part of fascia release, or visceral manipulation or cranial osteopathy. It involves mainly seven diaphragms which are: pelvic diaphragm, abdominal diaphragm, thoracic inlet, hyoid bone, sub occipital area and tentorium at parieto-temporal suture level. Releasing these diaphragms helps balancing the body and return homeostasis of the body. It helps to normalise the inter abdominal, pelvic, thoracic and cranial pressures. Diaphragm Release also allows better ribcage expansion a enhance breathing.

Joint Mobilisation: It is indicated when there is limitation in range of motion of the joint or capsular restriction. It could be used with routine general osteopathic treatment.

Muscle Energy Technique (MET): It will help to improve muscle flexibility, increase circulation, decrease muscle tension and decrease myofascial trigger points and decrease fatigue of the body.

Visceral Manipulation: According to Jean-Barral the French Osteopathic Pioneer who re-invent the visceral manipulation concept, 90% of chronic musculoskeletal problem is associated directly or indirectly to visceral dysfunction. And visceral tissues should be assessed, palpated for any restriction with the patients who experience acute or chronic pain.

Craniosacral Therapy (CST): This will help decrease headache, sleeping disorders and normalising autonomic nervous system. According to the recent studies that CST helps to reduce the pain, decrease depression, improve sleeping and improve quality of life for patient who diagnosis with Fibromyalgia.

High Velocity Low Amplitude Manipulation: An Osteopathic technique employing a rapid, therapeutic force of a brief. duration that travels a short distance within the anatomic range of motion of a joint and that engages a restrictive barrier in one or more planes of motion to elicit release of restriction.

The Injury mechanism

1- The interest of kinetic chain

The human body continues to achieve amazing athletic feats of precision, power and speed. How does a baseball pitcher accurately throw a baseball at over 100mph, a sprinter run 100 m in under 10 seconds or a high jumper leap well over 2 m? At highest level, what separates the good from the great? Many of these answers can be found by exploring the concept of the human kinetic chain.

The concept of the kinetic chain originated from a German engineering scientist named Franz Reuleaux to describe how components of a system that are interlinked by pin joints can be affected by movement of just one component. In sport, the kinetic chain concept is often used when describing athletic movements, such as throwing, running and jumping.

While movement technique is key to kinetic chain performance, equally important is the need for well-developed basic physical attribute, such as balance, stability and strength. For example, a stable trunk is required for sprinting performance, and strong periscapular muscles are important to provide a base for energy to be transferred effectively during a boxer's punch.

When a significant 'force leak' is present, the movement speed is compromised, and for the athlete to increase their power and speed, other muscles must be recruited to a greater extend in order to make up for the energy leak in the system.

In endurance sports, conservation of energy through efficient movement is critical to success. Leaks in the kinetic chain can be highly detrimental, as the musculature must work harder to make up for the lost energy, accelerating fatigue and compromising performance.

2- The ineffective kinetic chain and injury

Fatigue has been shown to reduce proprioceptive capacities in the shoulder, alter scapulothoracic and glenohumeral motion, increase tibial translation in healthy knees, reduce postural control and change impact loading characteristics when running

Therefore, fatigue features as a significant injury risk factor in endurance-based, repeat-effort sports, which is why optimising the kinetic chain is so important.

Dysfunctional movement mechanics can increase stress on joints and soft tissues of the kinetic chain. In particular, poor utilisation of proximal segments to generate or transfer energy can place greater stress on distal segment. For example, elbow pathologies in tennis are often the results of technical problems on the serve, particularly a lack of an effective leg drive and a falling away from the ball, resulting in the elbow joint taking on greater valgus forces. In the lower body, excessive rear foot eversion and hip abduction has been shown to be a risk factor in people with patellofemoral joint pain, demonstrating how movement

aberrations at proximal and distal linkages can produce abnormal forces and stresses on a joint.

This concept can also be applied to explain how the body can absorb forces during movement deceleration, such as landing from a jump. Deceleration of the body and the eccentric muscle action can place excessive forces on tendons, making the athlete susceptible to the development of tendinopathies. Optimising the use of the kinetic chain to absorb forces across multiple linkages will reduce the potential for overload. Stiff landing strategies and altered hip sequencing upon landing have been shown to be more present in athletes with patella tendinopathy.

Clearly, then, optimising the human kinetic chain is an important component in injury prevention and rehabilitation. The implementation of Osteopathic treatments, involving assessment, soft tissue release, joint manipulation and mobilisation can therefore be a complete game changer in making the kinetic chain more efficient, and by consequence, decreasing the risk of injuries for athletes.

The effect of Osteopathic Treatment on athletes

1- Restoring optimal range of motion

As discussed previously, inefficient kinetic chain can potentially be harmful for the athletes. Osteopathic Treatment, especially soft tissue release and mobilisation has been showing to improve range of motion and potentially allow athletes to move with ease and improve their movement quality.

The neuroadaptation due the soft tissue mobilisation on the muscles allow a better gliding of the sarcomeres and a safer function of the muscles. That way it acts as a potential restart for the neuromuscular units connected to the treated areas.

Soft tissue release has been shown to temporary improve muscle length. Some movement, seen in the frame of therapeutic exercises, can sometimes be impossible to realise due to the lack of available range of motion. Following Osteopathic treatment by therapeutic exercises allows the body to perform a movement with more ease, therefore, enhance the outcome of the exercises.

2 -The psychological impact

People suffering from pain tend to develop fear avoidance syndromes, when they avoid a certain range of motion, the activation, or stretch of certain tissue. Due to the analgesic effect of Manual Therapy, it has been shown that Soft Tissue Release and Mobilisation work as a great tool to decrease fear avoidance and provide a safe environment for patients to move towards previously painful range. Knowing that a professional can provide release even in a state of acute pain works well with the fact that the patient understands what could be safe or beneficial for him/her to do even if it involves eventual discomfort.

3 -Neuromodulation for pain perception

Athletes can be subject to acute and chronic pain and Osteopathic treatment is a passive, skilled movement applied by clinicians that directly or indirectly targets a variety of anatomical structures or systems, which is utilized with the intent to create beneficial changes in some aspect of the patient pain experience. Collectively, the process of manual techniques is grounded on clinical reasoning to enhance patient management for musculoskeletal pain by influencing factors from a multidimensional perspective that have potential to positively impact clinical outcomes. The influence of biomechanical, neurophysiological, psychological and nonspecific patient factors as treatment mediators and/or moderators provides additional information related to the process and potential mechanisms by which soft tissue release may be effective.

Therefore, the effects of manual therapy techniques are mainly observable at two levels:

Biomechanical:

- Measurable passive range changes in targeted tissues
- Some structural changes occur within the targeted tissues in response to the treatment

Neurophysiological:

- Immediate changes in neurophysiological function observed after treatment
- Reduction in inflammatory markers
- Decreased spinal excitability and pain sensitivity;
- Modification to cortical areas involved in pain processing;
- Excitation of the sympathetic nervous system.

We can see those outcomes as a great value for curative treatments, a help for athletes to overcome injuries or pain they encounter throughout their career. However, Osteopathic Treatments can also be applied on a wider scope of practice. We can widen its application to preventive treatments, which is potentially the most valuable asset of Osteopathy when practiced with athletes. The best way to ‘fix’ an injury is to not get injured, and at a

professional level, an injured athlete is an athlete that takes the risk of ending his career, consequently, a significant amount of the athlete's time is dedicated to lower the risk of injury.

4- Recovery enhancement

For an optimal recovery, an athlete mainly need rest, and efficient blood and nutrient supply in the fatigued areas and an efficient lymphatic system to prevent potential inflammation in the body.

Osteopathic treatment often involves soft tissue work, lymphatic drainage techniques and recovery modalities such as heat and cold therapy. These tools offer a wide range of options for the therapist to enchance recovery mechanism for the athletes and prevent from:

- Tissue overloading
- Tendinopathies developpement
- Muscle tears
- Delayed onset musle soreness

5 -Detection and treatment of dysfunction in early stages

A regular consultation with a Manual Osteopath involves general and specific assessments. Some of those assessments are passive and active range of motion, special orthopedic tests, kinetic chain analysis in specific movement. Being able to record and track the results of these test on a regular basis can potentially allow the clinician to detect the apparition of restrictions, or weaknesses within the athletes. Those results would make sure that the therapist knows on what to focus on with his patient, but also potentially corelate a change in the athlete's training or lifestyle with the apparition of body dysfunctions that could increase the risk of injury.

An increase of training load, or the integration of a new training program can then be adjusted and adapted to the needs and goals of the athlete, not only performance wise, but also to make it beneficial for the athlete's health and longevity.

6 -The Athlete's longevity

As discussed earlier, the implementation of Osteopathic treatment within the athlete's lifestyle drastically reduces the risk of injury. Also, these past decade, an interesting factor has been observed in the professional sport frame: athletes are having a much longer career, retire up to ten years later than their previous generation and manage to maintain peak performance for a substantial amount of time compared to their previous peers.

It is, nowadays, not uncommon to see professional athletes –in addition of the services provided by their team- investing in physiotherapy modalities, corrective and therapeutic exercises. Athletes have now understood the importance of longevity in their career and make sure their body as functioning at an optimal level.

Conclusion

Osteopathic treatment, or in a more general way, recovery and therapeutic manual therapy have had a significant impact on sports. Any team staff not being able to provide those services for their athletes has become obsolete and more and more recreational athletes now make the step and invest time, finances and energy in treatment.

I will conclude this by quoting a Pierre Dandin, a character in 'Les Plaideurs' by Jean Racine: 'he who wish to travel far take care of his mount' as an analogy of the benefits that Osteopathy can provide to the patients, helping the perform their best, pain free and healthy.

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