

Evolving Sports Medicine Treatments

The following are treatments that are used in Sports Medicine. More information about what they are used for, how they work and the evidence behind them is explained below:

- **Extracorporeal Shock Wave Therapy (ESWT)**
- **GTN patches**
- **Hyperbaric oxygen**
- **Low frequency Ultrasound (*Exogen*)**
- **Muscle stimulation (*Compex*)**

Extracorporeal Shock Wave Therapy (ESWT):

This is a non invasive treatment often used to treat tendinopathies in the foot and ankle (e.g. Achilles tendinopathy), knee (patella tendinopathy), hip (trochanteric bursitis) elbow (tennis/ golfer's elbow), shoulder (calcific tendinitis) and heel pain (plantar fasciitis). It may also be useful in relieving pain from shin splints.

Patients will not need to stay overnight in hospital for the treatment and it is carried out in a specialist clinic. ESWT consists of high energy ultrasound waves being focused at the troublesome area using a hand held probe. It is thought that the high energy from the sound waves will encourage new blood vessels to form in order to increase blood supply to the damaged area. It will also stimulate inflammatory chemicals in the body to be released, which is the body's way of healing itself.

An ultrasound scan is usually carried out prior to treatment to identify the optimal area for treatment. The treatment sessions last around 10-15 minutes and an average of 3 sessions are usually needed. Pain should reduce after each session and a significant difference in symptoms should be felt for around 2-3 months after the final session. Side effects are minimal, however reddening of the treated area, slight bruising and possibly triggering of migraine have previously been reported.

Research suggests that ESWT will improve symptoms in:

- Up to 34-88% of people with plantar fasciitis. 75.3% of patients continued to be symptoms free after 1 year.
- 68-91% in those with tennis elbow (lateral epicondylitis)
- 78-91% in patients with calcific shoulder tendinitis
- 73.5% - 87.5 in patients with patella tendinopathy.
- Similar favourable results were found in Achilles' tendinopathy.

References:

Haake M, Boddeker IR, Decker T, Buch M, Vogel M, Labek G, Maier M, Loew M, Maier O, Boerries O, Fischer J, Betthasuer A, Rehack HC, Kanvsky W, Muller I, Gerdsmeyer L, Rompe D. 2002. Side effects of extracorporeal shock wave therapy in the treatment of tennis elbow. Archives of Orthopaedic and Trauma Surgery. 122(4) p222-8

Wang CJ. 2012. Extracorporeal shockwave therapy in musculoskeletal disorders. Journal of Orthopedic Surgery and Research (7)11 [online] <http://www.josr-online.com/content/7/1/11> Accessed 12/09/14

Glyceryl Trinitrate (GTN) patches

GTN is a drug that is commonly used throughout medicine and is often to help chest pain related to the heart (Angina). In addition to this, it may also be used in Sports Medicine in a patch form, to treat chronic and acute tendon disorders, for example in Achilles tendinopathy and tennis elbow.

Patients will not have to come in to hospital to use the patch. It is applied directly to the painful area. It was found that the patches are effective in improving pain and encouraging the healing process. They are most effective when used in combination with a specific exercise rehabilitation programme. Advice on exercises and how to do them can be sought from a Sports Medicine doctor or physiotherapist. The patches may cause low blood pressure, flushing and dizziness in 70-80% of patients and a small number of patients have reported a rash where the patch was stuck to the skin. For this reason it is often useful to cut the patch into quarters and start with $\frac{1}{4}$ patch and then increase by $\frac{1}{4}$ every week. This is to reduce the side effects as the body becomes more tolerant to the drug.

Research has suggested that GTN patches have had a healing effect in long term and short term:

- Achilles tendinopathy
- Wrist extensor tendinopathy
- Supraspinatous (shoulder) tendinopathy
- Chronic lateral epicondylitis (tennis elbow)
- Chronic patellar tendinopathy (Jumper's knee)

References:

Paloni JA, Murrell GA, Burch RM, Ang RY. 2009. Randomised, double blind, placebo- controlled clinical trial of a new topical glycerol trinitrate patch for chronic lateral epicondylitis. *British Journal of Sports Medicine* 43 (4) p299-302.

Zwerver J, Steunebrink M, Brandsema R, Groenenboom P, Akker- Scheek ID, Weir A. 2013. Topical glyceryl trinitrate treatment of chronic patellar tendinopathy: a randomised, double blind, placebo controlled clinical trial. *British Journal of Sports Medicine* 47 (9) p34-39.

Hunte G, Llyod- Smith R. 2005. Topical glyceryl trinitrate for chronic Achilles tendinopathy. *Clinical Journal of Sports Medicine* 15(2) p116-7

Paoloni JA, Appleyard RC, Nelson J, Murrell GA 2005. Topical glyceryl trinitrate application in the treatment of chronic supraspinatous tendinopathy: a randomized, double- blinded, placebo controlled clinical trial. *The American Journal of Sports Medicine*. 33(6) p806-813.

Hyperbaric Oxygen

Hyperbaric oxygen was introduced in sports medicine to encourage a quicker recovery from injury and to reduce short and long term effects of the injury. Research into the effectiveness of the treatment is still ongoing, however small studies that have taken place so far have shown it to have useful results.

The therapy can be used alone or in conjunction with other therapies. Pure oxygen (100%) is administered at pressures greater than atmospheric pressure and takes place in a room specially designed for this (monoplace hyperbaric chamber). However, occasionally the oxygen can be administered through a mask or hood (multiplace hyperbaric chamber). The aim of the therapy is to increase the level of oxygen getting to the injured tissues in order to increase oxygen supply, reduce swelling and create new blood vessels. This is thought to enhance several phases of healing, (the inflammatory phase, proliferative phase and remodelling phase).

Evidence shows it may improve pain and function, usually in combination with long standing conventional therapies in the following disorders:

- Non-union fractures (broken bones that have not healed as expected)
- Ligament injuries (eg. ACL and MCL injury, ankle sprains)
- Muscles strains/tears

It may also encourage quicker clearance of lactic acid and ammonia, which are waste products from exercise induced muscle fatigue. As a result it is associated with shorter post exercise recovery periods.

Reported side effects have been low. Complications can include oxygen toxicity, damage to the ear from high levels of oxygen and anxiety due to the confined nature of the hyperbaric chamber; however these are well controlled with acclimatisation sessions prior to the treatment.

References:

Barata P, Cervaens M, Resende R, Camacho O, Marques F. 2011. Hyperbaric oxygen effects on sports injuries. Therapeutic advances in Musculoskeletal Disease. 3(2) p111-121

Hyperbaric oxygen therapy and its role in sports medicine. 2003.[online] <http://www.nchbo.com/wp-content/uploads/2010/07/Hyperbaric-Oxygen-Therapy-and-its-Role-in-Sports-Medicine.pdf> cited 12/09/14

Exogen

NICE guidelines have recognised *Exogen* ultrasound treatment in managing long bone fractures, for example bones of the thigh (femur) and shin (tibia) that have not healed properly after 9 months. This offers an alternative to surgical treatment. *Exogen* may also be used in addition to non-operative orthopaedic management (eg. Plaster casts and splints) in fracture that are slow to heal after 3months.

It is a non invasive treatment and patients are given an ultrasound device to take home so they can administer it independently. If the patient has a cast on over the broken bone, a hole will be cut in the cast to allow the probe to be placed directly on to the effected site. Pulses of low intensity ultrasound waves are directed at the broken bone. This encourages the release of proteins and growth factors this encourages production of new bone. Once the new bone has formed, the *Exogen* ultrasound also promotes quicker strengthening of the new bone. The Treatment sessions last 20 minutes and treatment may be ongoing for several weeks to months. Side effects are minimal with a small number of patients experiencing local irritation from the ultrasound sound gel, and one case of pacemaker interference from the sound waves.

The treatment may also have a place in healing stress fractures, commonly seen in athletes. Evidence is varied and more studies are needed, however there is suggestion that *Exogen* speed up stress fracture healing in athletes that can not afford time out of training.

References:

- National Institute for health and care excellence. 2013. *Exogen* Ultrasound bone of healing system for long bone fractures with non union or delayed healing. [online] <http://www.nice.org.uk/guidance/mtg12> cited 28/09/14
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- Warden, SJ. 2003. A new Direction for ultrasound therapy in sports medicine. *Sports Medicine* 33(2) p 95-107.

Muscle Stimulation (Compex)

Muscle stimulation works by causing contraction of a muscle using small doses of electrical impulse. It can be used for muscle strengthening and during recovery in training athletes. It is also used in rehabilitation following an injury, for example to strengthen quadriceps muscles after a ligament injury of the knee, as well as for pain relief. In this situation regular induced muscles contraction prevents wasting of the muscle, which often arises from lack of activity. The frequency of electrical impulses will be determined by the individual's response to the electrical stimulation and is usually between 50-100Hz. It will be enough to make the muscle contract, but should not cause pain.

Electrical impulses can be administered by electrodes through a machine which the athlete can use at home. *Compex* is a Swiss company that have developed the treatment and their muscle stimulation machines are commonly used by sports medicine doctors and physiotherapists. It allows muscles to be worked without putting strain through the joints and targeting a specific group of muscles. In addition to controlling pain and strengthening muscles during rehabilitation, evidence cited by Compex has also shown that muscle strengthening in non- injured athletes can translate to an improvement in power and performance throughout a variety of sports. It may also provide an alternative for active recovery after a high intensity work out, as studies show the Compex device clears blood lactate levels as effectively.

More information can be found on their devices via the Compex website:

http://www.compex.info/en_UK/index.html

References:

Hasegawa S, Kobayashi M, Arai R, Tamaki A, Nakamura T, Moritani T. 2011. Early implementation of electrical muscle stimulation to prevent muscle atrophy and weakness in patients after anterior cruciate ligament reconstruction. *Journal of Electromyography and Kinesiology*. 21(4)p 622-630

Compex. 2014. Electrostimulation: Clinical studies available. [online]
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