TREATMENT OF ACHILLES TENDONITIS WITH MEDICAL CARBON DIOXIDE INSUFFLATIONS

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INTRODUCTION

Carboxitherapy was first used in 1930 in France at the Royat (Clermont-Ferrand) spa, where it was used to treat people with diseases of the venous system.
Carbonic waters, used in Spas, are, per definition, rich in CO2 (over 300cc per litre).
The presence of this substance in the water produces a feeling of warmth on the skin, which, due to the opening of the capillaries, reddens.
Subcutaneous Carbon Dioxide Insufflations (SCI) are used almost exclusively in Central Europe as a treatment methodology in Physical Medicine and Pain Therapy, using gas from natural sources or injecting medical, purified gas from Carbon Dioxide (CO2) tanks.
Unlike medical CO2 gas, which contain exclusively purified CO2, the gasses used in pools and baths, contain small amounts of other compounds (usually less than 5% of the volume), such as N_2, Ar, He, O_2, H_2, H_2S o CH_4.

METHOD

The gas can be applied through the skin even at a medical clinic. In this case the gas is injected into the subcutaneous tissue with fine needles.
A device connected to a medical CO2 cylinder is used. This makes it possible to supply the gas in a controlled manner and to programme its exit according to the resistance of the patients' skin tissues.
During the administration a "swelling" of the tissue becomes visible, sign of the remarkable diffusing capacity of CO2. A reddening of the skin together with a feeling of warmth follow, sign of the vascular activity of the gas.

There are many indications for CarboxyTherapy. Obvious benefits are appreciated in patients suffering from venous insufficiency of the lower limbs and as a matter of fact, even from the first administrations of subcutaneous CO2, it is possible to notice a clear improvement of the symptomatology related to venous stasis.
There are a number of health claims: "headaches" (including migraines), a number of musculoskeletal disorders, "afflictions"(mostly to the neck and back, arthrosis, and enthesopathy), and "peripheral obliterative arteriopathy" are all conditions for which SCI is indicated.
Carbon Dioxide insufflations have a mainly analgesic effect. However the way it works is not known and some authors suggest that the analgesia observed is the result of a local increase in subcutaneous blood.
The authors interpreted their results as proof of a specific vasodilator action of CO2. Nowadays CO2 is widely accepted as a natural vasodilator with local properties.
Many cases of Achilles tendinopathies are brought to my attention. These are usually related to people who either play sports at amateur level –mostly football, basketball and volleyball players- or sedentary people who are overweight and have a metabolic syndrome.
As a matter of fact among the main causes of Achilles tendonitis we may find: repeated microtrauma due to intense sport efforts and to insufficient training of the athlete, insufficient muscle lengthening, a premature return to sport activity after a period of inactivity, a very hard playing field, a sudden increase in the intensity of the sport activity or unsuitable footwear, no muscle warming up activity, a lack of compensation training, ignoring the first symptoms.
For non-athletes patients suffering from Achilles tendinopathy the causes are manifold, in particular: old age, metabolic disorders (i.e. diabetes or gout), collagen related diseases (systemic lupus erythematosus; rheumatoid arthritis, etc), repeated cortisone injections or the intake of medicines such as antibiotics (ciprofloxacin) or statins, congenital factors, (pronation or supination of the foot), a muscle structure in with an excessive agonists / antagonists ratio (the tendon works also to compensate the bad muscles), overweight or obesity.

The main symptoms of Achilles Tendonitis are a dull ache along the posterior portion of the tendon, towards the heel.
At times the tendon appears bruised, swollen and oedematous, painful during foot movements, especially

when standing on the tip of one's toes, thus elongating the tendon. Mobility of the ankle is limited during flexion and extension movements and during abduction-adduction movements.
The diagnosis is based on objective examination, but most of all it depends on diagnostic procedures such as muscle and tendon ultrasound which highlights the areas affected by necrosis and/ or breaks in the tendon substance.
It is the first exam of choice as it is effective, cheap, non invasive nor damaging for the patient and it is easy to perform. It is also used for the patient's follow-up, from the tendon lesion o its healing.
MRI is useful to complete the diagnostic process, thanks to the amount of complementary information it can supply concerning the bone and the soft tissues.
The treatment of Achilles tendonitis is based on conservative therapies and, depending on the stage of the pathology one may avail oneself of different therapeutic procedures.
A very important element is promptness of intervention. Pain in the Achilles area must never be treated lighty, for while the tendon is only slightly inflamed the treatment is of a certain kind, but the approach is completely different if there is a break!
My approach has been mostly conservative. I have inoculated subcutaneously, along the length of the tendon, if it isn't degenerated, removing the cause of the inflammation. A tendonitis healing time is about one month.
Healing time increases in situations like for example when an athlete continues to try even in presence of a partially painful tendon, or when a sedentary person refuses to lose weight.
Healing time decreases substantially if we improve microcirculation, by creating true angiogenesis and if we produce vasodilatation by CO_2 gas insufflations and if we also stimulate tissue oxygenation thanks to the Bohr effect.

CONCLUSIONS

The effects of Carboxytherapy are: vasodilatation of the tiny subcutaneous vessels which in many pathologies do not work (microcirculation reactivation), arteriolar vasodilatation and increase of sphygmic capacity, true neo-angiogenesis, a tissue oxygenation above 70%, fibrotic tissues separation, scar treatment, surrounding tissues revascularization, (as an effect of the fibrin present in the areas affected by pain), circulation increase in speed, erythrocyte deformability increase.
In the presence of CO_2 arterial vessels naturally tend to dilate causing an increase in the local tissue blood flow. Research carried out with Laser Doppler Flow by Curri and other authors has demonstrated an increased arteriolar and meta-arteriolar vasodilatation and an increased arteriolar and meta-arteriolar sphygmic capacity.
Some authors have suggested that the analgesia is a result of a local increase of subcutaneous blood flow and of the stimulation of local receptors, others speculate on the inhibitory secondary influences of inflammatory cytokines, and other yet on the possibility of direct action with the inhibition of trigger points
The choice of points to be treated -which I have called pain points- in some cases correspond to trigger points. These vary depending on the disease or trauma suffered by the patient
Also the choice of the type of treatment varies and in particular: the amount of injected CO_2, the selected flow, the gas temperature in the moment of perfusion, the greater or lesser depth of the localization (subcutaneous, intradermal, in the tendon sheath, in the articular capsule) all vary according to the pathology.

The search for trigger points to inoculate in Achilles tendonitis varies from case to case. I inoculated in total from 50 to 100 ml of Carbon Dioxide preheated to 41 degrees Celsius with a flow rate of 100 ml per minute. Treatments took place twice a week.
Patients noticed beneficial effects right from the first treatment. Recommendations were to rest, refrain from physical activities during at least the first 15 days and, if the tendon is oedematous, use ice.
Already after the first due weeks improvements are noticeable both in pain level and joint functionality, without having used steroids or anti-inflammatory drugs.
All patients had charts showing the muscle elongation exercises they had to do at least 4 times a day.
Right from the start, but most of all when physical activity was resumed, particular attention was given to the elimination or decrease of the causes that had led to the tendonitis. After one month Carboxy treatments were reduced to once a week.