

# EVALUATION OF THE EFFECTIVENESS OF CO<sub>2</sub> INSUFFLATION (GAS-ANTALGIK) IN THE TREATMENT OF ACUTE PAIN

*Nowadays Carboxytherapy is used mostly in Cosmetic Medicine. It has an excellent lipolytic effect, and is equally effective on microcirculation, localized adiposities, PEFS (edematous-fibrosclerotic panniculopathy) and on many other conditions.*

Carboxytherapy is a treatment which originates from thermal medicine. Starting from 1932, the administration of carbon dioxide, mostly transcutaneously by using carbon dioxide baths and showers, but also subcutaneously, was used in the Royat Clermont-Ferrand spas (France). This is a small spa in the Auvergne region specialized in the treatment of organic and functional peripheral vasculopathies and their progression in patients suffering from arteriopathies.

A very high number of patients were subjected to this treatment for vascular pathologies and the studies performed in this field demonstrated that there is a positive effect in arteriopathic subjects, as there is an increase in the walking time.

Now it is used mostly in Cosmetic Medicine. It has an excellent lipolytic effect on localized adiposities, and on PEFS (edematous-fibrosclerotic panniculopathy). It has an equally good effect on stretch mark related skin blemishes. It also acts on the face in the area around the eyes, reactivates microcirculation and in the chin area it reduces localized adiposities. In Angiology, it is used successfully with patients suffering from

arteriopathic problems, Raynaud's phenomenon, acrocyanosis, lymphatic stasis, diabetic ulcers; in dermatology, for the treatment of psoriasis, scleroderma, and alopecia.

Carbon dioxide insufflation has also a systemic action which causes a lowering of arterial blood pressure, induces bradycardia and coronary vasa dilatation. Carboxytherapy consists in the percutaneous injection of the gas. Carbon Dioxide is made up of one carbon atom tied to two oxygen atoms. Whilst the dry gas baths, the carbon dioxide water baths, the dry carbon dioxide showers and the carbon dioxide water showers are thermal treatment treatments, subcutaneous injections is a method which can be performed exclusively in a medical clinic.

It is performed using an electric nozzle connected to a tank of medical carbon dioxide which not only makes it possible to dose the gas, but also ensures a certain degree of purity of the gas. A series of filters purify the CO<sub>2</sub> from possible contaminants such as, for example, Clostridium Sporogenes spores. The gas, dosed by a central device and purified by a series of filters, arrives through a regulator infusor set which terminates with a 30 G 13 mm needle.

The activation of this sophisti-

cated device starts the administration of Carbon Dioxide. The gas is allowed to exit from the needle for a few seconds, to be sure that the duct of the infusor is saturated of CO<sub>2</sub> and at the same time cleaning the circuit which carries the gas from the tank to the needle. Then the needle is placed subcutaneously, creating a gradual subcutaneous emphysema. The aim of this study has been to measure the analgesic and therapeutic effect of carbon dioxide insufflations in patients suffering from osteo-arthro-myofascial benign pain. Different authors have noted the analgesic effect of Carboxytherapy after insufflations, giving different explanations for the different modalities of action.

## ACTION MECHANISM

Some authors have suggested that analgesia is the effect of a local increase in subcutaneous microcirculation flow and of the stimulation of local receptors. Others hypothesize a secondary influence of the inflammation related cytokines; others still hypothesize direct action with trigger point inhibition.

The therapeutic effects can be outlined as the following: an active arterial vasodilation brought on by a direct action of CO<sub>2</sub> on the vascular myocytes, a sympatholytic mediated mechanism, neo-angiogenesis. The microcirculation vasodilation has always been considered as the main effect and as the actual responsible for the clinical improvements. As for the direct action on myo cells, it has been





Epicondylitis treatment.

demonstrated that inactive and released arterial rings, put in a CO2 rich solution, tone up, while they tend to relax again when placed in an oxygen rich solution.

In some pathologies, where the stenotic lesion is such as to exclude a direct action on the vase, the improvement in the flow (ascertained both by the improvement in the symptomatology, and by instrumental testing e.g. infrared thermography) originates from the development of collateral circulation (probably also thanks to a locoregional reaction). To this direct action corresponds a sympatholytic reflex action, with a mediated chemical action. One must consider that, given the needle and the diffusion of the gas, the injections are not completely painless, and that therefore trauma released chemical mediators might intervene. However it has been proven that the most important mechanism is the direct action.

All treated patients suffered from benign pain caused by tendinopathies, fasciitis, trauma related pain, arthritic pain and arthrosic pain. Patients were given a full explanation of the process and the aim of the study. They also signed an informed consent form. Different scales were used to evaluate the intensity and the threshold of the pain, pain tolerance and actual pain perception. I evaluated, using different scales, the threshold and intensity of pain, the inability of the patients affected by pain and their functional alteration respect to normal daily activities.

In the upper arm pathologies I evaluated patients using a VAS pain scale and each patient filled in a Shoulder Rating Questionnaire (to determine functionality and symptomatology of the shoulder). This contained questions on the details and the intensity

of the pain and the degree of difficulty on the use of the shoulder during functional and work activities. The score of the questionnaire went from a minimum of 12 ( worst possible situation) and a maximum of 75 ( best possible situation).

For the upper arm, a self-reporting questionnaire was used. It included the evaluation of the patient's socio-personal data, the presence of possible co-morbidities, the treatment performed, the Lequesne Algofunctional Index and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). They were mostly pathologies regarding the elbow, shoulder and wrist. The lower limbs more frequent pathologies were knee pains and Achilles tendonitis.

The selection of the treated points, which I called active points, in some cases coincided with trigger points, varied according to the pathology and/ or the trauma suffered by the patient. The medical device used was the Maya Beauty Engineering Venusian. It is equipped with a software which makes it possible to dose the injected gas flow, regulate it's temperature and has a series of preset work protocols with predetermined quantities, durations and temperatures of the injected gas. The choice of treatments, varied according to the pathology treated. In particular the elements that were accordingly modified were the choice of the quantity of CO2 injected, the selected flow, the temperature of the gas in the moment of the perfusion, the more or less deep localization (subcutaneous, intradermal, in the

tendon sheath, in the joint capsule). The actual perception of pain, the degree of functionality and joint mobility after the treatment were measured at time zero, immediately after a series of treatments and after three months.

## CONCLUSIONS

The noticeable number of different pathologies, and the consequently modest sample per type of pathology makes the study statistically not relevant, but given the important result concerning analgesia, calls for an in-depth analysis. The results achieved administering Carboxytherapy are pain reduction, in some cases definitive, improvement in joint functionality, pain threshold lowering, resuming of normal daily activities in the more serious cases and of sport activities.

The number of points that had to be treated were variable, trigger or tender points according to the pathology. The same is true for the number of treatments necessary, which varied from a minimum of three in the acute cases up to even 10 - 15 in the chronic cases. The quantity of administered gas pretreatment varied from a minimum of 10cc, for example in carpal tunnel cases, up to even 100cc for tendinopathies. The analgesic and therapeutic effects on musculoskeletal pain, on tendinopathy, on pathologies of rheumatic nature and on initial phase arthrosis, are to be considered a good support for kinesiology physiotherapy, in some cases they may even be decisive.

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Carpal Tunnel treatment.



Achilles tendonitis treatment.

