Oxygen therapy in varicose veins: Improvement of the microcirculation in the legs - Casuistic

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Oxygen therapy for Varicose Veins: Oxygen as an energy carrier - Oxygen therapy for Varicose Veins: All mechanisms in the human organism during growth, its maintenance and its physical and mental activity require energy. This becomes particularly clear to the patient during cardiac work, breathing work in the lungs, skeletal muscles and intellectual work. The pathology of the microcirculation in the capillaries depends largely on the oxygen partial pressure and on the blood pressure in the supplying arteries and the high pressure in the draining veins.

Key Words: *Oxygen therapy; Varicose veins; Microcirculation of legs; Improvement of capillary function.*

INTRODUCTION

It is a strange thing in the history of medicine that, apart from sports medicine, the deeper consideration of people from an energetic point of view has been neglected for decades.

It was only in 2019 that 3 scientists, the Americans WiliamKaelin and Gregg Semenza and the English Man Peter Ratcliffe, received the Nobel Prize in Physiology and Medicine - for their long-term scientific research work on the oxygen supply to human cells.

The three scientists found out how cells feel the different oxygen concentrations as well as react to them. They discovered the molecular control mechanisms that regulate the activity of genes in response to fluctuating amounts of oxygen.

This Nobel Prize award is also a late honor for Prof. Manfred von Ardenne and his team at the Dresden Ardenne - Institute of the same name. As early as 1977, the scientists at the institute Auf demWeißen Hirsch at the mountains around the city Dresden had questions about the energetic supply of the cell energy balance, especially about the role of oxygen concentration in the cells, worked.

OXYGEN THERAPY FOR VARICOSE VEINS: LACK OF OXYGEN, LACK OF CELL ENERGY

The cell energy is provided by adenosine triphosphates (ATP). The process takes place in the mitochondria of the cells. These require oxygen to generate energy. Energy is consumed very quickly, and it is not possible to refuel and store larger amounts of energy [1,2].

In order to improve the energy status, the continuous formation of the high-energy phosphates mentioned is important. The means for this is the continuous supply of oxygen and the improvement of the oxygen status [3,4].

The deterioration of this oxygen status begins around the age of 25. The oxygen absorption at rest is approx. 0.3 l/min, and it decreases continuously from the middle of the third decade of life. An 80 - year old patient still absorbs about half of the oxygen, i.e. 0.15l/min.

These oxygen deficiency states are first felt in the heart, then in the legs and the brain! In the frequency of their clinical appearance, circulatory disorders of the legs are in the foreground alongside cardiac and cerebral deficiency states [5].

What can be done to mitigate or delay the steep decline in energy reserves in old age? You should be active for as long as possible, do sports and exercise. And get regular therapy with oxygen therapy to keep your energy status up (Figure 1).

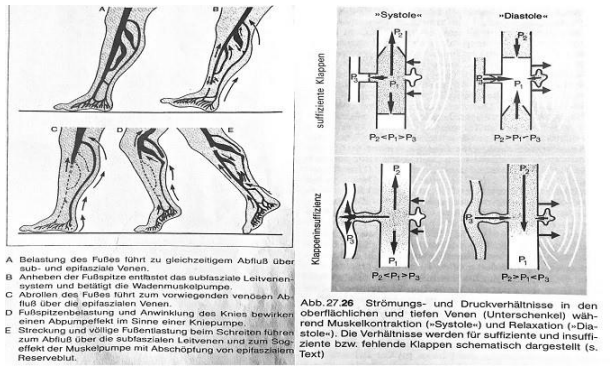

Figure 1) Oxygen therapy for varicose veins: normal and pathological flow in the leg veins.

PATHOPHYSIOLOGICAL VIEW: OXYGEN THERAPY FOR VARICOSE VEINS - THE PATHOLOGY OF MICROCIRCULATION IN THE LEG CAPILLARIES

The pathology of the microcirculation in the capillaries depends largely on the oxygen partial pressure and on the blood pressure in the supplying arteries. On the one hand, this means a reduced flow in the arteries leading to the capillaries (arteriosclerosis). Secondly, a reduced oxygen partial pressure in the arteries due to age or illness can also lead to a reduction in the oxygen release into the tissue. And this reduced oxygen pressure also leads to swelling of the capillary walls with a further reduced flow [6].

AND HERE LIES THE CAUSATIVE PATHOLOGICAL CONNECTION TO LEG VARICES

The varicose veins of the legs lead to a backflow of the venous blood into the lower leg. Both the deep veins and the skin veins are under high pressure. This pressure is passed back to the capillaries unhindered. Both muscle spasm electrodes and venules have no venous valves, and control of

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the venous blood in the microcirculatory area is not possible. This means that the capillaries are under further tension, in addition to the reduction in the oxygen partial pressure, the venous pressure also causes the capillary walls to swell and cause a pathological deformation of these microcirculatory vessels.

On the one hand swelling of the capillary wall due to reduced oxygen partial pressure in the arteries, swelling and deformation of the capillary walls due to high venous back pressure. We are dealing here with an identical pathological effect on the capillary wall due to two completely different causes (Figure 2).

Figure 2) Oxygen therapy for varicose veins: swelling of the capillary walls and deformation due to high venous pressure (left picture), swelling due to insufficient oxygen partial pressure (picture middle and right).

THERAPEUTICAL VIEW: OXYGEN THERAPY FOR VARICOSE VEINS - WHAT CAN WE DO?

It should be considered whether, in addition to the minimally invasive therapy of the varicose veins on the legs by means of microfoam and catheter interventions (VenaSeal®, radio wave, laser), an accompanying treatment using oxygen multi-step therapy should be carried out [7].

The restoration of the varicose veins initially leads to a significant reduction in venous pressure in the entire venous tract up to the capillaries. The accompanying oxygen therapy generates a significant increase in the oxygen partial pressure with improved oxygen saturation of the cells and thus also leads to a swelling of the microcirculatory vessels [8].

Two different therapy concepts with a clear effect synergy - improvement of the microcirculation in the legs (Figure 3).

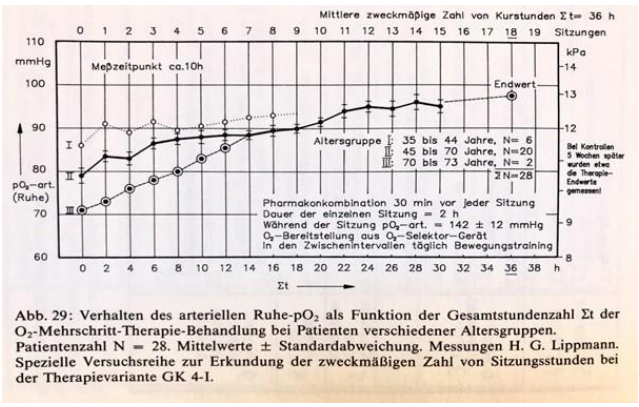

Abb. 29: Verhalten des arteriellen Ruhe-pO_2 als Funktion der Gesamtstundenzahl Σt der O_2-Mehrschritt-Therapie-Behandlung bei Patienten verschiedener Altersgruppen. Patientenzahl N = 28. Mittelwerte ± Standardabweichung. Messungen H. G. Lippmann. Spezielle Versuchsreihe zur Erkundung der zweckmäßigen Zahl von Sitzungsstunden bei der Therapievariante GK 4-1.

Figure 3) Oxygen therapy for varicose veins: achievable increase in O_2 - saturation with oxygen multi-step therapy.

THERAPEUTICVIEW: OXYGEN THERAPY FOR VARICOSE VEINS - OUR THERAPEUTIC CONSEQUENCES

After a few weeks of thinking about, studying the literature and testing with an oxygen multi-step therapy system, we decided to offer this accompanying therapy to our patients with immediate effect. We carry out this therapy - as can be seen in the video - parallel to the post-operative compression massage therapy. This massage therapy is carried out post op after every catheter intervention, whether VenaSeal®, radio frequency or Sealing Microfoam. The compression therapy lasts 25 - 30 minutes, the oxygen therapy is used over the entire course of the compression massage. At the beginning of oxygen therapy and at the end of the therapy cycle, we measure the initial value of the oxygen partial pressure and the therapeutic valueachieved and document this in a patient's own oxygen therapy pass. The oxygen masks remain withthe patient for the further sessions - we do not clean them or use them again with another patient. In addition to normalizing the venous pressure, the aim is to improve the oxygen partial pressure in order to improve the microcirculation in the legs in a sustainable and multi-functional way [9].

Actual experiences with a 75 - year old patient showed an increase in the oxygen partial pressure from 62 mmHg to 78 mmHg after a session of 20 minutes. A pO_2 of 74 mmHg was measured in a 54 year old patient before therapy. After 30 minutes of compression and oxygen therapy, a pO_2 of 92 mmHg was reached [10].

CASUISTIC VIEW

A briefcase report about a long course of the disease: A 69-years old patient reported to us 6 months ago about a leg ulcer on the right footmedial side that had existed for 10 years. Attempts to conservative therapy to date have been very complex and have visited several Vein Care Centers and dermatologists. The only therapeutic approach was intensive compression therapy and regular massages. In addition, dressing changes and ulcer cleaning were performed 2 days a week [11].

At the first visit in our practice, a pronounced varicose strain of the GSV and SSV, as well as numerous insufficient perforator veins on the right lower leg were revealed by duplex sonography. Also, a lower leg and para plantar arcus varicose diagnosed.

We first performed a VenaSeal® ablation of the GSV and the SSV simultaneously in one operation. About 14 days later, we started sealing foam sessions to treat the perforating veins and varicose veins. In parallel, we always performed a compression massage of the legs immediately after the surgery [12].

After 4 months, the actual ulcer was healed very well. However, the patient now complained about a new ulcer and the heel sole. Here we saw no indication for a new surgical/interventional intervention. In addition to compression therapy and regular wound cleaning by the patient herself, massages and an oxygen multi-step therapy were started in our practice. So far 7 sessions have been held. The success is amazing, the ulcerations on the heel have healed, the ulcer on the sole of the foot has become significantly smaller and neatly granulated. The patient can go to work again (Figure 4).

Figure 4) Ulceracrures right leg – 10 years without any healing, then after Sealing GSV and SSV with VenaSeal® and oxygen therapy faster healing process. Combination therapy oxygen and intermittent compression with 12-chamber device.

OUR DISCUSSION: OXYGEN THERAPY – VASCULAR AND FURTHER INDICATIONS

In addition to the special indications for vascular medicine - arteries, veins, microcirculation in all body regions - oxygen multi-step therapy (SMT) also has very good effects in other diseases. These include cardiac arrhythmias, pulmonary diseases, high blood pressure, cancer therapies, stabilization and strengthening of the immune system, tinnitus (ringing in the ears), improvement of vision in retinal diseases, migraine headache.Our oxygen system is of course also open to all other patients for all of these indications for the use of oxygen multistep therapy.

Although it is certainly not easy for a surgeon to use non-surgical therapy, we are now ready to use non-surgical therapies adjuvant to catheter interventions on the arterial and vein system in the sense of a holistic therapeutic approach [13].

The multi-step oxygen therapy is one of the effective adjuvant therapies that also provides the vascular specialist with non-surgical accompanying therapies to further improve the therapy results for our patients. In the past, oxygen multi-step therapy has certainly been somewhat underestimated and viewed as less effective. The importance of oxygen for tissues and cells has also been brought back into the light, especially with regard to the awarding of the Nobel Prize for medicine. Our own, still short experiences confirm the substantial additional effect of this therapy [14].

DISCLOSURE

The author has not any potential conflict of interests.

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