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Clinical Case Study

Peripheral Arterial Disease. We Can Fight the Disease, Slow its Progression, But Not Defeat it

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Abstract

In one of my recent papers, "Peripheral Artery Disease: Double Focal Compression Bandaging Technique", I discuss several clinical cases involving severe peripheral arterial disease successfully treated with this technique. Despite a common belief among primary care physicians and nurses that, compression bandaging should be avoided in patients with peripheral arterial disease (PAD) and an ankle brachial index (ABI) of 0.80 or lower, this stance is misguided and may deny patients, the opportunity for early arteriopathy intervention by compression therapy. An ABI of 0.80 indicates the presence of peripheral arterial disease and should prompt evaluation by an angiologist. However, it is not a strict contraindication for compression therapy. Instead, close monitoring of the disease's clinical course, during the initial weeks, is advisable to detect any signs of deterioration and removing the compressive bandage. Compression therapy can be safely employed in patients with peripheral arterial disease and an ankle brachial index between 0.60 and 0.80, contributing to improved tissue blood flow and the healing of the vascular ulcer.

I document the clinical progression of a patient diagnosed with severe peripheral arterial disease, starting from the amputation of half of the left foot, twelve years ago (2011) to the supracondylar amputation of the right foot (2023). The clinical evolution is categorized into three distinct phases: The first phase involves the patient undergoing a trans-metatarsal amputation of the left foot, twelve years ago (2011), until the second phase, the patient experienced an episode of decompensated heart failure and unstable angina (2016). The third and final phase outlines the patient's initial trans-metatarsal amputation of the right foot, followed by several leg surgeries. Despite these interventions, a deteriorating clinical condition ultimately necessitated a supracondylar amputation of the right lower extremity (2023).

In my view, greater efforts could have been undertaken to prevent the need for the supracondylar amputation. It is not a solution, to stay in bed while waiting for the wound to heal. I will strive to articulate and justify my perspective. My intention is not to spark controversy regarding the actions of vascular surgeons, but rather to shed light on this matter to postpone, for as long as possible, the inevitable amputation. While we cannot completely overcome the challenges posed by atherosclerosis, we can slow its progression.

Keywords: Peripheral Arteriopathy; Compression Therapy; Amputation

Introduction

This is a case that I described, in one of the last published papers (corresponding to the second case) [1]. It should be noted that, until his admission to the hospital (09/26/2023), the patient led an independent life. He was able to walk despite the amputation of half of his left foot, seven years ago (2011). Now, he walks in a wheelchair. This is the pathophysiological hypothesis on which the technique is based: Focused pressure on the wound bed stimulates arteriogenesis and angiogenesis, leading to healing of the vascular ulcer, by increasing tissue perfusion. I illustrate the result of applying focused pressure to the wound bed, with this simple drawing (Figure 1).

Lower-extremity peripheral artery disease (PAD) affects more than 230 million worldwide, and it is associated with an increased risk of some adverse clinical outcomes (other cardiovascular diseases such as coronary heart disease and stroke, and leg outcomes such as amputation) [2]. Primary care doctors and nurses have a key role, in the early detection of the disease. Handheld Doppler is a diagnostic tool used to detect peripheral arterial disease and available in primary care, so we can calculate the ankle brachial index. The Ankle-Brachial Index (ABI) is a practical, reproducible, simple, and inexpensive diagnostic tool for the detection of peripheral arterial disease [3]. This non-invasive test can indicate (ABPI) = (1.0-1.4) →No narrowing or blockage of the leg-arteries; (0.9-1.0) →Acceptable state of arteries in legs; (0.8-0.9) → Some arterial disease;

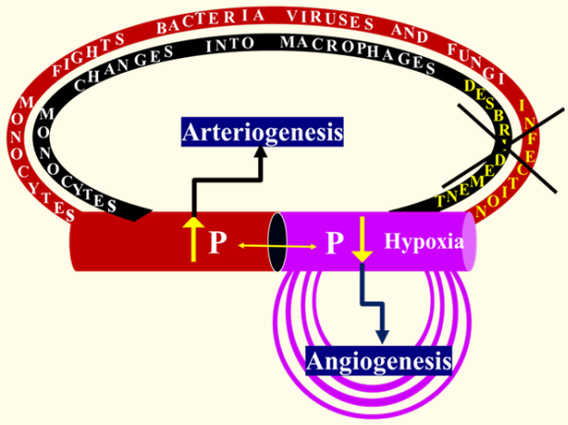


Figure 1: Graph showing a physiological explanation of how compression promotes healing of a vascular ulcer, without the use of antibiotics or debriding substances.

(0.6-0.8) →Moderate arterial disease; (less than 0.5) →Severe arterial disease, critical ischaemia. Compression is strongly contraindicated in serious peripheral arterial disease, when this index, measured by Doppler ultrasound, is below 0.6 [4]. If it is below 0.8, the guidelines recommend referring the patient to a vascular specialist, however, this does not mean that compressive therapy is contraindicated, when is applied by expert medical/nursing primary care. All that is needed is a clinical diagnosis and daily monitoring, for the first few weeks [5]. When compression is used correctly and contraindications are considered, serious adverse events associated with medical compression therapy are exceedingly rare [6].

Why does compression therapy improve blood flow in the wound bed?

The benefits of compression therapy in vascular ulcers, are explained by two physiological concepts, arteriogenesis and angiogenesis. Angiogenesis is defined as growing and spreading blood vessels from existing vascular structure [7]. The remodelling of pre-existing collateral channels is termed Arteriogenesis. In their normal state, these collateral channels are narrow, high resistance vessels, and they provide little blood flow to their distal tissue bed. However, when a major conduit becomes obstructed, blood flow is redirected through the collateral channels, which causes alterations in vascular wall shear stress. This hemodynamic stimulus provokes an increase in the diameter and wall thickness of the collateral channels, with proliferation of vascular cells and turnover of the vascular matrix [8-10]. An interesting document, on what has been learned for the advancement of medical revascularisation in peripheral artery disease, and how this information may lead to novel approaches for therapeutic angiogenesis and arteriogenesis in peripheral artery disease [11].

When a blood vessel is blocked, the pressure in the pre-obstructed area rises. This stimulates collateral arteries, to form a physiological bypass around the blockage (Arteriogenesis). In contrast, in the post-obstructive zone, there is a drop in pressure and a decrease in blood flow, leading to hypoxia. Hypoxia stimulates Angiogenesis (growth of the capillary network). The antibacterial, antiviral and antifungal effects of the monocytes are other important effects of increased blood flow, subsequent trans differentiation into macrophages, confers debriding activity (autolytic debridement) (Figure 1).

The effect of focal compression on blood flow, twenty-four hours after application of the bandage, is shown in the following photographic sequence (Figure 2). The effect can also be seen in the video, in another patient (video 1).

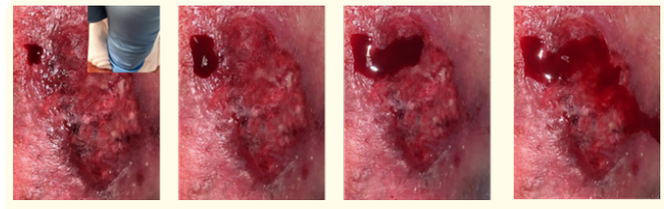
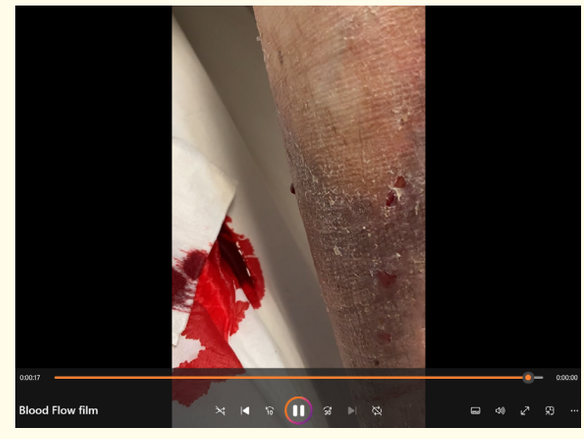


Figure 2: We pressure on the wound bed with gauze, when we stop putting pressure on the wound, there is an increasing of blood flow.



Video 1: Showing an increasing of blood flow.

Material

1/ Gauzes. 2/ Bandages (short-stretch 10 x 10 cm). 3/ Adhesive bandage. 4/ Adhesive tape. 5/ Saline physiological solution. The diagnostic tools are: 1/ A hand-held Doppler. 2/ A weight-control scale. 3/ The Edinburgh Claudication Questionnaire. 4/ A camera for the photographic sequence of the ulcer´s clinical course.

Technique: Double Focal Compression Bandaging (Figure 3). We apply the technique I named "double focal compression bandaging" [12], that consist of:

- A/ Cutting Gauze Pad: Cut a piece of gauze to create a 1cm thick pad (Figure 3/1).
- B/ Wrapping Gauze Padding: Wrap the cut gauze with another layer to create padding, which is then placed over the wound bed (Figure 3/2, 3, 4).
- C/ Securing with Adhesive Bandage: Use an adhesive bandage to secure the padding in place (Figure 3/5).
- D/ Applying Gradual External Compression: Initiate gradual external compression using a short-stretch bandage (10 x 10 cm) on the dorsum of the foot, wrapping around the heel, and ascending to 2 cm below the knee flexion. Apply pressure based on the patient's tolerance. Begin with gradual pressure, reducing as you ascend due to increased leg thickness (Figure 3/6, 7, 8, 9).

Figure 3: Double focal compression bandaging technique.

E/ Reinforcing with Tape Strips: Reinforce the bandage by applying strips of tape. Attach these strips to the sides and back of the leg and to the front of the back of the foot (Figure 4/10).

Figure 4: Double focal compression bandaging technique.

Case Report

The description of the case is divided into three periods of time.

Period 1: March 2011 to July 2016.

- **Initial Presentation and Diagnosis:** A 56-year-old man, smoker, regular drinker, and sedentary, presented with symptoms of intermittent claudication in his left leg. Despite experiencing symptoms for months, he did not seek medical attention.
- **Admission and Diagnosis:** On March 15, 2011, the patient sought emergency care due to severe pain in his first toe and left front foot, extending to the fourth toe over the previous two months. Diagnosed with severe peripheral arterial disease, he was admitted to the hospital's angiology department.
- **Diagnostic Procedures and Surgery:** Arteriography on March 23, 2011, revealed occlusion of the third segment of the left popliteal artery with an outlet through the fibular artery. Right popliteal artery was permeable. Two days later, on March 25, 2011, underwent femoral-peroneal bypass surgery in the left leg with amputation of the first toe.
- **Postoperative Complications:** Complications included wound dehiscence at the site of digital amputation. Experienced an episode of congestive heart failure postoperatively, managed with medication (Figure 5/A-B).
- **Follow-up Surgery and Discharge**: On June 4, 2011, underwent a left trans-metatarsal amputation. Discharged 67 days later with diagnoses of Chronic Ischaemia Grade IV, left femoral-peroneal bypass with left trans-metatarsal amputation, and heart failure.
- **Rehabilitation and Ongoing Care**: Underwent two months of rehabilitation for the amputated foot. Compression therapy was contraindicated; pharmacological treatment was prescribed. Regular angiology appointments over the next five years, checking bypass patency and arteriopathy evolution. Ankle-brachial index remained around 0.60 throughout this period (Figure 12).

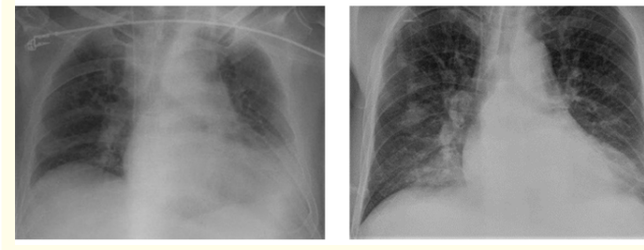


Figure 5: A/ Chest X-ray (03-26-2011).
B / Chest X-ray (05-05-2011).

Period 2: July 2016 to September 2023

- **Admission for Worsening Heart Failure:** Admitted to the cardiology department on July 20, 2016, due to worsening heart failure and episodes of unstable angina. Cardiac Catheterization and Stent Placement: Coronary artery obstruction confirmed by cardiac catheterization. Drug-eluting stents placed to address the coronary artery issues.
- **Peripheral Arterial Disease Assessment:** Cold lower extremities and weak peripheral pulses noted, prompting concern about peripheral arterial disease given the patient's history. Cardiologists requested an inter-consultation with the angiology department for assessment.
- **Arteriography and Clinical Assessment:** Clinical assessment of the patient's vascular status was performed, and vascular surgeons ordered an arteriography. Arteriography performed on August 12, 2016, one month after the patient was discharged from the hospital.

While the patient was in a waiting period, for making the arteriography to assess the severity of his condition, he came to us for further medical advice. A notable observation was the condition of his legs, especially the one with a half-amputated foot, characterized by pronounced coldness and a weak peripheral pulse. The patient had an ankle/brachial index of around 0.60 for five years post-surgery, without significant improvement (Figure 12). The persistently low ITB posed difficulties when considering the option of compression therapy. However, despite concerns about ankle/brachial index, the decision to use compression was influenced by a previously treated patient with an arterial ulcer who responded positively to compression therapy, despite its a priori contraindication. The case, involving the use of compression therapy despite the low ABI and prior contraindication, was published [14].

Based on the positive outcome and the potential benefits, compression therapy was deemed a viable option.

There is an inherent risk, in using compression therapy in a patient with an arterial ulcer. This risk can be minimized, by carefully monitoring the clinical course of the ulcer. The first time that I used double focal compression bandaging, in a patient with an arterial ulcer, we followed up, almost daily, for 5 months, for detecting signs or symptoms of worsening, but did not happen [14]. Back to the case that is the subject of our report, we provide comprehensive education to the patient on recognizing signs and symptoms of deterioration, instructing him, to promptly remove the compression bandage and seek immediate attention if any deterioration is noted. We teach the patient how to bandage his legs (Figure 7-A). He applied a padding at the level of the internal malleoli, with external compression bandaging (short stretch) in the morning, removing both bandages at night. As there is a natural reduction in pressure during the day, reapplication in the morning will minimize this effect.

How hard should the bandage be applied?

When applying the bandage, we instruct the patient to exert as much pressure as, he or she, can comfortably tolerate. We opted for short stretch bandages, due to their better tolerance by patients, although we can achieve effective pressure peaks, using large stretch bandages with additional padding 1 cm thick (Figure 7-B). Patient comfort and adherence play a crucial role in the success of compression therapy. I carefully explained the risks and benefits of the procedure, made sure that the patient understood it, and obtained his informed consent before I proceeded.

Arteriography was conducted one month after the patient's discharge from the hospital.

Vascular Findings (Figure 6)

- **A/ Right Lower Extremity:** Common and deep femoral artery were permeable. No significant injuries were observed. Superficial femoral artery and popliteal artery showed multiple diffuse, non-significant lesions.
- **B/ Left Lower Extremity**: Superficial femoral artery identified with critical stenosis in the upper third. Occlusion observed in the first section of the popliteal artery.

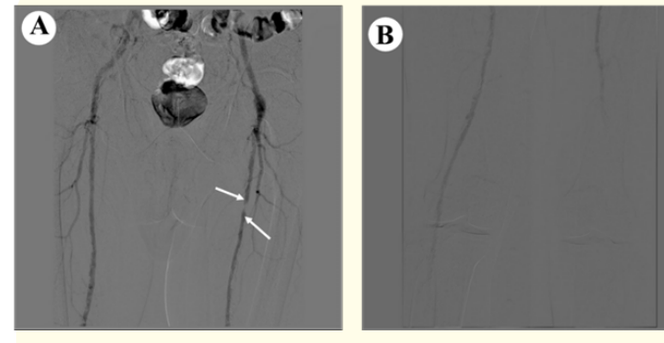


Figure 6: Arteriography lower left limb. A/ Short critical stenosis of the left superficial femoral artery. B/ Right popliteal artery occlusion.

The patient had been applying bandages on his legs, for a month, by the time of the appointment with the vascular surgeons, to know the results of the arteriography. The patient did not disclose the use of compression therapy to the vascular surgeons, during the appointment.

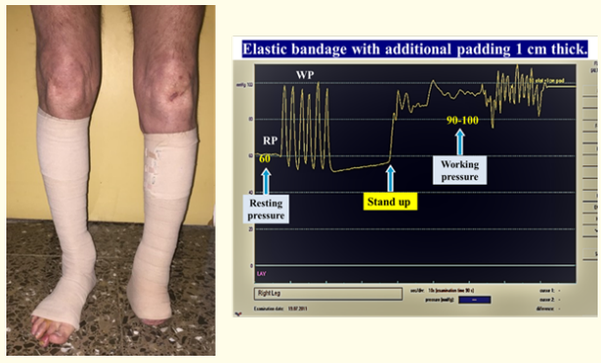


Figure 7: A/ Self-bandaging by the patient. B/ Pressure peaks with Pico-press device, in another patient, using large stretch bandages.

Despite previous indications that leg compression was contraindicated, the patient expressed a desire to continue with compression therapy (double focal compression bandaging). Clinically, the patient was found to be in good health during the appointment. A follow-up appointment was scheduled for six months to assess the patient's progress. He continued pharmacological treatment.

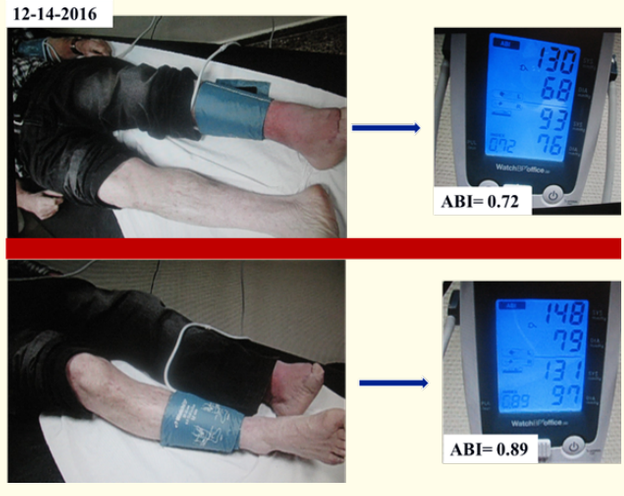


Figure 8: Post-treatment assessment revealed a notable improvement in the Ankle-Brachial Index (ABI).

After four months of applying compression bandaging, the ankle-brachial index had improved in both legs: ABI increased to 0.72 in the left leg. ABI increased to 0.89 in the right leg (Figure 8). The increase in ABI values indicates an enhancement in blood flow in both legs. ABI improvement suggests a positive response to the compression bandaging treatment.

Ten months after initiating compression bandaging, the patient's progress was reassessed. The Ankle-Brachial Index (ABI) continued to show improvement. ABI increased to 0.94 in the left leg. ABI increased to 0.98 in the right leg. Accompanying (Figure 9) likely provides a visual representation of the sustained ABI improvement.

A notable clinical observation was the reddening of the left leg, present for more than a year, that subsequently, the reddening disappeared, indicating a positive change in the vascular condition. The disappearance of long-standing reddening suggests improved blood circulation and vascular health. This clinical observation aligns with the positive trends seen in ABI measurements (Figure 11). The sustained improvement in ABI over ten months is indicative of the ongoing positive response to compression therapy.

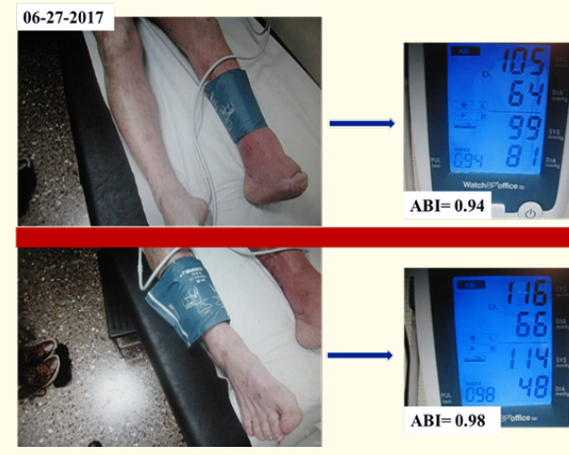


Figure 9: ABI, 10 months later applying double focal compression bandaging.

Sixteen months after the initiation of compression bandaging, the patient's progress was reassessed. The Ankle-Brachial Index (ABI) continued to demonstrate improvement: ABI increased to 0.98 in the left leg. ABI increased to 1.02 in the right leg (Figure 10). The increased ABI values suggest sustained positive changes in vascular perfusion. Higher ABI values indicate enhanced blood flow and improve arterial health in both legs.

The patient's progress was assessed at twenty-two months. The Ankle-Brachial Index (ABI) remained stable. ABI was recorded at 0.95 in the left leg. ABI was measured at 1.02 in the right leg (Figure 11). Stability in ABI values over an extended period indicates the maintenance of positive vascular changes. Consistent ABI values reflect ongoing benefits from the compression bandaging therapy.

The notable improvement in the colour of the left leg over the two-year period, since the initiation of compression therapy, is remarkable. This positive outcome suggests that the applied double focal compression bandaging technique, has had a beneficial impact on tissue perfusion and overall vascular health. The visual evi-

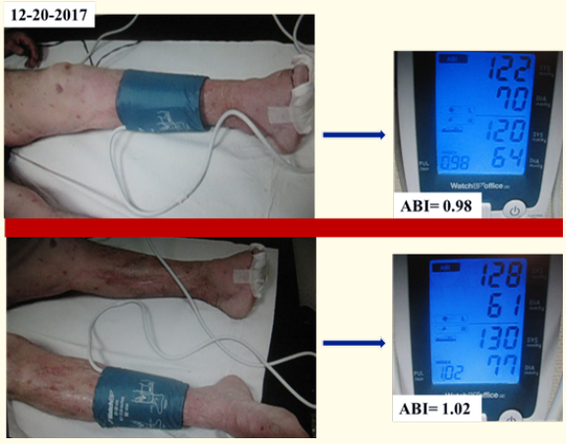


Figure 10: ABI, 16 months later applying double focal compression bandaging.

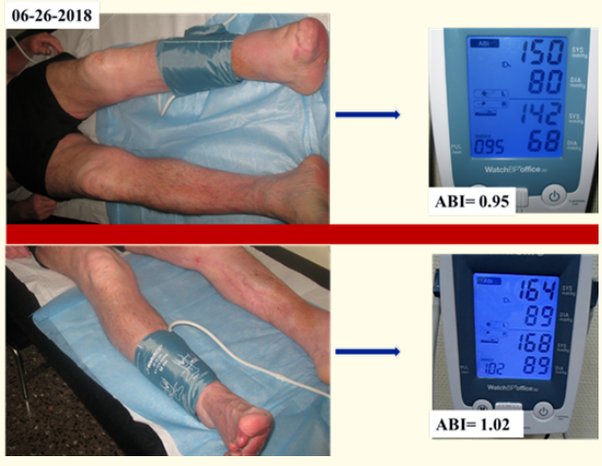


Figure 11: ABI, 22 months later, applying double focal compression bandaging.

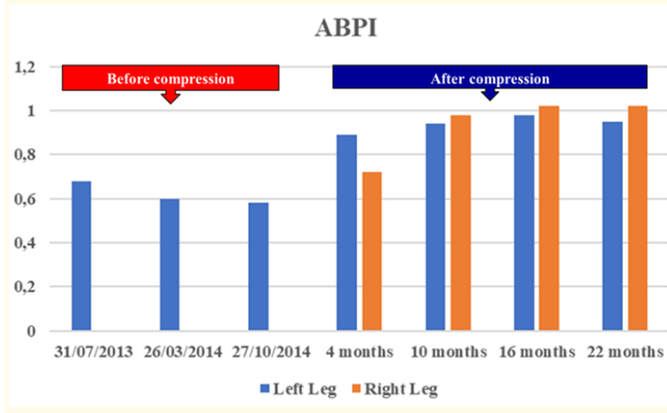


Figure 12: Graph of Ankle-Brachial Index (ABI) Measurements.

Figure 13: The stable ABI values of 1.14 for the left leg and 0.87 for the right leg, indicate a continued positive response to the compression bandaging therapy, 32 months later applying double focal compression bandaging.

dence of improved colouration, further supports, the effectiveness of the compression therapy in contributing to the management of peripheral arterial diseases. Certainly, the importance of ongoing wound monitoring cannot be overstated.

We can see a visual representation of the ABI measurements over time, comparing them before and after the application of the compression bandaging. The improvement of the ITB values, as depicted in the graph, reflects the efficacy and sustained effect of the compression bandaging (Figure 12).

The patient's progress was evaluated at thirty-two months after initiating compression bandaging (Figure 13).

The Ankle-Brachial Index (ABI) remained stable. ABI was recorded at 1.14 in the left leg. ABI was measured at 0.87 in the right leg. Stability in ABI values over an extended period indicates the continued maintenance of positive vascular changes.

The description notes the good appearance of the legs with strong peripheral pulses. This indicates improved blood flow and vascular health. The stability in ABI values and positive clinical observations underscore, the importance of continued follow-up and monitoring. Ongoing assessments will help to monitor ongoing benefits. They will also inform any necessary adjustments to the treatment plan.

It is impressive to observe the patient's commitment to using the double focal compression banding technique, over seven years (2018-2027) and the positive results achieved. The fact that the patient has continued to attend scheduled vascular surgery and

cardiology visits, demonstrates a proactive approach to managing his health.

The three main facts regarding this treatment are the following:

- **A/ Cardiac Decompensation**: Since the start of compression bandage treatment, the patient has not experienced an episode of cardiac decompensation. This suggests a potential positive impact of compression therapy on the health and stability of the patient's cardiovascular system.
- **B/ Vascular Surgery Visits**: During scheduled vascular surgery visits, the patient did not wear the compression bandage, as it was considered contraindicated by vascular surgeons. The clinical course was good, demonstrating the efficacy of compression therapy, performed independently by the patient and under our supervision.
- **C/ Ischemic Episode in the Left Leg**: Four years into the treatment, the patient suffered an episode of ischemia in the left leg (amputated foot). This episode was successfully resolved with the administration of anti-inflammatory drugs and low-molecular-weight heparins.

These facts contribute to the overall understanding of the patient's trajectory, with double focal compressive bandaging and show positive results in cardiovascular stability, independent management, and successful resolution of an ischemic episode.

It's encouraging to note that in February 2023, the patient presented with very good-looking legs, normal ankle brachial index (ABI) values (ABI = 0.87 for the right leg and ABI = 1.14 for the left leg) and strong peripheral pulses (Figure 14). These positive indicators suggest that the double focal compression bandaging technique continues to be effective in maintaining vascular health and overall wellbeing.

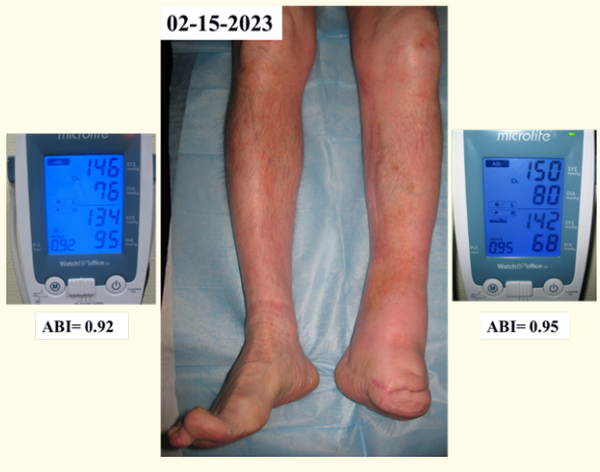


Figure 14: For 7 years, the patient wore, on both legs, double focal compression bandaging.

The patient's commitment to wearing double focal compression bandaging on both legs, for seven years, is a notable testament to their dedication to managing their vascular health. The positive outcomes observed, such as good-looking legs, normal Ankle-Brachial Index (ABI) values, and strong peripheral pulses, suggest that the chosen compression therapy has been effective, in promoting vascular well-being over this extended period.

In March 2023, I asked for a chest X-ray. The radiological improvement, observed in the chest X-rays from 2011 to 2023 (Figure 15), is a significant and positive development.

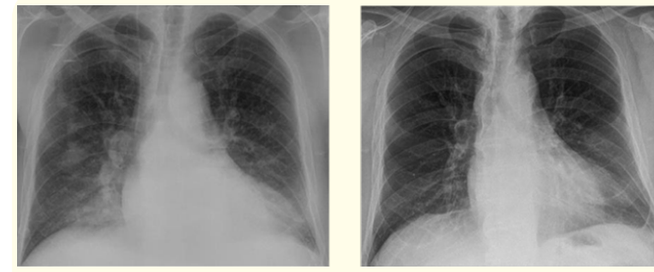


Figure 15: A/ Chest X-ray (05-05-2011).
B/ Chest X-ray (03-21-2023).

It's intriguing to observe improvements in general health among patients with venous leg ulcers treated with this technique [15]. Compression therapy has a positive effect on the heart and general health state.

This hypothesis is consistent with known physiological responses to increased cardiac preload. The displacement of blood volume into the heart due to compression of the lower extremities leads to an increase in cardiac preload. The resulting release of natriuretic peptides (NP) from the cardiac chambers, as a compensatory mechanism, could have several positive effects on cardiovascular and systemic health. Natriuretic peptides (NPs) are hormones which are secreted from heart and have important natriuretic and kaliuretic properties. Apart from blood pressure lowering properties, natriuretic, diuretic, and/or kaliuretic properties of the NP originating from the ANP prohormone [16] and from BNP, inhibition of the renin–angiotensin system, sympathetic outflow, and vascular smooth muscle and endothelial cell proliferation have been attributed to NP [17].

It is important to note that the effectiveness of compression therapy can vary depending on the condition and the specific characteristics of the patient. Individualized treatment plans, close monitoring and collaboration with healthcare professionals are crucial to optimize the benefits of compression therapy.

In July 2023, the patient visited a podiatrist, who performed a debridement procedure on the second toe of the right foot (Figure 16). The surgical debridement exposed the distal phalanx of the second toe of the right foot. It is important to note that, the outcome of the right lower extremity supracondylar amputation, is not related to this podiatric procedure. Arteriosclerosis was the cause of amputation.

Figure 16: Debridement, exposing the distal phalanx of the second right toe.

I tried to save the toes on the right leg for two months, with antibiotics, anti-inflammatory drugs, and low-molecular-weight heparins. It's disheartening when, despite my best efforts, the progression of necrosis ultimately leads to the need for amputation (Figure 17).

Figure 17: The spreading hypoperfusion to other toes.

Until cyanosis developed in the 1st, 3rd and 4th toes, I held out hope of saving the rest of the foot. I knew amputating half a foot was an inevitable consequence of his advanced atherosclerosis, but hoped the result would be like the amputation he had undergone twelve years earlier. Unfortunately, this was not the case.

On the 26th of September 2023, the patient was admitted to the angiology department of the hospital. Noteworthy that, despite the condition of the toes, the leg looked good on the day of admission (Figure 18), and the patient still had a clear and strong anterior tibial pulse (Video 2), being able to walk independently. I was confident that a trans- metatarsal amputation would be sufficient, given the presence of a clear anterior tibial pulse and the good appearance of the leg at the time.

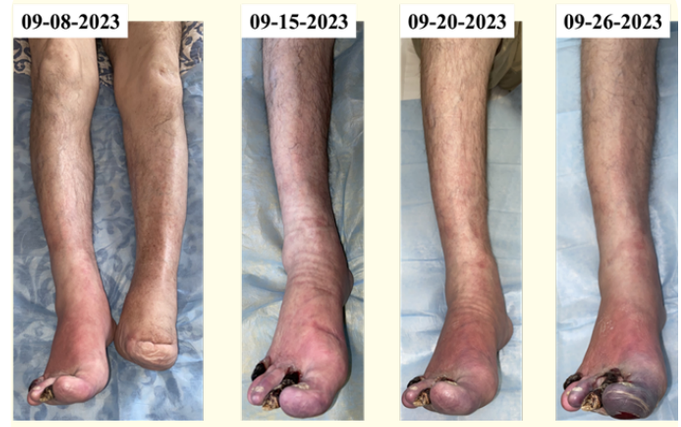
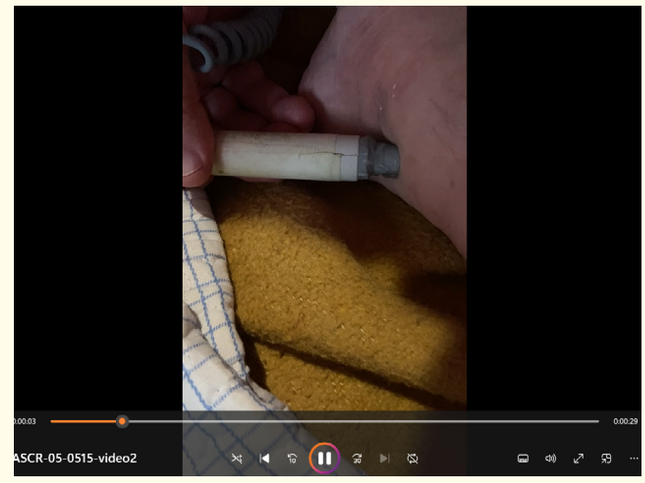


Figure 18: Spreading hypoperfusion to other toes.



Video 2: The video (09-18-2023) shows that the anterior tibial pulse is clear and strong

Period 3: September 2023 to November 2023

Necrosis of the 2nd and 5th toes and ischemia of the 1st and 3rd toes of the right foot were diagnosed on admission, in a patient with occlusive arterial disease. CT angiography is performed the following day, revealing the following vascular findings:

- **A/ Right Lower Limb:** Significant stenosis of the external iliac artery. Significant calcified atheromatosis at the common bifurcation. Significant calcified atheromatosis at the origin of the superficial and deep femoral arteries.
- **B/ Left lower limb:** Post-operative changes. Wide neck pseudoaneurysm of the common femoral artery. Lesions of the superficial femoral artery occluding its middle third. The remainder cannot be assessed due to the delay in contrast progression.

These findings illustrate the extensive vascular pathology affecting both lower limbs. The presence of significant stenosis, athero-

matosis, and pseudoaneurysm further complicates the patient's vascular condition, contributing to the ischemic and necrotic changes observed in the toes.

The patient's diagnosis of grade IV iliac obliteration in the right lower extremity indicates a severe vascular pathology. The initial recommendation of a supracondylar amputation was made, but the patient chose not to proceed with it, understanding the associated risks of infection and ischemia. Subsequently, the patient underwent antibiotic therapy with Piperacillin and Tazobactam for 20 days, indicating an attempt to manage potential infection. The patient underwent a series of surgeries to address the severe vascular pathology and complications in the right lower extremity. Here is an overview of the surgical interventions:

- **First Surgery (09/29/2023):** Femoral endarterectomy. Right foot trans-metatarsal amputation. The vascular surgeons aimed to optimize blood flow and address the ischemic conditions in the affected limb, the results of the operation are good, with a good angiographic outcome.
- **Second Surgery (10/25/2023):** Distal femoral bypass over the previous interventions. Right foot Lisfranc amputation.
- **Third Surgery (10/31/2023):** Chopart re-amputation of the right lower limb. third surgery.
- **Fourth Surgery (11/08/2023):** Trans-femoral amputation of the right lower limb. (Figure 17).

I want to emphasize that 26 days have passed, between the first and second surgeries. During all this time, the patient remained bedridden. *The residual limb was not subjected to focused compression*. The three operations that followed were due to the unfavourable development of the wound on the stump.

On 11-28-2023, the patient was discharged from the hospital to a home for dependent patients. Five days later (12-02-2023), I had to go to the residence to perform minor surgery at the stump of the patient's leg, due to the premature removal of three stitches at the hospital, which resulted in the wound not closing properly (Figure 19). This time, when I finished suturing, I applied focalized pressure to the suture with a padding, to prevent infection [18]. The wound closure after two weeks without the use of antimicrobials but with the application of focalized pressure on the suture is a noteworthy observation. This suggests a successful healing process and management of the wound.

Discussion and Conclusion

It had been 12 years since he had had the amputation of half of his right foot. To understand the benefits of compression therapy in this patient, it is important to establish a chronology of events leading up to the supracondylar amputation of the right leg.

Figure 19: A/ Supracondylar amputation leg right. Blood on dressing covering residual limb. B/ Focalized pressure to the suture with a padding.

First Period (March 2011 to July 2016)

The patient, a 56-year-old man, presented with symptoms of intermittent claudication in his left leg. Severe peripheral arterial disease (PAD) was diagnosed, leading to half of his left foot being amputated. The patient underwent femoral-peroneal bypass surgery and a left trans-metatarsal amputation. Complications included dehiscence of the wound at the digital amputation and an episode of congestive heart failure.

According to the therapeutic indications of the vascular surgeons, the patient did not receive compression therapy.

Second Period (July 2016 to September 2023)

The patient was admitted to the cardiology department in July 2016, due to worsening heart failure and episodes of unstable angina. Coronary artery obstruction was confirmed, and drug-eluting stents were placed. The patient had cold lower extremities, weak peripheral pulses, and an ankle-brachial index (ABI) around 0.60. Compression therapy was initiated despite the potential contraindication. Over the following years, the patient's ABI gradually improved with compression bandaging. The patient did not inform vascular surgeons about the compression therapy during their visits, but the clinical evolution was good. An episode of ischemia in the left leg occurred four years into the compression therapy, successfully managed with anti-inflammatory drugs and low-molecular-weight heparins.

If the compression therapy was the cause of the patient's deterioration, as the vascular surgeons thought, the deterioration would have occurred shortly after the therapy was started. This was not the case, quite the contrary. The patient's heart condition showed improvement during the period (2016-2023), when he

was using this technique. The improvement in the patient's heart condition, as evidenced by the visits to the cardiologist and the absence of cardiac decompensation incidents, is further supported by a radiological improvement observed in the chest X-rays taken in March 2023. The chest X-rays from 2011 and 2023 show clear differences, indicating positive changes over the years (Figure 15 A-B). On the other hand, the improvement in the condition of the patient's legs contributed to his ability, to lead an independent life over the 7-year period. The effectiveness of the compression therapy and the overall management of his vascular condition, seem to have positively impacted his quality of life. After amputation, the patient's quality of life is now severely compromised, he has become dependent. It's essential for individuals in such situations, to receive appropriate care and support.

Although the vascular surgeons are of the opinion that the patient should have been admitted to hospital earlier, I am of the opinion that this would not have prevented the amputation. What I am about to describe, should give us pause for thought whether the trans-femoral amputation, could have been delayed, as long as possible. I will give my opinion on the matter:

- First/ There is no doubt that the patient had advanced arteriosclerosis, manifested by peripheral arteriopathy, which led to the amputation of half of his left foot, to heart failure (in 2011) and to the implantation of a coronary stent (in 2016). There is no cure for atherosclerosis, but the effects of the disease can be slowed. This was reflected in the clinical improvement of the patient during these years.
- Second/ The patient was scheduled for trans-metatarsal amputation of the foot and Femoral endarterectomy. The toes were unrecoverable. The surgery was successful with a positive angiographic outcome. During a period of more than a month, when the patient was in bed with limited movement, monitoring for infection and pain control was done. In my opinion, early mobilisation of the leg with pressure focused on the residual limb points, should have been performed. This would prevent infection [18], which eventually led vascular surgeons to perform several surgical procedures, resulting in supracondylar amputation of the right lower extremity.

The uncertainty surrounding my patient's future and the potential impact on his cardiovascular health is reflected by the significant efforts to manage and improve his condition over the years. Unfortunately, the cardiovascular benefits of compression have been compromised by the limb amputation. The challenges faced by the patient, including the likelihood of being confined to a wheelchair, raise concerns about the impact on their overall health, especially in the context of ischaemic heart disease. As a healthcare professional, navigating complex cases like this one requires not only medical expertise but also empathy and a holistic understanding of the patient's well-being.

I believe the description of this clinical case, highlights the potential benefits of compression bandaging in patients diagnosed with severe peripheral arterial disease. By applying focused pressure to the wound bed, compression therapy could help improve blood circulation, through the remaining functioning arteries. Stimulation of atherogenesis and angiogenesis in the affected area may contribute to the overall management of the condition. It is important to carefully consider the individual patient's condition and monitor the response to such treatment.

I would like to end with the phrase, with which I began this article: Peripheral arterial disease. We can fight the disease, slow its progression, but not defeat it.

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