



Practice Tips

Relief of ischemic leg pain with intermittent positive pressure

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Ischemic leg pain from arteriosclerosis can intensify and become constant and intolerable despite bypass surgery and medications. When all other therapies have been exhausted, amputation is often the only recourse. In 1979, I admitted a patient with this kind of pain to hospital. She had been able to sleep only fitfully and was confined to a wheelchair. Two femoropopliteal bypass operations had not helped, and morphine gave only partial relief.

She was given two 1-hour applications of intermittent positive pressure (IPP) using an inflatable leg sleeve and an extremity pump. After the second session, her pain subsided; she slept well that night and required no analgesia. She was discharged and received further treatments as an outpatient. She continued treatments, at first twice weekly, tapering to once every 3 weeks for 4 years. She died from a ruptured aortic aneurysm.

Fifteen other patients with similar histories (two with bilateral disease) have had relief with this treatment. All had severe, unremitting leg pain from arteriosclerosis despite bypass surgery or che-lation therapy. All remained pain free. Most have since died from other causes; some still continue treatment successfully.

Method

With patient recumbent and a stockinet on the bare leg, apply and attach an inflatable leg sleeve to an extremity pump (the one I use is the GCS 2000 from Camp Ltd). The settings are:

- therapy type: SIS (simultaneous decompression of chambers rather than cascade decompression),
- chambers: 5,
- pressure: 40 each chamber,
- inflation: FAS (fast inflation rather than slow),
- deflation time: 40 seconds, and
- treatment time: 60 minutes at first, later 30 minutes.

Theory

The rate of flow of a fluid depends on the diameter of its conduit. We see this in rivers flowing in and out of a lake; the flow is much faster in the rivers than along the length of the lake.

So it is in the arterial system. As arteries divide to become arterioles and eventually capillaries, their combined diameter increases and the flow becomes much slower, allowing time for osmosis and enzymatic forces to transfer nutrients to the cells and remove the breakdown products of metabolism. Should the arterial flow be reduced by mechanical obstruction, the rate of flow in the capillaries is also reduced and could, in some areas, virtually stop. The result is tissue anoxia, which does not cause pain, and an increase in the products of metabolism, which is likely to be the source of pain. With IPP, the capillaries are emptied and fresh blood flows in. The osmotic effect resumes, and the tissues return to a more normal state.

Case reports

Case no. 2 was a 75-year-old man with pain at rest after bilateral femoropopliteal bypass grafts

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and chronic infection in his right groin graft. Amputation was offered. He was pain free after the second IPP treatment and was maintained on weekly treatments for 2 years and 4 months. He died of rupture of the graft.

Case no. 3 was a 75-year-old woman with pain at rest after left popliteal embolectomy. Pain subsided with the second IPP treatment, and she was maintained through weekly treatments for 9 years and 4 months.

Case no. 4 was a 63-year-old woman with severe pain at rest after a failed bypass graft. She was slated for amputation in 3 days, but was pain free after the second IPP treatment. Her surgery was canceled. She has continued weekly treatments for 6 years and 9 months. She is still in pain from rheumatoid arthritis and walks with difficulty.


Case no. 10 was a 64-year-old man with continuing pain at rest after bilateral bypass surgery and 30 chelation treatments. He had relinquished his driver's license. He was pain free after the second IPP treatment and has continued treatment for 5 years and 7 months. He has regained his driver's licence.

Case no. 35 was a 77-year-old man who had had a midtarsal amputation of his right foot for gangrene in his toes. His left toes were blue and cold and the tips of his second, third, and fourth toes were necrotic. He started with twice weekly IPP. There was demarcation at 3 weeks, and his toes regained their normal colour. Gangrenous areas sloughed at 3 months; healing was complete at 4 months. He was maintained through fortnightly treatments until he fractured his right hip and died of pneumonia.

Comments

The cases outlined above are a sampling of patients treated successfully with IPP. The cases included 17 patients with ischemic pain at rest; 16 of them achieved complete relief. Among the other cases, two patients had postembolic pain. One had early gangrene. Intermittent positive pressure was tried for other problems. Sixteen patients had claudication but no pain at rest. Some of these thought IPP led to improvement, but in no case was improvement sufficient to continue treatments. One patient had pseudoclaudication; this patient obtained no

relief. Three patients with diabetes mellitus had ischemic pain at rest; all of them experienced increasing pain after about 15 minutes, and the treatment was stopped. Diabetes mellitus, therefore, is considered a contraindication to IPP.

Only one patient was able to discontinue treatment without reappearance of pain. This patient had classic "blue toe" and severe pain from embolus at rest, probably from development of collateral circulation. For those with pain at rest, the ankle-brachial index was generally below 0.60 and did not improve with treatment. Therefore, IPP is considered palliative; it does not cure ischemia. 

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For further reading

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