Proper Hydration And Supplemental Oral Protein Administration Improves All Lower Extremity Ischemic Symptoms: It May Replace Stenting And Bypasses For Many Patients: The Evidence

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Medical Treatment of Claudication and Rest Pain
- Suppression of tobacco
- Supervised exercise
- Cilostazol
- Control of Risk Factors

Medical Treatment of Claudication and Rest Pain
We made two observations:
1) Female patient of 84 years old. She could walk only ten steps, suffered intestinal angina and renal insufficiency.
2) CT angiogram showed a “coral reef” aorta with occlusion at the level of the diaphragm. Bowel and kidneys irrigated by collaterals. Past history of two AMI. Occlusion of both subclavian arteries. Distal aorta was open as well the iliacs and femoral arteries.
3) A self-expandable stent opened the right subclavian artery. An axilo-bifemoral bypass cured claudication, abdominal angina and improved renal function.

Medical Treatment of Claudication and Rest Pain
After 4 months the patient called the Service telling that she was having the same symptoms she had before.

The patient was admitted. She was having diarrhea for four days before the symptoms recur. Mucosa of the mouth was dry. On clinical examination and ultrasound study we learnt that the bypass was patent.

We rehydrated the patient intravenously and after 24 hrs. the patient was walking without pain, intestinal angina subsided and creatinine dropped to less than 2 mg per milliliter.

Patient was discharged with the recommendation to drink 2.5 liters of water a day.

During the last follow up visit patient was asymptomatic after 13 months of the admission for rehydration.

Medical Treatment of Claudication and Rest Pain
Patient 2: 72 years old patient came to the consult with a sub acute pain of the right foot. On physical examination the foot was pale and cold. Popliteal and distal pulses were negative. A duplex-scan and an angiogram did not show any patent artery.

Amputation was considered, the patient refused surgical options. Oral mucosa was dry and urinary density was high. After 2 days of re-hydration, pain subsided and capillary filling was noted. We discharged the patient with the recommendation to drink more than 2.5 liters of water a day.

After 3 months she was able to walk 3 blocks without pain. Currently is walking 4 Kilometers without the need to stop.
Medical Treatment of Claudication and Rest Pain

The common factor of both patients was dehydration.

We organized a prospective trial of patients with claudication and/or rest pain who did not respond to standard treatment.

We obtained the approval of the Ethical Committee of the Hospital patients signed an informed consent.

36 patients accepted to sign in the pilot group, final number of patients is 52

Protocol:

Adult patients with disabling claudication or rest pain who failed to improve after 6 months of complete medical treatment. Patients with past history of CHF or renal insufficiency were excluded. Fifty two patients signed the informed consent, median age was 76 years (60-79), 63 were males.

Medical treatment continued as before the trial was initiated.

Complete physical examination was performed including blood and urinary tests.

Ankle/brachial index was recorded and cutaneous temperature determined

Time and distance to claudication was determined using a treadmill at 3.5 miles per hour.

Subjective pain sensation was recorded (0=no pain, 10=intense pain).

Three liters of water ingestion was recommended every 24 hrs.

Physical examination and blood and urinary tests were performed weekly including electrolytes.

After 6 weeks and 6 months all tests were repeated and subjected to statistical analysis.

Protocol was continued to complete 12 months and new patients were incorporated.

Results:

Fifty two patients drunk 2.5 liters of water or more.

All patients who complied with the protocol, had a significant increase of skin temperature in the feet. Initial temperature of the dorsal first toe. Median 29.95 IC (28 to 31)

Dorsal temperature first right toe (final) Median 30.65 IC (29,300 to 31,468 )

The difference was statistically significant Wilcoxon test (paired samples) Two-tailed probability p=0.045

After treatment all patients who complied with the protocol (51/52) increased the time and distance to claudication p<0.0001, had significant decrease in pain sensation p<0.0001, when ankle/brachial index was > 0, it increased in all patients p=0.0001.

Cutaneous Temperature at 6 weeks

Initial temperature: 29.95 C (28 to 31)
Final temperature: 30.65 C (29.3 to 31.4)

p=0.045
Cutaneous Temperature at 6 weeks

Distance and time to Claudication using a treadmill at 3.5 miles per hour. 6 weeks

Subjective Pain Sensation (6 weeks)

Ankle/Brachial Index. 6 weeks

Ankle / Brachial Index Variations at 6 months

Pain Index Variation at 6 months
Dehydration is common in elderly patients, one every ten admission to American hospitals are because dehydration. Dehydration can occur because fluid losses or decreased intake. Elderly people drink less fluids because the sensation of thirst decrease. This decrease of thirst sensation can occur because depletion in dopamine level and increased level of plasma Atrial Natriuretic Peptide (ANP).

The body water composition decreases from 60 to 55% because of the decrease in muscles and an increase in fatty tissue, renal function is impaired with less capacity to concentrate, increasing urine formation. Kidneys are also less reactive to ADH and have a lower ability to regulate Sodium excretion. Lastly iatrogenic factors can aggravate dehydration (Laxatives, diuretics or angiotensin converting enzyme convertors).

**Discussion**

Most of elderly patients with intermittent claudication were drinking a low volume of water (Median 1000 ml).

All patients responded to an increase of water intake.

Difference in pain sensation, ankle/brachial index and distance and time to claudication, comparing before treatment and after treatment were statistically significant.

In the last 12 months our cases of angioplasty and/or stenting dropped almost 90%
Limitations

- Small number of patients
- Short follow-up
- No control group

Ankle / Brachial Index Variations at 6 months

Pain Index Variation at 6 months

Temperature of the Left Foot (6 Months)

Temperature of the Right Foot

Distance to Claudication
Statistical Analysis

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<th>Measure</th>
<th>Shapiro-Wilk (Gaussian) Test</th>
<th>99.9% Significance Level</th>
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<th>NOT</th>
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<td>Pain Index Pre Treatment</td>
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