



Dear Doctor,

*Greetings from Micro Labs Limited. We are happy to bring you “**Cardio Mag**”, which contains latest and interesting news in the field of Cardiology.*

This issue contains

-  *Effect of loop diuretic on skeletal muscle in patients with heart failure.*
-  *Spontaneous Coronary Artery Dissection Involving Left Main Bifurcation with successful PCI intervention: A case report.*
-  *Nanostimulators Activate auto Healing of tissues.*

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback.

Best Regards,

Medical Team, Micro Labs Limited

1. Effect of loop diuretic on skeletal muscle in patients with heart failure.

Loop diuretics are usually used for the treatment of fluid retention in patients with heart failure. Current guidelines do recommend loop diuretics as a first-line treatment for relieving symptoms of fluid overload and congestion in HF patients.

Skeletal muscle wasting is frequently present in patients with HF in a phenomenon known as 'secondary sarcopenia'. Loop diuretics have been implicated as a risk factor for skeletal muscle depletion.

Aim of the current study is to evaluate impact of loop diuretics on the skeletal muscle mass in patients with HF.

Methods:

A cross sectional study involving 200 patients.

Patients included was of age >20 years; one or more hospitalizations due to worsening HF; stable New York Heart Association (NYHA) functional class I–III for >1 month since the prior hospitalization



and with no signs of congestion or edema.

Patients excluded were those with nephrotic syndrome, liver cirrhosis, cancer, a history of gastrointestinal surgery within the prior 3 months, or poorly controlled diabetes ($\text{HbA1c} > 7.0\%$).

Patients were also excluded if they were taking a steroid, anticancer agent, or antidepressant since these drugs are known to affect appetite, dietary content, and body composition.

Primary outcomes were HF patients who were treated with loop diuretics ($n = 150$) with the patients who were not ($n = 50$) treated.

Results:

BMI of patients on diuretics were significantly lower compared to those who were not (22.9 ± 3.9 vs. 25.6 ± 7.2 , $p = 0.038$). The echocardiography findings did not differ between the two patient groups.

Uric acid and plasma brain natriuretic peptide (BNP) levels were higher in the loop diuretic use group than other group.

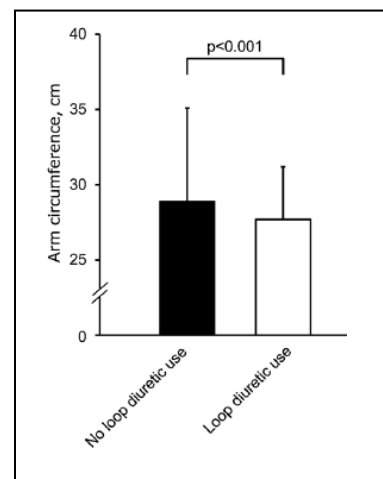
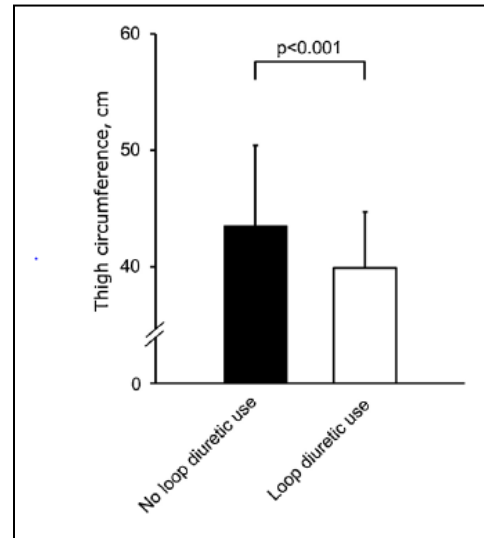
The use of angiotensin-converting enzyme inhibitors (ACE-Is) and those of angiotensin II receptor blockers (ARBs) and b-blockers did not differ between the two patient groups. The proportion of patients treated with spironolactone was significantly higher in the loop diuretic use group (68% vs. 26% , $p < 0.001$).

The patients nutritional status based on the CONUT score and GNRI did not differ between the two patient groups; nor did the patients activity status based on the Lawton index or the proportion of patients undergoing exercise training. The thigh and arm circumferences were both significantly smaller in the HF patients treated with loop diuretics compared to those not so treated ($p < 0.001$).

Discussion:

Muscle wasting is characterized by a progressive decline in skeletal muscle mass, is a highly prevalent complication in HF, and it is not only related to worse symptoms; muscle wasting also directly contributes to adverse outcomes in HF patients.

Loop diuretics worsen neurohormonal activation, including activation of the renin-angiotensin-aldosterone system (RAAS) and the sympathetic nervous system, induce myocardial fibrosis, oxidative stress, and the stimulation of proinflammatory cytokines, play a detrimental role in HF





Conclusion:

Loop diuretics are associated with muscle wasting in patients with HF, independent of the severity of HF.

Reference:

Nakano I, Tsuda M, Kinugawa S, et al. Loop diuretic use is associated with skeletal muscle wasting in patients with heart failure [published online ahead of print, 2020 Jan 27]. J Cardiol. 2020;S0914-5087(20)30018-6.

2. Spontaneous Coronary Artery Dissection Involving Left Main Bifurcation with successful PCI intervention: A case report.

Coronary artery dissection that occurs spontaneously is a relatively rare but important cause of acute coronary syndrome. It is seen especially in young women without significant cardiovascular risk factors and coronary atherosclerosis.

Conservative medical therapy is recommended in clinically stable patients with SCAD because observational studies have shown favorable short-term outcomes and a high rate of spontaneous angiographic healing of the dissected segment

However, in patients with high-risk features such as ongoing ischemia with ST elevation, dissection involving the left main trunk (LMT), and hemodynamic instability, urgent revascularization strategies including percutaneous coronary intervention (PCI) or coronary artery bypass surgery should be considered for the treatment of Spontaneous Coronary Artery Dissection (SCAD).

PCI has a relatively low success rate and a high complication rate in patients with SCAD.

Case presentation:

Current is a case of non-ST-elevation acute myocardial infarction due to SCAD involving left main bifurcation.

A 51-year-old woman without significant cardiovascular risk factors presented with a 1-hour history of sudden-onset chest pain. She had taken no medication and experienced no physical or emotional stress preceding the chest pain.

Physical examination revealed stable vital signs with no abnormal findings. Electrocardiography revealed no clear findings of ischemic ST-T changes or prior Q-wave myocardial infarction, but laboratory testing showed elevated cardiac enzymes such as troponin T (0.855 ng/mL) as well as creatine phosphokinase (565 U/L) and its MB isozyme (66 U/L).



Bedside transthoracic echocardiography revealed impaired contractility in the focal apical segment of the left ventricle, but there was no clear finding of basal hypercontractility or an apical ballooning sign suggestive of stress-induced cardiomyopathy.

Estimated ejection fraction of the left ventricle was broadly preserved (60%). The patient was diagnosed with non-ST elevation acute myocardial infarction. Her condition was stable without chest pain on arrival, we initially administered conservative medical therapy including aspirin, prasugrel, nicorandil, perindopril, pitavastatin, and bisoprolol.

After Three days, coronary angiography was performed via the right radial artery using a 6 Fr sheath to determine the etiology of the myocardial injury.

Coronary angiography showed no significant atherosclerotic stenosis in the right coronary artery and LCX, but a dissection was found from the mid portion of the LMT to the proximal site of the LAD, suggestive of type 1 SCAD. Because the coronary blood flow, LAD was impaired from thrombolysis in myocardial infarction (TIMI) flow grade III to I after contrast injection.

The patient had chest pain with ST elevation, then urgent PCI was performed. The first wire was initially

introduced into the distal LAD, but IVUS imaging revealed that the guide wire had passed through the true lumen of the left coronary artery ostium, false lumen at the ostium of the LCX, and true lumen of the distal LAD (true-false-true).

Along with that, true lumen of the proximal LAD was compressed by the false lumen, and no significant atherosclerosis was observed within the vessel on IVUS, then a second wire was inserted into the LCX and IVUS imaging confirmed that it had been placed in the true lumen from the LMT to LCX .

After which, third guide wire from the true lumen of the LCX to the compressed true lumen of the LAD using a double-lumen catheter by referring to the IVUS findings of the dissected segment , inserted the third guide wire into the true lumen of the obtuse marginal branch using a double-lumen catheter that was placed in the true lumen of the LCX.

Then wire was pulled back and controlled it toward the true lumen of the LAD, which was located under the first guide wire from the right anterior oblique and caudal view. The IVUS guided rewiring technique was successful, and the subsequent IVUS imaging confirmed that the third guide wire had passed entirely through the true lumen from the LMT to LAD.





After successful rewiring from the true lumen of the LMT to distal LAD, first wire was removed and deployed a drug-eluting stent (3:5 × 30mm from the LMT to LAD. Blood flow of the LCX was preserved after stenting, hence rewiring of the side branch was not performed. Final coronary angiography showed acceptable results and TIMI grade III flow in both the LAD and LCX. The post procedural course was uneventful, and no major adverse cardiovascular events were observed. Peak levels of creatine phosphokinase and its MB isozyme were 1155 and 142 U/L, respectively. Follow-up coronary computed tomography (CT) angiography was performed 12 months after the procedure and showed acceptable results with no clear findings of in-stent restenosis or incomplete stent apposition. Clinical course was uneventful during an 18-month follow-up.



Follow up CT

Discussion:

SCAD is to be considered among the differential diagnoses in patients with acute coronary syndrome, particularly in young women. IVUS plays a pivotal role in detecting not only the presence of a dissection but also the optimal position of the guide wire in patients with SCAD.

PCI for patients with SCAD is challenging because of difficulties in wiring into the true lumen and the risk of extending the dissection or intramural hematoma by the catheter-based procedure. Cutting balloon angioplasty is one of the useful alternatives to fenestrate the intima, especially in patients with SCAD characterized by a long and diffuse lesion.

In current case, because the dissection involved the left main bifurcation and could be covered by a single stent, a direct stenting strategy using a drug-eluting stent was selected.

Conclusion:

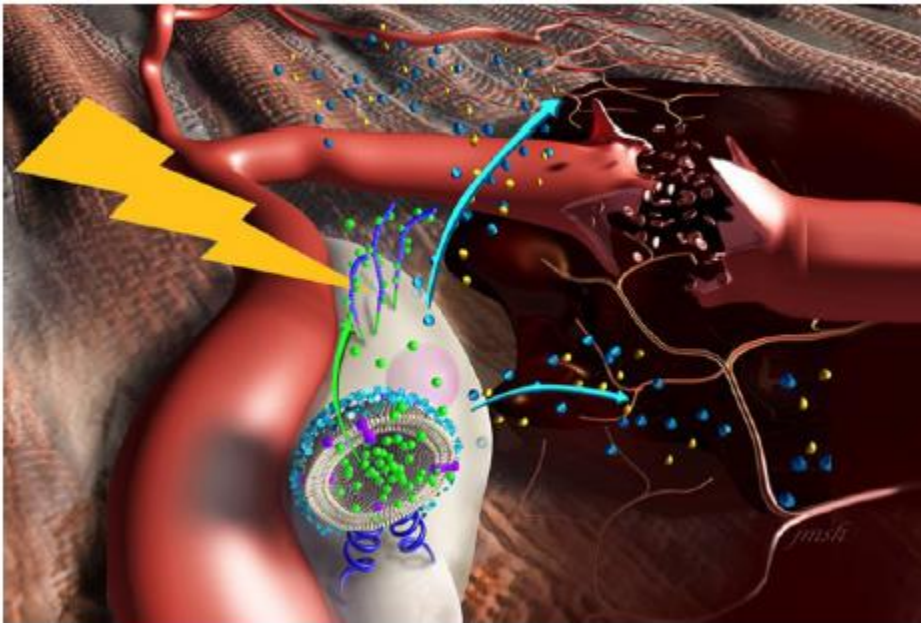
A case of Spontaneous Coronary Artery Dissection was successfully managed with PCI using IVUS guided re wiring technique.

Reference:

Numasawa Y et al. Successful Percutaneous Coronary Intervention Using Intravascular Ultrasound-Guided Rewiring Technique in a Case of Spontaneous Coronary Artery Dissection Involving Left Main Bifurcation. Case Reports in Cardiology. 2020; 8890538 :1-7 pages



3. Nanostimulators Activate auto Healing of tissues.



Stem cell transplantation is a promising treatment for peripheral arterial diseases in the past decade. Stem cells act as living bioreactors of paracrine factors that orchestrate tissue regeneration.

Pre-stimulated adipose-derived stem cells (ADSCs) acts as potential candidates but have been met with challenges in activating their secretory activities for clinical use.

Tethering ADSC surface with nanoparticles releasing tumor necrosis factor α (TNF α), named nanostimulator, would stimulate cellular secretory activity in situ. Examined by complexing octadecylamine-grafted hyaluronic acid onto a liposomal carrier of TNF α .

Hyaluronic acid did increase the liposomal stability and association to CD44 on ADSC surface. ADSCs tethered with these TNF α carriers exhibited up-regulated secretion of proangiogenic vascular endothelial growth factor and immunomodulatory prostaglandin E2 (PGE2) while decreasing secretion of anti-angiogenic pigment epithelium-derived factors.

ADSCs tethered with nanostimulators promoted vascularization in a 3D microvascular chip and

Cardio Mag

Volume 1 | Issue 17 | 2020



enhanced recovery of perfusion, walking, and muscle mass in a murine ischemic hind limb compared to untreated ADSCs.

This surface tethering strategy for in situ stimulation of stem cells would replace the costly and cumbersome pre-conditioning process and expedite clinical use of stem cells for improved treatments of various injuries and diseases.

Reference:

Leong J et al. Surface Tethering of Inflammation-Modulatory Nanostimulators to Stem Cells for Ischemic Muscle Repair. ACS Nano. 2020;14(5):5298-5313.



This scientific input is prepared from the Department of Medical Services, an initiative of M/s Micro Labs Limited under the aegis of Micro Knowledge Academy. The information contained herein is for education purpose only. The content is developed by compiling information from various authentic and published literatures. Although great care has been taken to assure the accuracy of the publication, M/s Micro Labs Limited shall not be responsible or in any way liable for any inaccuracy, errors, or omissions resulting from negligence or otherwise howsoever or any consequences arising there from. In spite of best efforts, the information in this publication may become outdated over time. M/s Micro Labs Limited shall not be responsible in any manner whatsoever, for any action taken, opinions expressed, advice rendered or accepted, any direct, incidental, special or consequential loss and damage caused on the basis of any material or information presented in this publication / update