Cardiomyopathy Associated with Zinc Deficiency after Bariatric Surgery

Malka Yahalom, MD, DSc, FICA¹ Ofir Koren, MD, FICA^{1,2} Ehud Rozner, MD¹ Yoav Turgeman, MD^{1,2}

¹Heart Institute, HaEmek Medical Center, Afula, Israel

²Rappaport Faculty of Medicine, Technion – Israel Institute of Technology, Haifa, Israel

Address for correspondence Malka Yahalom, MD, DSC FICA, 62, Ben-Gurion Ave., P.O. Box 53, Kiryat-Bialik 2710001, Israel (e-mail: malka8@netvision.net.il).

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Abstract

Keywords

- cardiomyopathy
- congestive heart failure
- trace element deficiency
- bariatric surgery
- parenteral nutrition
- morbid obesity
- Keshan disease

Noncompliance with vitamin and mineral supplement protocol after bariatric surgery may lead to true-elements deficiency. Among them, zinc and selenium deficiencies were closely related to cardiac complications, such as myocardial fibrosis, heart failure, and arrhythmias.

We describe a 30-year-old female, 6 weeks after delivery and 5 years after bariatric surgery, who was admitted to the cardiology department because of dyspnea and clinical evidence of heart failure, as well as an echocardiogram that demonstrated reduced systolic left ventricular function. Standard antifailure regimen shows mild benefit. Zinc supplements added to treatment lead to significant clinical and echocardiographic improvement.

It has been shown that noncompliance with vitamins and mineral supplement protocol after bariatric surgery may lead to trace element deficiency (such as zinc, iron, vitamin B, and selenium), and related complications such as myocardial fibrosis, cardiomyopathy, heart failure, and arrhythmias. A similar phenomenon was first described in Keshan region in China where congestive cardiomyopathy was associated with endemic selenium deficiency.^{1–7}

Zinc and selenium participate in metabolic processes that involve reduced oxidative stress in the cardiac muscle. It has been proven that such deficiencies result in myocardial damage, fibrosis, congestive heart failure, arrhythmias, and death.^{8–10}

Case Report

We describe a 30-year-old female, 6 weeks postdelivery, who was admitted to the cardiology department due to dyspnea and a clinical evidence of heart failure. Her past medical history indicated sleeve gastrectomy 5 years ago due to morbid obesity without other comorbidities. Echocardiogram which was done routinely prior to the surgery was normal. The patient had neither previous cardiovascular

disease nor complains. Routine blood level of zinc was basically normal. On current admission, initial physical examination indicates rapid regular pulse, third heart sound, jugular veins congestion, and reduced breath sounds at the base of the lungs with severe sacral and leg edema.

An echocardiogram revealed nondilated, globally severely reduced systolic left ventricular function (= 30%) with normal valvular function and without pericardial effusion. On a chest X-ray, there was evidence of pulmonary venous congestion.

The initial diagnosis was cardiomyopathy most probably peripartum. Antifailure treatment regimen that included furosemide 40 mg twice daily, carvedilol 3.125 mg three times a day, and enalapril 10 mg twice a day was initiated without any significant improvement for 5 days. Due to significant low blood level of zinc (35 mcg/dL, normal value: 70–120 mcg/dL), we added oral supplements. After several days of oral zinc supplement on top of current antifailure regimen, clinical improvement was observed. Consecutive echocardiogram indicates mildly reduced left ventricular systolic function, estimated as 40 to 45%. Patients lost almost 10 kg of weight with progressive improvement in dyspnea and peripheral edema.

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During a 1-year follow-up, patient adhered to medical treatment and zinc supplement, and recent echocardiogram indicate normal left ventricular systolic function.

The clinical and echocardiogram improvement which initiated after oral zinc supplement, to our opinion, play a major contribution to the rapid improvement in heart failure which may be a sole cause of significant zinc deficiency or on top of peripartum cardiomyopathy.

Discussion

This case indicated a link between zinc deficiency with reversible cardiomyopathy.

We were unable to test for blood level of selenium due to technical issues. In the past three decades, selenium deficient cardiomyopathy has reemerged in Western medicine, secondary to gastrointestinal disorders, long-term total parenteral nutrition, and gastrointestinal surgery.

Conclusions

It is recommended, by us and others, that patients after bariatric surgery should be routinely followed up by a cardiologist and nutritional team. In selected patients with unclear evidence of cardiac disease, zinc and selenium blood level should be examined as a potential cause and should be treated by supplements as needed.

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