THE COURSE OF SUBCLINICAL SYSTEMIC LYMPHEDEMA OVER A SIX-YEAR PERIOD

Jose Maria Pereira de Godoy, MD, PhD1, Lívia Maria Pereira de Godoy, MD2, Glauco Veloso Rodarte de Melo, MD3, Maria de Fatima Guerreiro Godoy, OT, PhD4

1Cardiology and Cardiovascular Surgery Department of the Medicine School in São José do Rio Preto (FAMERP), CNPq (National Council for Research and Development)-Brazil

2Physician specialized in General Practice, member of Researcher Group of the Clínica Godoy, São José do Rio Preto, SP-Brazil

3Physician specialized in Urology Surgery, member of Researcher Group of the Clínica Godoy, São José do Rio Preto, SP-Brazil

4Occupational Therapist professor of the Post-Graduate Stricto Sensu in Medicine School in São José do Rio Preto (FAMERP) and Research Group in the Clínica Godoy, Sao Jose do Rio Preto, Brazil

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E-mail: godovimp@gmail.com

ABSTRACT

The aim of the present study was to evaluate the course of subclinical systemic lymphedema over a six-year period using bioelectrical impedance analysis. A 44-year-old woman sought our clinic six years ago with the complaint of pain and swelling in the legs upon waking that aggravated throughout the course of the day. The physical exam revealed edema in the legs and obesity, with a body mass index (BMI) of 50.6 kg/m². Bioelectrical impedance analysis was performed and revealed an increase in total intracellular and extracellular water beyond the range of normality. Over a six-year period, the patient lost 12 kilograms and her BMI was lowered, but the pattern of intracellular and extracellular water remained the same. Obesity is associated with an increase in body water characterizing subclinical systemic lymphedema, which is maintained over the years. A reduction in weight may lead to a reduction in the volume of liquids.

Key Words: Lymphedema, subclinical systemic lymphedema, bioelectrical impedance analysis

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INTRODUCTION

Obesity is worldwide public health problem that leads to a variety of physical and psychological changes. Weight loss is a challenge for these patients, many of whom seek solutions, such as bariatric surgery, but the metabolic problem often persists.¹

Obesity has been associated with lower limb lymphedema, which is yet another aggravating factor for this patients.² Lymphedema is a clinical condition that leads to the buildup of macromolecules in the interstitial space, which, in turn, leads to the accumulation of liquids. In most cases, it affects the limbs and is not a generalized condition.³

Studies with animals have shown that weight gain is accompanied by changes in capillary permeability, the pumping mechanism of blood vessels and the immune defense system as well as inflammatory processes. These findings suggest a systemic change that effects the entire lymphatic system.⁴,⁵

Recent studies report a new type of edema evaluated by bioelectrical impedance analysis that leads to increases in intracellular and extracellular liquids as well as liquids in the limbs and trunk beyond the standards of normality in obese individuals. This condition of generalized edema occurs as weight

Increases and has been denominated subclinical systemic lymphedema.⁶,⁷

The aim of the present study was to evaluate the course of subclinical systemic lymphedema over a six-year period using bioelectrical impedance analysis.

Case report

A 44-year-old woman sought our clinic six years ago with the complaint of pain and swelling in the legs upon waking that aggravated throughout the course of the day. She reported having bodily pain and a diagnosis of fibromyalgia. The physical exam revealed edema in the legs and obesity, with a body mass index (BMI) of 50.6 kg/m². Bioelectrical impedance analysis was performed and revealed an increase in total intracellular and extracellular water beyond the range of normality (Table 1).

Over a six-year period, the patient lost 12 kilograms and her BMI was lowered, but the pattern of intracellular and extracellular water remained the same. The recommendation is for continued weight loss and the practice of physical activity.
Table 1 – Values of intracellular water (ICW), extracellular water (ECW) and total body water (TBW) over six-year period in patient compared to normal range

<table>
<thead>
<tr>
<th></th>
<th>June 6, 2012</th>
<th>August 2, 2013</th>
<th>February 15, 2015</th>
<th>May 11, 2018</th>
<th>Normal range</th>
<th>ECW/TBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICW</td>
<td>30.0</td>
<td>30.0</td>
<td>28.6</td>
<td>28.3</td>
<td>19.9-24.3</td>
<td></td>
</tr>
<tr>
<td>ECW</td>
<td>19.5</td>
<td>18.9</td>
<td>18.3</td>
<td>18.4</td>
<td>12.1-14.9</td>
<td></td>
</tr>
<tr>
<td>ECW/TBW</td>
<td>0.394</td>
<td>0.383</td>
<td>0.389</td>
<td>0.395</td>
<td>0.36-0.39</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>50.6</td>
<td>49.5</td>
<td>47.6</td>
<td>46.7</td>
<td>0.388 (0.36-0.39)</td>
<td></td>
</tr>
<tr>
<td>Right Arm</td>
<td>3.18</td>
<td>3.19</td>
<td>3.11</td>
<td>2.97</td>
<td>1.62-1.98</td>
<td>0.388 (0.36-0.39)</td>
</tr>
<tr>
<td>Left Arm</td>
<td>2.98</td>
<td>3.0</td>
<td>2.97</td>
<td>2.86</td>
<td>1.62-1.98</td>
<td>0.388 (0.36-0.39)</td>
</tr>
<tr>
<td>Trunk</td>
<td>24.0</td>
<td>24.1</td>
<td>23.7</td>
<td>22.9</td>
<td>14.7-18.0</td>
<td>0.392 (0.36-0.39)</td>
</tr>
<tr>
<td>Right leg</td>
<td>7.78</td>
<td>7.34</td>
<td>7.11</td>
<td>7.44</td>
<td>5.13-6.27</td>
<td>0.400 (0.36-0.39)</td>
</tr>
<tr>
<td>Left leg</td>
<td>7.78</td>
<td>7.27</td>
<td>7.11</td>
<td>7.44</td>
<td>5.13-6.27</td>
<td>0.403 (0.36-0.39)</td>
</tr>
</tbody>
</table>

Discussion

The present study illustrates the six-year course of a patient with morbid obesity (BMI: 50.6 kg/m²) with an increase in intracellular and extracellular water as well as water in the limbs and trunk. The amount of body liquid is what most draws one’s attention in this patient, demonstrating that the increase in weight does not only stem from the increase in fat tissue, but also liquids. We denominate this increase in body water beyond the range of normality subclinical systemic lymphedema. Such findings have been published by the authors and have drawn attention. However, other types of edema associated with lymphedema and new therapeutic options should be considered.

Analyzing the bioimpedance findings, a continual reduction in liquid (intracellular, extracellular, limbs and trunk) occurred with the reduction in BMI. At the last evaluation, however, increases were found in the liquid of the lower limbs and the ECW/TBW ratio, suggesting the progression to clinical lower limb lymphedema.

The increase in total body liquid in all limbs and the trunk is associated with obesity. Animal studies have shown that an increase in obesity is accompanied by changes in the pumping of the lymphatic system, capillary permeability and immune defense as well as inflammatory processes. This association has been identified in a clinical trial – as BMI increases, there is an increase in body...
liquids that can lead to generalized lymphedema, which can be determined using bioelectrical impedance analysis. This edema is seen in the lower limbs and trunk of the patient described herein.

The present study paves the path for a line of research related to obesity and lymphedema, in which we find that the reduction in obesity is associated with improvements in clinical lymphedema and the volume of body water, but not always with the normalization of body water.

Conclusion

Obesity is associated with an increase in body water characterizing subclinical systemic lymphedema, which is maintained over the years. A reduction in weight may lead to a reduction in the volume of liquids.

Conflict interest

The authors declared no have conflict interest for the study.

Funding statement

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