Electrical bioimpedance analysis for assessment of nutritional status and prognosis in a patient with primary myelofibrosis undergoing allogeneic hematopoietic stem-cell transplantation

Keywords: proinflammatory, nutritional, multifactorial, monitoring disease, abdominal fullness

Abbreviations: WL, weight loss; PMF, primary myelofibrosis; PA, phase angle; BIA, bioimpedance analysis; HSCT, hematopoietic stem-cell transplantation;

Case report

Progressive, involuntary weight loss (WL) is common in patients with primary myelofibrosis (PMF). The etiology of this manifestation is multifactorial, and includes increased levels of proinflammatory cytokines, abdominal pain and enlargement, early satiety, and decreased oral intake. A triad of ascites, edema, and splenomegaly is common in these patients. Therefore, body weight may be overestimated due to fluid overload. A comprehensive nutritional assessment, including measurement of dry weight, is necessary for monitoring disease progression and to allow effective planning of nutritional interventions. In addition to dry weight, another important parameter is the phase angle (PA), which has been suggested as a prognostic marker in patients with cancer. The PA, measured through electrical bioimpedance analysis (BIA), is a marker of cell mass; it correlates positively with muscle mass and negatively with survival. PA is considered low if $<5.0^\circ$ in men or $<4.6^\circ$ in women. To date, there have been no reports of BIA in patients with PMF.

A 56-year-old man was diagnosed with PMF in 2013. Due to low-risk disease and absence of a JAK mutation, a watchful waiting approach was adopted. In 2016, the patient reported onset of the constitutional symptoms of PMF, including WL, abdominal fullness, abdominal distension, and fatigue. In February 2017, the patient reported worsened symptoms, and a bone marrow biopsy revealed 10% blasts. Ruxolitinib was started, but discontinued after 4 months due to lack of response. In June 2017, the patient was admitted with constitutional symptoms of PMF, including WL, abdominal fullness, and splenomegaly, as well as nonsignificant WL (3.1% in 1 month).

Unfortunately, despite successful hematopoietic engraftment, he developed multiple complications and died of septic shock on D+62.

| Table 1 Electrical bioimpedance analysis findings on HSCT D-13 and D+13. |
|-------------------------|-------------------------|
| Before electric bioimpedance | After electric bioimpedance |
| Weight | 75.3kg | 69.7kg |
| BMI 20.6kg/m² | 19.1kg/m² |
| Weight | 66.1kg | 63.9kg |
| BMI 18.1kg/m² | 17.5kg/m² |
| Fluid balance | + 9.2L | + 5.8L |
| Phase angle at 50kHz | 3.15° | 3.17° |

At both time points of BIA, the patient was found to be in a state of fluid overload, which corroborates the hypothesis that weight should be evaluated cautiously in patients with PMF. Accurate estimation of dry weight allows design of reliable interventions and energy and protein intake goals without overestimating or underestimating nutritional needs—either of which would be detrimental to the patient, would cause pain and discomfort for the extra volume of enteral diet based on current or incorrect weight—and allows the clinician to monitor the effectiveness of the proposed interventions. Limitations for the use of BIA include the biases of body composition data (lean mass and fat mass), which are influenced by the presence of edema and splenomegaly, and should thus be disregarded in this setting.

Additional studies are needed to demonstrate the effectiveness of cyclosporine and mycophenolate. On D+13 of HSCT, a repeat BIA revealed a dry weight of 63.9kg (fluid balance +5.8L; BMI 17.5kg/m² [grade I underweight]; phase angle at 50 kHz: 3.17°), as well as nonsignificant WL (3.1% in 1 month).
BIA in these patients, but if a BIA device is available, its use can be considered for monitoring of dry weight and phase angle, both of which are predictive of clinical outcomes and help us with decisions at each moment of treatment, avoiding possible patient suffering related to nutritional therapy.

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Conflict of interest

The author declares no conflict of interest.

References


