

Background: Lymphedema results from inadequate transport of lymphatic fluid, and typically affects the extremities. The condition may be caused by maldevelopment of lymphatics or by injury to lymph nodes or vessels. Recently, obesity has been recognized as a novel cause of extremity lymphedema. The purpose of this study was to characterize patients with obesity-induced lymphedema.

Methods: Patients referred to our Lymphedema Program between 2009 and 2013 with possible lower extremity lymphedema were reviewed. Individuals with a body mass index (BMI) ≥ 30 who underwent lymphoscintigraphy to assess lymphatic function were studied. Patients with a history of primary lymphedema, lymphadenectomy, or nodal radiation were excluded. Gender, age, BMI at the time of lymphoscintigraphy, and maximum BMI history were recorded.

Results: Forty patients met inclusion criteria; mean age was 54.6 years (range 14-85 years). Lymphoscintigraphy showed that 27 patients had normal lymphatic function, and 13 (7 females, 6 males) had lymphatic dysfunction consistent with obesity-induced lymphedema. Obese patients with normal lymphoscintigraphy findings had a BMI at the time of their study of 38.5 (range 30.3-56.8), and a maximum BMI history of 44.4 (range 30.3-85.4). Individuals with lower extremity lymphedema had a greater BMI at the time of lymphoscintigraphy (64.1; range 43.9-83.0) ($p < 0.0001$), and a higher maximum BMI history (76.1; range 60.5-105.6) ($p < 0.0001$). The patient with the highest BMI history of 105.6 also had bilateral upper extremity lymphedema confirmed by lymphoscintigraphy.

Conclusions: Massive obesity can cause extremity lymphatic dysfunction. A BMI threshold appears to exist at which point lower extremity lymphedema occurs, followed by upper extremity disease. Patients with obesity-induced lymphedema are referred to a bariatric center because weight loss appears to improve lymphatic function, but may not reverse the condition.

Figure Legend: Obesity-induced lower extremity lymphedema; a BMI threshold appears to exist between 53-59 when lymphatic dysfunction occurs. (*Left*) Adult female with a BMI of 53.3. Lymphoscintigraphy illustrates normal transit to inguinal nodes 20 minutes following injection. (*Right*) Adult female with a BMI of 78.3. Lymphoscintigram shows delayed transit of tracer to inguinal nodes 3 hours following injection, tortuous collateral lymphatic channels, and dermal backflow consistent with lymphedema. Arrows indicate inguinal nodes, black arrowheads show tortuous lymphatic channels and dermal backflow, and white arrowheads mark the feet where the radiolabelled tracer was injected.

BMI 53.3



BMI 78.3

