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Bilateral aggravation of CEAP score associated with obesity

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SOUHRN

Kontext: Chronické žilní onemocnění je časté postižení vyvolávající pocit nepohodlí s negativními dopady na kvalitu života; obezita je spojena s omezenou mobilitou kloubů a zhoršením chronického žilního onemocnění.
Cíl: Cílem této studie bylo zhodnotit zhoršování skóre CEAP pro obě dolní končetiny se zvyšující se hodnotou indexu tělesné hmotnosti (body mass index, BMI).
Metoda: Na Belczakově klinice v brazilském městě Maringá bylo vyšetřeno 45 pacientů s křečovými žilami na dolních končetinách a s BMI > 40 kg/m^2. Pacienti s klinickou diagnózou křečových žil a BMI > 40 kg/m^2 byli rozděleni do tří skupin: skupina I – BMI > 50 kg/m^2; skupina II – BMI 45–50 kg/m^2; a skupina III – BMI 40–45 kg/m^2. Po zařazení do studie byli vyšetřeni pacienti s varixy na obou dolních končetinách ve stupni ≥ C3 klasifikace CEAP.
Výsledky: Fisherův exaktní test prokázal výraznější otoky na obou dolních končetinách ve skupině I vs. skupina II (p = 0,04), Pacienti ve skupině I měli výraznější otoky na obou končetinách než pacienti ve skupině III (p = 0,0001) a skupina II vykazovala výraznější otoky bilaterálně než skupina III (p = 0,001).
Závěr: Tato studie prokázala, že u pacientů s chronickým žilním onemocněním je obezita spojena s tvorbou otoků na obou dolních končetinách.

Keywords:
Aggravation
Bilateral edema
CEAP score
Obesity

ABSTRACT

Background: Chronic venous disease is common and causes discomfort, exerting a negative impact on quality of life and obesity is associated with a reduction in joint mobility and the aggravation of chronic venous disease.
Aim: The aim of the present study was to evaluate the worsening of the CEAP score bilaterally with the increase in the body mass index (BMI).
Method: Forty-five patients with varicose vein in the lower limbs and a BMI higher than 40 kg/m^2 were evaluated at the Belczak Clinic in the city of Maringá, Brazil. Patients with a clinical diagnosis of varicose veins and BMI higher than 40 kg/m^2 were divided into three groups: Group I – BMI >50 kg/m^2; Group II – BMI 45 to 50 kg/m^2; and Group III – BMI 40 to 45 kg/m^2. After inclusion into the study, patients with bilateral varicose veins equal to or higher than C3 of the CEAP classification were evaluated.
Results: Fisher's exact test revealed that Group I had more bilateral edema than Group II (p = 0.04), Group I had more bilateral edema than Group III (p = 0.0001) and Group II had more bilateral edema than Group III (p = 0.001).
Conclusion: The present study shows that obesity is associated with the formation of bilateral edema in patients with chronic venous disease.

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Introduction

Chronic venous disease is common and causes discomfort, exerting a negative impact on quality of life.[1] Obesity is associated with a reduction in joint mobility and the aggravation of chronic venous disease.[2] One study demonstrates significant restrictions in joint mobility (measured using a goniometer) in stage C5 of the Clinical-Etiological-Anatomical-Physiopathological (CEAP) classification, but significant changes in the ejection fraction and residual volume fraction are seen in stage C4.[3]

Recent studies have associated obesity with systemic lymphedema as well as the development of a novel concept of lymphedema determined using bioelectrical impedance analysis, namely, subclinical systemic lymphedema.[4,5]

Important changes in the lymphatic system have been seen in animal studies, showing that the increase in obesity is associated with changes in the lymphatic pumping mechanism, capillary permeability and immunological defense as well as the occurrence of the inflammatory process.[6,7] Moreover, the few studies addressing treatment show that weight loss is associated with an improvement in edema.[8,9]

What we observe in daily clinical practice is the aggravation of edema and a worse CEAP score with the increase in harm to the venous and lymphatic systems.

Chronic venous insufficiency is associated with the presence of cardiovascular risk factors and disease. Individuals with CVI experience an elevated risk of death, which is independent of age and sex, and present cardiovascular risk factors and comorbidities.[8] Obesity is an aggravating factor and one of the characteristics is bilateral aggravation.

The aim of the present study was to evaluate the worsening of the CEAP score bilaterally with the increase in the body mass index (BMI).

Methods

Patients and setting

Forty-five patients with varicose vein in the lower limbs and a BMI higher than 40 kg/m^2 were evaluated at the Belczak Clinic in the city of Maringá, Brazil.

Inclusion criteria

Varicose veins in the lower limbs and a BMI higher than 40 kg/m^2.

Exclusion criteria

Other causes of edema diagnosed during the clinical evaluation.

Development

Patients with a clinical diagnosis of varicose veins and BMI higher than 40 kg/m^2 were divided into three groups: Group I – BMI >50 kg/m^2; Group II – BMI 45 to 50 kg/m^2; and Group III – BMI 40 to 45 kg/m^2. After inclusion into the study, patients with bilateral varicose veins equal to or higher than C3 of the CEAP classification were evaluated.

Statistical analysis

Statistical analysis was performed using Fisher's exact text and considering an alpha error of 5%.

Ethical considerations

The study was approved by the Ethical Committee Centro Universitário de Maringá (CESUMAR)-Brazil#240\09.

Results

Group I (BMI >50 kg/m^2) was composed of nine individuals (seven women and one man) with a mean age of 49.9 years (Table 1). All nine individuals had a CEAP sco-

Table 1 – Age, BMI, and CEAP score of each leg in patients with BMI > 50 kg/m^2

Age	BMI	CEAP R. leg	CEAP L. leg	Sex
29	50.64	C3	C3	F
60	51.06	C4	C4	F
42	53.40	C3	C4	F
68	50.94	C4	C4	F
67	53.35	C2	C3	F
44	50.42	C3	C3	F
67	52.71	C3	C4	F
32	58.15	C3	C4	F
40	50.26	C4	C4	M

Table 2 – Age, BMI, and CEAP score of each leg in patients with BMI 45 to 50 kg/m^2

Age	BMI	CEAP R. leg	CEAP L. leg	Sex
54	46.37	C3	C4	F
39	45.08	C1	C2	F
55	47.37	C3	C3	F
56	45.17	C2	C3	F
27	45.54	C0	C1	F
57	45.29	C4	C2	M
61	45.99	C3	C3	F
36	47.34	C2	C1	F
48	49.72	C3	C4	M
50	46.22	C4	C3	F
51	46.76	C3	C2	F
51	47.29	C3	C2	F
42	47.80	C3	C4	F
61	49.66	C3	C4	F
21	49.13	C3	C3	F
39	46.65	C2	C2	F
32	45.33	C1	C2	F
34	48.42	C2	C3	F

Table 3 – Age, BMI, and CEAP score of each leg in patients with BMI > 40 to 45 kg/m²

Age	BMI	CEAP R. leg	CEAP L. leg	Sex
36	44.27	C0	C2	F
57	42.87	C3	C1	F
40	42.16	C2	C3	F
29	41.96	C0	C2	F
55	44.28	C2	C2	M
30	42.72	C1	C2	F
59	44.00	C2	C3	M
27	41.56	C1	C1	F
35	44.26	C1	C0	F
54	44.14	C2	C3	F
38	43.43	C2	C2	F
47	42.61	C2	C3	M
55	42.10	C0	C1	F
38	44.08	C1	C2	F
28	42.13	C2	C3	F

re of C3 or higher bilaterally. Among the 18 patients in Group II (BMI 45 to 50 kg/m²) (Table 2), 16 were women and two were men, with a mean age of 42.2 years, and eight had edema bilaterally. Among the 15 patients in Group III (BMI 40 to 55 kg/m²) (Table 3), 12 were women and three were men, with a mean age of 41.8 years, and none had bilateral edema. Fisher's exact test revealed that Group I had more bilateral edema than Group II ($p = 0.04$), Group I had more bilateral edema than Group III ($p = 0.0001$) and Group II had more bilateral edema than Group III ($p = 0.001$). No significant difference in age was found among the three groups.

Discussion

The present study shows that the increase in BMI aggravates chronic venous disease (CVD) bilaterally. Few studies in the literature have confirmed the association between obesity and the aggravation of CVD.[2] However, the present study shows that the involvement is bilateral, suggesting another physiopathological process that affects both limbs. As the lymphatic system is the functional reserve of the venous system, damage to the lymphatic system can theoretically aggravate CVD.

Animal studies have shown that an increase in weight compromises the lymphatic pumping mechanism, alters capillary permeability, affects immune defense and contributes to the inflammatory process.[8–10] These finding are compatible with those reported by Godoy, who found that obesity was a specific cause of subclinical systemic lymphedema and its progression to the clinical form.[4,5] Weight loss leads to an improvement in edema, suggesting the effect of excess weight on the development of lymphedema.[11] These findings suggest that a worsening of the CEAP score in obesity may have another physiopathological component, namely, harm to the lymphatic system caused by obesity.

Bioelectrical impedance analysis is an important exam for following up these patients regarding the evaluation of venous and lymphatic edema. This method enables the identification of edema and variations over time.

Systemic impairments involving the formation of edema are generally bilateral, as seen in patients progressing to morbid obesity.[5] When evaluating edema, however, one should identify possible aggravating mechanisms, such as obesity, erysipelas, deep vein thrombosis, trauma as well as cardiac, renal and other causes.[12]

Conclusion

The present study shows that obesity is associated with the formation of bilateral edema in patients with chronic venous disease.

Conflict of interest and funding body
The authors declared no financial support and conflict interest.

Author's contribution
Design and conduct of the study: Belczak SQ, Ramos RN, Godoy JMP
Collection data: Belczak SQ, Ramos RN, Godoy JMP
Management: Belczak SQ, Ramos RN, Godoy JMP
Analysis and interpretation of the data: Belczak SQ, Ramos RN, Godoy JMP
Preparation: Belczak SQ, Ramos RN, Godoy JMP
Review: Belczak SQ, Ramos RN, Godoy JMP
Approval of the manuscript: Belczak SQ, Ramos RN, Godoy JMP
Decision to submit the manuscript for publication: Belczak SQ, Ramos RN, Godoy JMP
All authors approved the manuscript.

Data availability statement
The data used to support the findings of this study are included within the article.

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