Nutrición Hospitalaria

Original

Should ascitis volume and anthropometric measurements be estimated in hospitalized alcoholic cirrotics?

E. M. Silva[1], L. C. S. L. Morais[2], J. E. M. Medeiros Filho[3], L. S. R. Asciutti[2], H. A. C. Rocha[3], M.ª J. C. Costa[2], M.ª C. R. Gonçalves[2] and J. Faintuch[4]

[1]RD. University Hospital Lauro Wanderley. Federal University of Paraiba. João Pessoa. Brazil. [2]Postgraduate Program in Nutritional Sciences. Federal University of Paraiba. João Pessoa. Brazil. [3]MD. Department of Medicine. University Hospital Lauro Wanderley. Federal University of Paraiba. João Pessoa. Brazil. [4]MD. PhD. Department of Gastroenteroly. Hospital das Clinicas. Sao Paulo. Brazil.

Abstract

Introduction: Ascitis and undernutrition are frequent complications of cirrhosis, however ascitis volume and anthropometric assessment are not routinely documented or considered in prognostic evaluation . In a homogeneous cohort followed during two years these variables were scrutinized, aiming to ascertain relevance for long-term outcome.

Methods: Population (N = 25, all males with alcoholic cirrhosis) was recruited among patients hospitalized for uncomplicated ascitis. Exclusion criteria were refractory or tense ascitis, cancer, spontaneous bacterial peritonitis, bleeding varices and critical illness. Measurements included ultrasonographically estimated ascitis volume, dry body mass index/BMI , upper arm anthropometrics, hematologic counts and liver function tests.

Results: Population (age 48.3 ± 11.3 years, BMI 21.1± 3.5 kg/m², serum albumin 2.5 ± 0.8 g/dL) was mostly in the Child-Pugh C category (77.8%) but clinically stable. During the follow-up period of 22.6 ±3.8 months, additional hospitalizations numbered 1.7 ± 1.0 and more than one quarter succumbed . Admission ascitis volume corresponded to 7.1 ± 3.6 L and dry BMI to 18.3 ± 3.5 kg/m². Child Pugh index was relevant for both mortality and rehospitalization. Nevertheless, similar matches for mortality were documented with ascitis volume and dry BMI, and arm circumference below the 5th percentile was highly significantly associated with rehospitalization.

Conclusions: A greater association than hitherto acknowledged, between ascitis volume and anthropometric measurements from one side, and long-term rehospitalization and mortality from the other, was demonstrated in male stable alcoholic cirrhotics. Further studies with alcoholic and other modalities of cirrhosis including women are recommended.

(*Nutr Hosp.* 2012;27:2089-2092)

DOI:10.3305/nh.2012.27.6.6123

Key words: *Alcoholic cirrhosis. Ascitis. Malnutrition. Dry body mass. Ascitis volume. Anthropometric assessment. Rehospitalization. Mortality.*

¿ES CONVENIENTE ESTIMAR EL VOLUMEN ASCÍTICO Y LAS MEDIDAS ANTROPOMÉTRICAS EN PACIENTES HOSPITALIZADOS CIRRÓTICOS?

Resumen

Introducción: Ascitis y desnutrición son complicaciones frecuentes de la cirrosis, pero el volumen ascítico y la evaluación antropométrica no son como rutina documentadas o consideradas para la evaluación del pronóstico. En un coorte homogéneo de pacientes acompañados por dos años estas variables fueron escrutinadas, con el objetivo de determinar su relevância para los resultados clínicos de largo plazo.

Métodos: La población (N = 25, todos hombres con cirrosis alcohólica) fue recrutada entre pacientes hospitalizados por ascitis no complicada. Los critérios de exclusión fueron ascitis tensa o refractária, peritonitis bacteriana espontánea, varices sangrantes y enfermedad crítica. Los métodos involucraron volumen ascítico estimado ultrasonograficamente, el índice seco de masa corporal/IMC seco, antropometria del brazo, recuentos hematológicos y pruebas de función hepática.

Resultados: La población (edad 48,3 ± 11,3 años, IMC 21,1 ± 3,5 kg/m², albumina sérica 2,5 ± 0,8 g/dL) encontrabase predominantemente en la categoria Child-Pugh C (77,8%) , pero clinicamente estable. En el período de seguimiento de 22,6 ± 3,8 meses hubo 1,7 ± 1,0 hospitalizaciones adicionales por paciente, y mas de una cuarta parte sucumbió. El volumen ascítico de admisión fue de 7,1 ± 3,6 L y el IMC seco de 18,3 ± 3,5 kg/m². El indice de Child-Pugh fue relevante tanto para mortalidad como para rehospitalización. Asociaciones similares para mortalidad fueron demonstradas para volumen ascítico y para IMC seco, y la circunferencia del brazo abajo del 5º percentil fue un indicador muy significativo para rehospitalización.

Conclusiones: Una asociación mas importante que lo hasta ahora publicado ocurrió entre volumen ascítico y antropometria de una parte, y mortalidad asimismo rehospitalización de otra parte, en pacientes masculinos cirróticos alcohólicos estables. Estúdios adicionales con cirrosis alcohólica y de otras modalidades incluyendo mujeres son recomendados.

(*Nutr Hosp.* 2012;27:2089-2092)

DOI:10.3305/nh.2012.27.6.6123

Palabras clave: *Cirrhosis alcohólica. Ascitis. Desnutrición. Masa corporal magra. Volumen ascítico. Medidas antropométricas. Rehospitalización. Mortalidad.*

Introduction

Malnutrition has been emphasized in liver cirrhosis for decades, with prevalence as high as 75%.[1-5] Ascitis is not uncommon either, especially in late disease.[6,7] With few exceptions, modern therapeutic protocols have not substantially touched the main liver damage.[8] Nevertheless, the alluded to complications typically respond to nutritional support and diuretic administration. In this sense they are prone to be overlooked within the larger context of the disease.

Earlier protocols highlighted association between both undernutrition[3,4] and ascitis[4,6,7] with mortality. Indeed, in the absence of severe portal hypertension the two complications tend to be related.[2] In contrast to some recommendations,[9,10] prognostic indices such as Child Pugh and MELD (Model for End-Stage Liver Disease)[11] do not consider these variables.

Given the prognostic relevance of ascitis and malnutrition particularly in alcoholic cirrhosis,[12,13] a prospective pilot study was conducted. The aim was to analyze mortality and rehospitalization during a two-year period, in a homogeneous male cohort followed in an academic setting.

Material and methods

The study was approved by the institutional Ethical Committee, and all patients gave written informed consent.

Population (N = 25, all males), with clinically diagnosed alcoholic cirrhosis confirmed by imaging methods, was consecutively recruited among patients hospitalized for ascitis treatment. Exclusion criteria were refractory or tense ascitis, cancer, alcoholic hepatitis, spontaneous bacterial peritonitis, bleeding varices, critical illness or admission to the intensive care unit .

Patients were seen by a multidisciplinary team including dietitian, surgeon and gastroenterologist, along with other specialists whenever required. Diet, diuretics and other prescriptions were in agreement with accepted protocols, and abstinence was a therapeutic priority.[7,8]

Measurements included nutritional status (arm circumference, triceps skinfold, body mass index/BMI, plasma proteins) liver function tests, lipid fractions and hematologic counts. Dietary intake and also Child-Pugh and MELD indices were calculated.

Exploratory paracentesis was not routine, ascitic fluid analysis being conducted when any clinical or biochemical sign of infection was present. Ascitis was clinically evaluated at admission[14] and the volume sonographically defined.[15] On the basis of ascitis volume, corrected (dry) BMI was estimated.

Values are presented as mean ± SEM. Student's "t" test was selected for continuous variables, if necessary employing logarithmic conversion. Pearson correlation

Table I Demographic findings, prognostic indices and general outcome	
Age (years)	48.3 ± 11.3
Gender	100% males
Child-Pugh (%)	22.2% B, 77.8% C
MELD (points)	28.9 ± 8.6
Follow up (months)	22.6 ± 3.8
Mortality (%)	27.8% (5/18)
Rehospitalizations (episodes/patient)	1.7 ± 1.0

coefficient (r) was calculated for targeted measurements, and positive findings were confirmed by multivariate analysis.

A significance level of 5% was established, and Graph Pad Prism 4.0 software (Graph Pad, San Diego, CA, USA) was utilized for all calculations.

Results

All patients agree to the protocol however exclusion criteria were identified in seven , therefore the effective cohort encompassed 18 cases. General features of these patients are depicted in table I.

Dietary intake during admission was excellent (2,815 ± 279 kcal and 130 ± 12 g protein/day) however prehospitalization dietary recall could not be performed. Most were in the Child-Pugh C category, and mortality was comparably elevated within the observation period, despite adequate follow-up.

Biochemical profile was consistent with the advanced cirrhosis status. Serum albumin was severely depressed, anemia was common and systemic inflammation was confirmed, but without peritonitis or sepsis. Uncorrected BMI was acceptable but not triceps skinfold and arm circumference. Skinfold below the 5th percentile was not as common (16.7%, 3/18) as arm circumference (77.8%, 14/18), indicating predominant muscle wasting.

Mean ascitis volume reached 7.1 ± 3.6 liters, and when dry BMI was computed also this anthropometric measurement was below the normal range, confirming both visceral and somatic malnutrition (table II).

A few results were relevant for survival, namely number of hospital admissions which was quite obvious, and classic Child-Pugh index. Low platelet count is a known marker of liver fibrosis and of portal hypertension and did not surprise. A negative impact for low BMI (dry weight) as well as of massive ascitis was evident . MELD did not reach significance.

As concerns rehospitalizations Child-Pugh C index appeared again, but a particularly good match was noticed for arm circumference below the 5th percentile (table III).

Ascitis volume, dry BMI and arm circumference correlated with themselves as well as with other nutri-

Table II	
Biochemical, anthropometric and ascitis volume results	
Total bilirubin (mg/dL)	4.2 ± 4.8
Prothrombin time (s)	36.4 ± 14.8
International normalized ratio	3.6 ± 1.5
C-reactive protein (mg/dL)	13.2 ± 16.7
Platelets (X 1,000/mm^3)	169 ± 101
White blood cell count/mm^3	$7,759 \pm 4,304$
Serum albumin (g/dL)	2.5 ± 0.8
Hemoglobin (g/dL)	9.7 ± 3.1
Arm circumference (cm)	23.9 ± 3.4
Tríceps skinfold (mm)	8.2 ± 7.9
BMI (standard) (kg/m^2)	21.1 ± 3.5
Ascitis volume (L)	7.1 ± 3.6
BMI (dry weight) kg/m^2	18.3 ± 3.5

tional and metabolic markers, but not with Child-Pugh, MELD or other tests. Such profile reinforces the contribution of body protein consumption to the unfavorable clinical course, independently from traditional prognostic signals (table IV).

Discussion

Currently the main chronic liver derangement worldwide as well as the principal predisposing condition for liver cirrhosis, cancer and transplantation is nonalcoholic fatty liver disease, a condition associated with overweight and metabolic syndrome.[16] Even statistics of viral and alcoholic cirrhosis are influenced by the widespread obesity epidemic, and obesity has been shown to be an independent predictor of clinical decompensation, including ascitis, in cirrhosis of all etiologies.[17]

Yet malnutrition is a classic feature of liver cirrhosis which depends on degree of liver damage , hypermetabolism, renal compromise and other complications,

but also on such iatrogenic causes as repeated paracenteses, lactulose-related diarrhea, degree of protein restriction, and other interventions. In nonabstinent alcoholics, the substance addiction itself may be a precipitant of systemic inflammation and muscle wasting.[1,8,18]

Developing countries understandably exhibit higher proportions of body protein consumption than industrialized ones, due to the synergy between primary and secondary malnutrition.[1,5,12] Yet in Child-Pugh C patients, such as the majority of the currently documented cases, cachexia risk seems to be universal.[2,5,19]

In most centers anthropometric assessment along with dry weight are not calculated and ascitis classification is qualitative, as adopted by the International Ascites Club.[20] The advent of ascitis has been associated with up to 50% mortality within two years.[21] Prognosis of malnutrition is less precise, in spite of ample evidence for a deleterious impact,[1,3-5,12,22] one of the reasons being lack of consensus on which malnutrition indices are most useful for this population.[8,22,23]

Body mass index, upper arm anthropometrics, subjective global assessment, biochemical markers, dietary intake and complex body composition techniques have all been investigated, but with rather conflicting results. Admittedly liver dysfunction, and especially peripheral and peritoneal fluid accumulation, tend to interfere with most of these indices.[8,22,23]

Large population studies exist but participants are often heterogenous, including both stable and critically ill cases. The interference of obese cirrhotics on mean nutritional results, as already alluded to, may be conspicuous in certain environments. Moreover, independent and meaningful end-points such as number of hospitalizations and long-term mortality are not often selected. To the best of our knowledge, this is the first long-term observation with stable alcoholic cirrhosis and uncomplicated ascitis, focusing the role of anthropometric findings.

Current results endorse the association of ascitis volume and dry body mass index with mortality in the

Table III			
Outcome differences			
Mortality	*Yes*	*No*	*Significance*
Ascitis volume(L)	6.4 ± 2.8	8.9 ± 3.2	$P = 0.041$
BMI (dry weight) (kg/m^2)	18.9 ± 3.6	15.4 ± 1.6	$P = 0.047$
Rehospitalization(/patient)	1.3 ± 0.8	2.8 ± 1.0	$P = 0.011$
Child Pugh classification	69.2% C (9/13)	100% C (5/5)	$P = 0.045$
MELD (points)	28.3 ± 8.3	29.4 ± 9.4	$P = 0.481$
Platelet count (X 1,000/mm^3)	194 ± 101	103 ± 57	$P = 0.048$
Rehospitalization	*Yes*	*No*	*Significance*
Arm circumference < 5th	100% (13/13)	0%(0/5)	$P < 0.001$
Child Pugh C	84.6% (11/13)	40.0%(3/5)	$P = 0.037$

Obs: Arm circumference < 5th percentile.

Table IV
Correlations of ascitis volume, dry BMI and arm circumference

Variable	"r" correlation index	Significance
Ascitis volume		
Arm circumference	**0.631**	**P = 0.006**
Tríceps skinfold	0.505	P = 0.037
HDL cholesterol	**0.504**	**P = 0.037**
Dry BMI		
Arm circumference	**0.608**	**P = 0.008**
Triceps skinfold	0.578	P = 0.010
Arm circumference < 5th percentile		
Hemoglobin	**0.483**	**P = 0.048**

Obs: Values in bold were confirmed by multivariate analysis.

ensuing two years. Depressed arm circumference shoud be underscored as well, because of robust correlation with these primary markers, and notably with rehospitalizations. Some of these measurements have been addressed in other protocols, but targeting different populations and outcomes.[1,3,4,23]

The lack of end-stage liver disease may explain why MELD failed. The same reason justifies the lack of liver transplantaion in this series. Child-Pugh classification retained its prognostic interest, although correlation was not better than with the highlighted measurements. Given the fact that this was a pilot protocol, additional investigations will be necessary to confirm present findings.

Conclusions

A greater association than hitherto acknowledged, between ascitis volume and anthropometric measurements from one side, and long-term rehospitalization and mortality from the other, was demonstrated in stable hospitalized alcoholic cirrhotics. Paracentesis was not necessary for volume estimation. Further studies with alcoholic and other modalities of cirrhosis are recommended.

Acknowledgments

References

1. Caly WR, Strauss E, Carrilho FJ, Laudanna AA. Different degrees of malnutrition and immunological alterations according to the aetiology of cirrhosis: a prospective and sequential study. *Nutr J* 2003; 2: 10-16.
2. Lautz HU, Selberg O, Körber J, Bürger M, Müller MJ. Protein-calorie malnutrition in liver cirrhosis. *Clin Investig* 1992; 70: 478-486.
3. Alberino F. Nutrition and survival in patients with liver cirrhosis. *Nutrition* 2001; 17: 445-450.
4. Merli MM, Riggio O, Dally L. Does malnutrition affect survival in cirrhosis? PINC (Policentrica Italiana Nutrizione Cirrosi). *Hepatology* 1996; 23: 1041-1046.
5. Carvalho L, Parise ER Evaluation of nutritional status of nonhospitalized patients with liver cirrhosis. *Arq Gastroenterol* 2006; 43: 269-74.
6. Planas R, Montoliu S, Ballesté B, Rivera M, Miquel M, Masnou H et al. Natural history of patients hospitalized for management of cirrhotic ascites. *Clin Gastroenterol Hepatol* 2006; 4: 1385-1394.
7. Biecker E. Diagnosis and therapy of ascites in liver cirrhosis. *World J Gastroenterol* 2011 ;17: 1237-48.
8. Gao B, Bataller R. Alcoholic liver disease: pathogenesis and new therapeutic targets. *Gastroenterology* 2011; 141: 1572-85.
9. Fernández-Esparrach, G, Sánchez-Fueyo, A, Ginès, P, Uriz J, Quintó L, Ventura PJ et al. A prognostic model for predicting survival in cirrhosis with ascites. *J Hepatol* 2001; 34: 46-52.
10. Abad A, Cabre E, Gonzalez-Riuz F. An index including objective nutritional parameters predicts mortality more acurately than Child-Pugh score in advanced cirrhosis. Multivariate analysis (abstract). *Gastroenterology* 1991; 100: A711.
11. Kamath, PS, Wiesner, RH, Malinchoc, M, Kremers W, Therneau TM, Kosberg CL et al. A model to predict survival in patients with end-stage liver disease. *Hepatology* 2001; 33: 464-470.
12. Panagaria N, Varma K, Nijhawan S, Mathur A, Rai RR. Comparison of nutritional status between patients with alcoholic and non-alcoholic liver cirrhosis. *Trop Gastroenterol* 2006; 27: 75-9.
13. Lieber CS. Alcohol and the liver: 1994 update. *Gastroenterology* 1994; 106: 1085-1105.
14. James R. Nutritional support in alcoholic liver disease: a review. *J Human Nutr Diet* 1989; 2: 315-323.
15. Irshad A, Ackerman SJ, Anis M, Campbell AS, Hashmi A, Baker NL. Can the smallest depth of ascitic fluid on sonograms predict the amount of drainable fluid? *J Clin Ultrasound* 2009; 37: 440-4.
16. Sun B, Karin M. Obesity, inflammation and liver cancer. *J Hepatol* 2011.
17. Berzigotti A, Garcia-Tsao G, Bosch J, Grace ND, Burroughs AK, Morillas R et al. Obesity is an independent risk factor for clinical decompensation in patients with cirrhosis. *Hepatology* 2011; 54: 555-61.
18. Sobral-Oliveira MB, Faintuch J, Guarita DR, Oliveira CP, Carrilho FJ. Nutritional profile of asymptomatic alcoholic patients. *Arq Gastroenterol* 2011; 48: 112-8.
19. Campillo B, Richardet JP, Scherman E, Bories PN. Evaluation of nutritional practice in hospitalized cirrhotic patients: results of a prospective study. *Nutrition* 2003;19: 515-521.
20. Arroyo V, Gines P, Gerbes A L, Dudley FJ, Gentillini P, Laffi G et al. Definition and diagnostic criteria of refractory ascites and hepatorenal syndrome in cirrhosis. International Ascites Club. *Hepatology* 1996; 23: 164-176.
21. Moore KP, Aithal GP. Guidelines on the management of ascites in cirrhosis. *Gut* 2006; 55 (Suppl. 6): vi1-12.
22. Henkel AS, Buchman AL. Nutritional support in patients with chronic liver disease. *Nat Clin Pract Gastroenterol Hepatol* 2006; 3: 202-209.
23. Morgan MY, Madden AM, Soulsby CT, Morris RW. Derivation and validation of a new global method for assessing nutritional status in patients with cirrhosis. *Hepatology* 2006; 44: 823-35.