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Baveno VI and Expanded Baveno VI criteria successfully predicts the absence of high-risk gastro-oesophageal varices in a Chilean cohort

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Abstract

Background: Baveno VI and expanded Baveno VI criteria have been recommended to circumvent the need for endoscopy screening in patients with a very low probability of varices needing treatment (VNT).

Aim: To validate these criteria in a Latin American population.

Methods: The ability of Baveno VI criteria (liver stiffness measurement (LSM) <20 kPa and platelet count >150 × 103/μL) and expanded Baveno VI criteria (LSM < 25kPa and platelet count >110 × 103/μL) to exclude the presence of VNT was tested in a prospectively recruited cohort of patients with Child-Pugh A liver cirrhosis and with no previous variceal haemorrhage who attended the liver clinics of three major hospitals in Chile.

Results: Three hundred patients were included. The median (IQR) age was 61 [18-86] years, median MELD was 8.0 (6-17), median LSM was 17.2 (10.2-77) kPa and median platelet count was 137 (23-464) × 10^3/μL. The main aetiology was non-alcoholic fatty liver disease (67.3%). VNT were present in 18% of patients. The Baveno VI criteria had a sensitivity of 98.1% and a specificity of 38.2%, potentially sparing 31.3% of upper endoscopies with a very low risk of missing VNT (1.1%). The expanded Baveno VI criteria had a sensitivity of 90.7% and a specificity of 61%, potentially sparing 51.3% of upper endoscopies with a risk of missing VNT of 3.6%. Both criteria were independently associated with the absence of VNT.

Conclusion: We validated the Baveno VI and expanded Baveno VI criteria in Chilean population, potentially sparing 31.3% and 51.3% of endoscopies, respectively, with a very low risk of missing VNT. Fondecyt 1191183.

KEYWORDS

cirrhosis, gastrointestinal haemorrhage, gastro-oesophageal varices, liver, non-invasive, portal hypertension, transient elastography

Abbreviations: GEV, Gastro-oesophageal varices; HCV, Hepatitis C virus; IQR, Inter quartile range; LSM, Liver stiffness measurement; MELD, Model of End Stage Liver Disease; NASH, non-alcoholic steatohepatitis; NPV, Negative predictive value; VNT, Varices needing treatment.
Gaete and Díaz are contributed equally to this study.

1 | INTRODUCTION

Approximately 30% of patients with compensated cirrhosis and 60% of patients with decompensated cirrhosis have varices at the time of diagnosis.[1,2] Thus, 40% of Child-Pugh A patients and 85% of Child-Pugh C patients have gastro-oesophageal varices (GEV).[1,3] Variceal haemorrhage is the leading complication of GEV reaching a mortality of 20% with an elevated risk of recurrence.[4] Therefore, early diagnosis of GEV is mandatory to initiate a prophylactic strategy for variceal bleeding.[5]

Excluding previous instances of variceal bleeding, those with the highest risk of bleeding are large (>5 mm) GEV and/or have red wale marks. These can be classified as varices needing treatment (VNT) which always require a prophylactic strategy to decrease the risk of bleeding.[3,6]

Although upper endoscopy is considered the gold standard for the detection of VNT, it is an expensive procedure, is time-consuming, requires the skills of a highly trained operator and has associated risks.[7] On the other hand, Child-Pugh A patients have a low risk of VNT (even less than 10%).[8] Thus, to identify a very low-risk population, minimizing the risk of missing VNT could save unnecessary endoscopies safely. This rationale is particularly important in middle- and low-income countries.

Transient elastography is a non-invasive method to evaluate liver stiffness (LSM) and is widely used as a surrogate marker of liver fibrosis [9-11]; it can be properly performed by trained non-medical health professionals, does not require sedation and lacks adverse effects. Increased liver stiffness has been associated with portal hypertension.[9,12,13] Baveno VI consensus indicate that patients with cirrhosis, LSM < 20 kPa and a platelet count >150 × 10^9 cells/L have a very low risk of VNT. Therefore, the use of Baveno VI criteria can safely spare between 10% and 30% of endoscopy screenings.[5] However, using this strategy, we still perform a significant amount of unneeded upper endoscopies. Recently, expanded Baveno VI criteria using less-restrictive cut-offs, that is LSM < 25 kPa and a platelet count >110 × 10^3/μL, have been described by Augustin et al[8] The authors described that the Baveno VI criteria could potentially avoid only 21% compared to 40% endoscopy screenings when employing the expanded Baveno VI criteria.[8]

Some studies have replicated the validation of the Baveno VI and expanded Baveno VI criteria in European and Asian patients, observing a similar rate of the sparing of unneeded endoscopies.[14-16] However, two studies have shown an elevated risk of missing VNT based on Baveno VI consensus (>5%).[17,18] Thus, the safety of these criteria must be established in different populations with different epidemiologic characteristics.

Our study aims to validate the Baveno VI and expanded Baveno VI criteria in Chilean population.

Lay summary

- The use of endoscopic procedures to diagnose high-risk varices in esophagus and stomach in patients with cirrhosis is very expensive and are commonly performed in patients with very low risk, incurring in unnecessary spent of resources. The use of simple and less expensive predictors of high-risk varices such as liver stiffness determination and platelet count, potentially reduce the cost allowing to employ these resources in patients with higher risk.
- We evaluated the performance of several tests designed to avoid unnecessary upper endoscopies. Notably, the Expanded Baveno VI Criteria were able to potentially avoid 51.3% of upper endoscopies with a very low risk of missing the presence of varices with a high risk of bleeding (3.6%). Thus, in our cohort, this was an efficient and safe test.
- Being fatty liver disease the main cause of cirrhosis in our patients, we also teste the criteria published by Petta specifically designed for these patients. Interestingly, the rate of missing the presence of varices was too high to be recommended based on current guidelines.
- Our findings emphasize the importance of validating, even if the test was specifically validated for a condition, to verify its usefulness in different populations.

2 | MATERIALS AND METHODS

2.1 | Study design and participants

We consulted a prospective registry of all patients with whom liver stiffness was measured in three Chilean centres: *Hospital Clínico Pontificia Universidad Católica de Chile*, *Hospital Clínico de la Universidad de Chile* and the *Hospital Dr Gustavo Fricke*. The inclusion criteria were as follows: (a) presence of cirrhosis; (b) Child-Pugh A and (c) reliable LSMs. The exclusion criteria were as follows: (a) decompensated cirrhosis; (b) hepatocellular carcinoma; (c) splenectomy; (d) liver transplantation; (e) portal vein thrombosis; (f) hospital admission during the last 12 months; (g) previous variceal bleeding; (h) the absence of an upper endoscopy performed 6 months before or after LSM; (i) the absence of blood tests performed 2 months before or after LSM; (j) symptomatic alcoholic hepatitis and (k) refusal to sign informed consent (Figure 1).

The diagnosis of cirrhosis was based on both liver stiffness and liver image (ultrasonography, computed tomography, magnetic resonance imaging) in all patients. Only two patients had a compatible liver biopsy available. The cut-off to diagnose cirrhosis employing liver stiffness was stablished based on the available literature for different aetiologies.[19-23] In aetiologies where not enough information was available to define a proper liver stiffness cut-off for cirrhosis (ie autoimmune hepatitis, haemochromatosis, cryptogenic cirrhosis) a liver stiffness ≥12.5 kPa was considered consistent with cirrhosis added to a liver image.

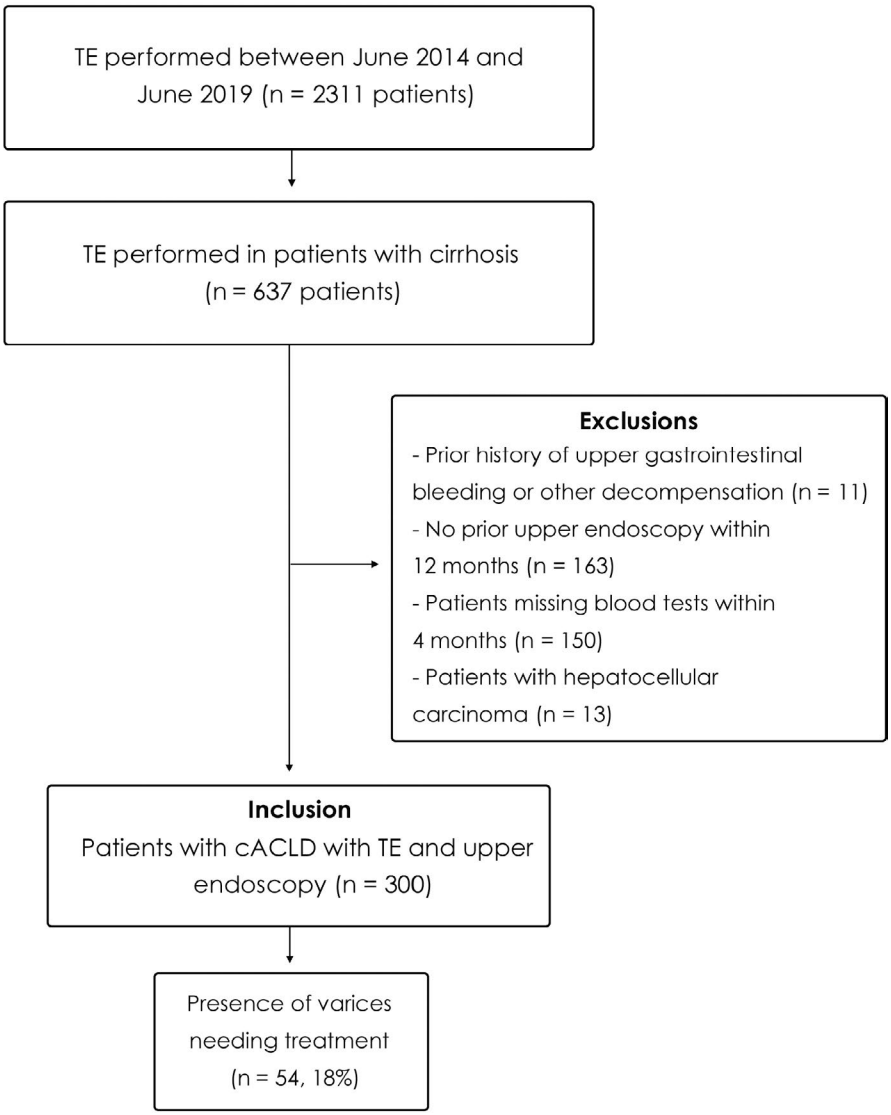

FIGURE 1 Study design and inclusion and exclusion criteria for validating non-invasive criteria to detect varices needing treatment. cACLD, compensated advanced chronic liver disease; TE, transient elastography

The participants were recruited from June 2014 to June 2019. We obtained the report from the last upper gastrointestinal endoscopy and the platelet count performed in the last 6 months from the transient elastography. This study was approved by the Ethics Committee of the *School of Medicine*, *Pontificia Universidad Católica de Chile*, and all data were processed anonymously.

2.2 | Transient elastography

We assessed LSM using transient elastography by Fibroscan® (Echosens). Examinations were performed by the same operator in each centre (with experience performing over 200 procedures). The following quality criteria defined a reliable LSM: at least 10 valid measurements obtained with a success rate ≥60% and an interquartile range to median ratio ≤30% in patients with an LSM ≥ 7.1 kPa. M probe was used for all measurements. The operator was blinded to the presence of VNT. We did not include patients with unreliable/no valid LSMs.

2.3 | Statistical analysis

We reported continuous variables as the median and interquartile range (IQR). Qualitative variables were compared using the Chi-square test. The main outcome was the prevalence of VNT. We defined VNT according to Baveno VI recommendations (presence of red wale marks and/or large varices). We used a threshold <5% of missed VNT to consider Baveno VI and expanded Baveno VI criteria as safe.[8] We evaluated the number of spared endoscopies using the Baveno VI criteria (<20 kPa and platelets >150 × 10^9 cells/L) and expanded Baveno VI criteria (<25 kPa and platelets >110 × 10^9 cells/L) and with the use of other cut-off values previously described.[8,24] We evaluated the effect of adding the MELD = 6 criterion to identify patients with a low risk of VNT among those not fulfilling the Baveno VI and expanded Baveno VI criteria. To determine the sensitivity, specificity, negative and positive e predictive values of the different criteria evaluated we considered as positive a test result consistent with the presence of VNT and negative a test result consistent with a low risk of VNT.

The rate of missed VNT was determined dividing the number of VNT in the group of patients fulfilling the criteria evaluated by the total number of patients that fulfil these criteria.

Thus, A multivariate logistic regression model was used to estimate the risk factors independently associated with the absence of VNT. Data were processed using SPSS version 24.0 (IBM Corp.).

3 | RESULTS

3.1 | Baseline characteristics and prevalence of VNT

Over the study period, 300 cirrhotic patients were included; 181 patients (60.3%) were female, and the median (IQR) age was 61 (18-86) years (Figure 1). The median MELD was 8 (6-17), the median LSM was 17.2 (10.2-77) kPa, and the median platelet count was 137 (23-464) × 10^3/μL. The main aetiology was non-alcoholic steatohepatitis (NASH) (67.3%), followed by hepatitis C virus (10.7%) and autoimmune hepatitis (8.4%) (Table 1). Only three of our patients were using non-selective beta-blockers (propranolol) to control arterial blood pressure. None of our HCV patients were using direct-acting antivirals when liver stiffness measurements and upper-endoscopy were performed. The prevalence of VNT in our cohort was 18% (54 patients). Table 1 shows additional baseline characteristics of the patients.

In the univariate analysis, the presence of VNT was associated with higher MELD and LSM, lower platelet counts, higher bilirubin levels, a higher international normalized ratio (INR), lower albumin levels and spleen size. No differences among aetiologies were found (Table 1).

3.2 | Baveno VI and expanded Baveno VI criteria performance

Ninety-five patients met the Baveno VI criteria. The sensitivity for detecting VNT was 98.1%, the specificity was 32.8%, negative predictive value (NPV) 98.4% and only one patient with VNT fulfilled the Baveno VI criteria. Thus, the risk of missing VNT was 1.1% among those who met the Baveno VI criteria. This criterion could potentially spare 31.7% of endoscopies. On the other hand, 155 patients met the expanded Baveno VI criteria. The sensitivity was 90.7%, the specificity was 61.0% and NPV was 96.8%, potentially sparing 51.7% of endoscopies. There were five cases of VNT that fulfilled the expanded Baveno VI criteria. Hence, the risk of missing VNT was 3.2% among those who met the expanded Baveno VI criteria. Table 2 summarizes the performance of different criteria previously proposed based on the expansion of the Baveno VI criteria increasing the LSM cut-off and/or decreasing the platelet count to spare endoscopies.[8]

TABLE 1 Baseline characteristics and differences between patients with and without VNT

Variables	Global (N = 300)	VNT (+) (N = 54)	VNT (–) (N = 246)	*P* value[a]
Age (years)	61 [18-86]	60 [36-79]	61 [18-86]	0.980
Female sex (%)	60.3	53.7	61.8	0.271
MELD score	8 [6-17]	9 [6-14]	8 [6-17]	0.001
Liver stiffness measurement (kPa)	17.2 [10.2-77]	26.1 [9.9-75]	16.1 [9.2-77]	<0.001
Serum sodium (mEq/dL)	141 [131-148]	141 [137-146]	141 [131-148]	0.571
Alanine aminotransferase (U/L)	42 [8-353]	37 [13-235]	43 [8-353]	0.177
Total bilirubin (mg/dL)	0.8 [0.2-4]	1.1 [0.3-4]	0.77 [0.2-3.6]	<0.001
International normalized ratio (INR)	1.1 [0.9-2.1]	1.2 [1-1.5]	1.1 [0.9-2.1]	<0.001
Creatinine (mg/dL)	0.74 [0.3-2.7]	0.7 [0.3-1.5]	0.74 [0.4-2.7]	0.260
Albumin (g/dL)	4.2 [3.8-4.5]	3.9 [3.7-4.4]	4.2 [3.9-4.6]	<0.001
Platelet count (×10^3/μL)	137 [23-464]	99 [23-291]	148 [39-464]	<0.001
Spleen size (cm)	12 [10.1-14]	13 [11.7-15]	11.5 [10-13.8]	0.004
Aetiologies (%)				
Non-alcoholic steatohepatitis	202 (67.3)	38 (70.3)	164 (66.7)	0.599
Hepatitis C virus	32 (10.7)	2 (3.7)	30 (12.2)	0.067
Autoimmune hepatitis	25 (8.4)	3 (5.6)	22 (8.9)	0.415
Primary biliary cholangitis	18 (6)	3 (5.6)	15 (6.1)	0.879
Alcohol	13 (4.3)	4 (7.4)	9 (3.7)	0.220
Haemochromatosis	4 (1.3)	2 (3.7)	2 (0.8)	1
Cryptogenic	4 (1.3)4 (1.3)	2 (3.7)	2 (0.8)2 (0.8)	1
Hepatitis B virus	2 (0.7)	0	2 (0.8)	1

Note: Continuous variables are expressed as median [Interquartile range 25-75].

[a]Statistical comparison between the presence and absence of varices needing treatment (VNT).

TABLE 2 Performance of different previously published cut-off values (including the Baveno VI and expanded Baveno VI criteria) to exclude the presence of VNT

Criteria	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Spared endoscopies (%) (N = 300)	VNT missed (%)[a]
Platelets >150 + LSM < 20 kPa (Baveno VI)[5]	98.1	38.2	25.9	98.4	95 (31.7%)	1/95 (1.1%)
Platelets >125 + LSM < 25 kPa[24]	96.3	56.1	31.5	98.5	135 (45%)	2/135 (1.5%)
Platelets >120 + LSM < 25 kPa[25]	96.3	55.3	32.1	98.6	138 (46%)	2/138 (1.5%)
Platelets >110 + LSM < 25 kPa (expanded Baveno VI)[8]	90.7	61	33.8	96.8	155 (51.7%)	5/155 (3.2%)
Platelets >110 + LSM < 30 kPa (Petta & cols. criteria)[16]	81.5	65.9	34.4	94.2	172 (57.3%)	10/172 (5.8%)
Platelets >100 + LSM < 25 kPa[26]	79.6	65.4	33.6	93.6	172 (57.3%)	11/172 (6.4%)
MELD = 6 criteria	98.1	19.5	21.1	97.9	49 (16.3%)	1/49 (2%)
Baveno VI/MELD = 6 criteria	96.3	45.1	27.8	98.2	113 (37.7%)	2/113 (1.8%)
Expanded Baveno VI/ MELD = 6 criteria	88.9	65.4	36.1	96.4	167 (55.7%)	6/167 (3.6%)

Abbreviation: LSM, liver stiffness measurement.

[a]Missed VNT were calculated dividing the number of VNT in the group of patients fulfilling the criteria evaluated by the total number of patients that fulfil these criteria.

The multivariate analysis showed that the only risk factors independently associated with the absence of VNT were fulfilling the Baveno VI and expanded Baveno VI criteria (Tables 3 and 4). We also performed a head to head analysis employing both criteria showing that the expanded Baveno VI criteria was independently related to the absence of VNT; OR 7.14 (2.5-20.8), $P \leq .001$).

3.3 | MELD = 6 criteria and the addition to the expanded Baveno VI criteria

We evaluated the performance of MELD = 6 criteria in our cohort. Additionally, we assessed the addition of the MELD = 6 criteria to the Baveno VI and expanded Baveno VI criteria. Forty-nine patients from our cohort obtained an MELD = 6. As the sole criteria, the MELD = 6 criteria spared 16.3% of endoscopies, with a risk of missing VNT of 2%. The addition of MELD = 6 criteria in those patients who did not meet the Baveno VI and expanded Baveno VI criteria spared 37.7% and 55.7% of endoscopies respectively. The risk of missing VNT slightly increased to 1.8% and 3.6% respectively (Table 2).

3.4 | Performance of the criteria in the non-alcoholic steatohepatitis subgroup

Since NASH was the main aetiology, we performed a subgroup analysis. The baseline characteristics and differences between patients with and without VNT are detailed in Table 5. We included 202 patients with cirrhosis and NASH. The prevalence of VNT in this subgroup was 18.8%. The performance of the different criteria is depicted in Table 6. The sensitivity and specificity of Baveno VI criteria were 97.4% and 44.5%, respectively, and NPV of 98.6% sparing 36.6% of endoscopies, with a risk of missing VNT of 1.4%.

TABLE 3 Logistic regression analysis of risk factors (including Baveno VI criteria) for VNT

Variables	β	OR	CI 95% OR	*P*-value
Baveno VI criteria	2.86	17.4	2.28-132.95	0.006
MELD	0.85	1.1	0.91-1.30	0.356
Serum sodium	0.05	1.1	0.92-1.21	0.431

Abbreviations: CI, confidence interval; OR, odds ratio.

TABLE 4 Logistic regression analysis of risk factors (including expanded Baveno VI criteria) for VNT

Variables	β	OR	CI 95% OR	*P*-value
Expanded Baveno VI criteria	1.84	6.27	1.53-25.76	0.011
MELD	0.05	1.1	0.86-1.29	0.629
Serum sodium	0.06	1.1	0.91-1.25	0.429
Platelets	0.00	1.0	1.0-1.0	0.060

Abbreviations: CI, confidence interval; OR, odds ratio.

TABLE 5 Baseline characteristics in patients with non-alcoholic steatohepatitis and differences between patients with and without VNT

Variables	Global (N = 202)	VNT (+) (N = 38)	VNT (–) (N = 164)	*P*-value[a]
Age (years)	54.5 [61-68]	54.8 [60-65.5]	54 [62-69]	0.785
Female sex (%)	59.4	52.6	61.0	0.345
MELD score	8 [6-17]	9 [6-14]	8 [6-17]	<0.001
Liver stiffness measurement (kPa)	16.9 [10.2-77]	26.3 [10.9-66.4]	15.9 [10.2-77]	<0.001
Serum sodium (meq/dL)	141 [131-148]	141 [137-144]	141 [131-148]	0.891
Alanine aminotransferase (U/L)	42 [8-259]	36 [13-235]	44 [8-259]	0.081
Total bilirubin (mg/dL)	0.8 [0.2-4]	1.14 [0.3-4]	0.72 [0.2-3.6]	<0.001
International normalized ratio (INR)	1.1 [0.9-1.6]	1.2 [1-1.5]	1.1 [0.9-1.6]	<0.001
Creatinine (mg/dL)	0.74 [0.3-2.7]	0.7 [0.3-1.5]	0.74 [0.4-2.7]	0.164
Albumin (g/dL)	4.2 [3.9-4.6]	3.9 [3.6-4.4]	4.3 [4-4.6]	<0.001
Platelet count ($\times 10^3/\mu L$)	145 [23-464]	99 [23-190]	157 [46-464]	<0.001
Spleen size (cm)	11.6 [10-14]	13.2 [11.5-15.2]	11.3 [9.6-13.7]	0.002

Note: Continuous variables are expressed as median [Interquartile range 25-75].

[a]Statistical comparison between the presence and absence of varices needing treatment (VNT).

TABLE 6 Performance of different previously published cut-off values to exclude the presence of VNT in non-alcoholic steatohepatitis patients

Criteria	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Spared endoscopies (%) (N = 202)	VNT missed (%)[a]
Platelets >150 + LSM < 20 kPa (Baveno VI)[5]	97.4	44.5	28.9	98.6	74 (36.6)	1/74 (1.4)
Platelets >125 + LSM < 25 kPa[24]	94.7	60.4	35.6	98	101 (50)	2/101 (1.9)
Platelets >120 + LSM < 25 kPa[25]	94.7	61.5	36.4	98.1	103 (51)	2/103 (1.9)
Platelets >110 + LSM < 25 kPa (expanded Baveno VI)[8]	86.8	64.6	36.3	95.5	111 (54.9)	5/111 (4.5)
Platelets >110 + LSM < 30 kPa (Petta & cols. criteria)[16]	76.3	68.3	35.8	92.6	121 (61.3)	9/121 (7.4)
Platelets >100 + LSM < 25 kPa[26]	78.9	70.1	37.9	93.5	123 (60.9)	8/123 (6.5)
MELD = 6 criteria	97.4	21.3	22.3	97.2	36 (17.8)	1/36 (2.8)
Baveno VI/MELD = 6 criteria	94.7	52.4	31.6	97.7	88 (43.6)	2/88 (2.3)
Expanded Baveno VI/ MELD = 6 criteria	84.2	70.1	39.5	95	121 (61.9)	6/121 (4.9)

Abbreviations: LSM, liver stiffness measurement.

[a]Missed VNT were calculated dividing the number of VNT in the group of patients fulfilling the criteria evaluated by the total number of patients that fulfil these criteria.

The sensitivity and specificity of expanded Baveno VI criteria were 86.8% and 64.6%, respectively, and NPV of 95.5% sparing 55.5% of endoscopies, with a risk of missing VNT of 4.5%. The Expanded Baveno VI/MELD = 6 criteria spared the highest number of upper endoscopies (61.9%) among the criteria evaluated with a 4.9% of missed VNT. Interestingly, criteria recently published by Petta et al generated specifically in NASH patients spared 61.3% of upper endoscopies. Its sensitivity, specificity and NPV were 76.3%, 68.3% and 92.6% respectively. However, the risk of missing VNT exceeded 5% (7.4%).

4 | DISCUSSION

We evaluated the performance of the Baveno VI and expanded Baveno VI criteria for the non-invasive prediction of VNT in patients with cirrhosis by including 300 patients from three centres. Interestingly, the main aetiology was NASH which makes this study different from most of those previously published which usually have a high prevalence of chronic viral hepatitis. The low prevalence of alcohol-related liver disease in our cohort can be explained by the local epidemiology (the prevalence of NAFLD is approximately 30%

in the Chilean population) and the scarce access to high-complexity centres by patients with alcohol-related liver disease because of severe socioeconomic barriers.[27,28] Although there are previous studies that have evaluated the Baveno VI and expanded Baveno VI criteria, this is the first validation performed in Chilean patients which have very different epidemiologic characteristics than previous cohorts.

The prevalence of VNT was 18% in our cohort, which is higher than the average prevalence of VNT in previous studies (approximately 11%).[29]

Even considering the epidemiologic peculiarities of our cohort, the Baveno VI criteria showed good performance, sparing 31.7% of endoscopies, with a rate of missed VNT of 1.2%. These criteria can be considered very safe according to the previously established threshold value of missed VNT < 5%.[8] Interestingly, the expanded Baveno VI criteria could spare 51.7% of endoscopies, with a slight increase in the risk of missing VNT (3.2%). Notably, the performance of the expanded Baveno VI/MELD = 6 criteria significantly improved the identification of patients with a low risk of VNT with a very low risk of missing VNT.

Although our prevalence of VNT was similar to the experience of Bae J et al in a cohort with an Asian background (19.5%) we had a lower risk of missing VNT using the expanded Baveno VI criteria (6.8% in the Asian cohort vs 3.2% in our study).[17]

Two-thirds of our population had NASH. This fact allowed us to evaluated the performance of the criteria generated by Petta et al specifically for NASH patients. Interestingly, although these criteria were able to spared 61.3% of upper endoscopies the risk of missing VNT exceeded the previously stablished threshold (7.4%). This fact reinforces the concept that a local validation of these criteria is important.

Regarding the strengths of this study, the number of patients included and the high prevalence of VNT (18%) allowed a proper validation of the criteria. Additionally, the time interval between the performance of upper endoscopy and transient elastography never exceeded 6 months. We included a very homogeneous cohort of patients with preserved liver function and low pretest probability of VNT (all of them Child-Puig A). This clear and simple definition makes this strategy easy to apply in clinical practice. Thus, our study was able to properly validate the use of the Baveno VI and expanded Baveno VI criteria in Chilean population.[18,30]

We are aware of the limitations of our study. First, some patients had to be excluded because their blood tests and/or upper endoscopy results were not available. However, this limitation was probably randomly distributed considering that in our study, the aetiologies of cirrhosis were quite similar to those in the national registry of candidates listed for liver transplantation in Chile.[31] On the other hand, upper endoscopies and liver stiffness measurements were performed by different operators. Thus, the presence of inter-observer variability cannot be ruled out. We were not able to determine the number of NASH patients performing active life style modifications and if they had weight changes before the measurements. However, this limitation is common in all studies including NASH patients.

We think that the validated criteria can be considered the first step for screening GEV. If the patient is classified as having a low risk of VNT the presence of the criteria can be evaluated 2 or 3 years later, assuming that liver disease will remain compensated. For instance upper endoscopy could be performed only on patients who do not fulfil the Baveno VI or expanded Baveno VI criteria potentially reducing the waiting list for other endoscopic procedures.

In conclusion, we validated the use of Baveno VI (LSM by TE < 20 kPa and platelet count >150 × 10^3/μL) and expanded Baveno VI (LSM by TE < 25 kPa and platelet count >110 × 10^9/L) criteria as safe strategies to spare upper endoscopies in a cohort of Chilean patients with compensated cirrhosis (Child-Pugh A).

CONFLICT OF INTEREST

The authors do not have any disclosures to report.

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