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## ORIGINAL ARTICLE

### Evaluation and comparison of capsule endoscopy scores for assessment of inflammatory activity of small-bowel in Crohn's disease

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#### KEYWORDS

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Lewis score;  
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#### Abstract

**Introduction:** Capsule endoscopy (CE) has the highest sensitivity in the evaluation of small-bowel mucosa in Crohn's disease (CD). Recent guidelines recommend the use of validated CE scores to assess small-bowel inflammatory activity in CD. Lewis score (LS) and Capsule Endoscopy Crohn's Disease Activity Index (CECDAI) are the currently available validated scores, but comparative studies are scarce. Moreover, correlation of these endoscopic scores with biomarkers and clinical activity is lacking. This study aims to compare LS with CECDAI, to determine cut-off values for CECDAI similar to those of LS (135–790), and to correlate LS and CECDAI with biomarkers and symptoms.

**Study:** All patients with CD who underwent CE between March/2010 and February/2016 were included. LS and CECDAI were determined after analysis of each CE. In patients with small-bowel CD, C-reactive protein (CRP) and Harvey–Bradshaw index (HBI) were evaluated. Statistical analysis: descriptive statistics, Spearman's correlation coefficient and linear regression analysis. Significance:  $p < 0.05$ .

**Results:** Fifty-three patients were included and the mean values obtained for LS were  $1147 \pm 1453$ , CECDAI  $11.3 \pm 6.9$ , CRP  $0.92 \pm 1.5$  mg/dL and HBI  $2.4 \pm 2.8$ . There was a very strong correlation between LS and CECDAI ( $r_s = 0.878$ ;  $p < 0.0001$ ) and thresholds values of 135–790 in LS corresponded to 7.7–10.3 cutoff values in CECDAI, respectively. Neither CRP correlated with LS ( $r_s = 0.068$ ;  $p = 0.72$ ) or CECDAI ( $r_s = -0.004$ ;  $p = 0.98$ ), nor HBI with LS ( $r_s = -0.15$ ;  $p = 0.40$ ) or CECDAI ( $r_s = -0.10$ ;  $p = 0.23$ ).

**Abbreviations:** CE, capsule endoscopy; CD, crohn's disease; LS, Lewis score; CECDAI, Capsule Endoscopy Crohn's Disease Activity Index; CRP, c-reactive protein; HBI, Harvey–Bradshaw index; SBTT, small-bowel transit time.

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## PALABRAS CLAVE

Cápsula endoscópica;  
Enfermedad  
de Crohn;  
Puntuación de Lewis;  
Índice de actividad  
de la cápsula  
endoscópica para la  
enfermedad de Crohn

**Conclusion:** Correlation between the two CE activity scores was very strong, with LS thresholds of 135–790 corresponding to CECDAI values of 7.7–10.3. HBI and CRP had no correlation with CECDAI and LS.

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## Evaluación y comparación de las puntuaciones de la cápsula endoscópica sobre la evaluación de la actividad inflamatoria del intestino delgado en la enfermedad de Crohn

### Resumen

**Introducción:** la cápsula endoscópica (CE) posee la mayor sensibilidad cuando se trata de la evaluación de la mucosa del intestino delgado en la enfermedad de Crohn (EC). Las últimas líneas de orientación recomiendan el uso de puntuaciones homologadas de la CE para evaluar la actividad inflamatoria del intestino delgado en la EC. La puntuación de Lewis (LS) y el índice de actividad de la cápsula endoscópica para la enfermedad de Crohn (CECDAI) son las puntuaciones homologadas actualmente disponibles, pero los estudios comparativos son escasos. Además, falta la correlación de estas puntuaciones endoscópicas con los biomarcadores y la actividad clínica. El objetivo de este estudio es comparar la LS con el CECDAI, determinar valores de corte para el CECDAI similares a los de la LS (135-790) y correlacionar LS y CECDAI con biomarcadores y síntomas.

**Estudio:** se incluyó a todos los pacientes con EC en que se había realizado CE entre marzo de 2010 y febrero de 2016. Se establecieron LS y CECDAI después del análisis de cada CE. En pacientes con EC de intestino delgado, se evaluaron la proteína C-reactiva (CRP) y el índice de Harvey–Bradshaw (HBI). Análisis estadístico: estadística descriptiva, coeficiente de correlación de Spearman y análisis de regresión lineal. Significado:  $p < 0,05$ .

**Resultados:** Se incluyó a 53 pacientes y los valores medios obtenidos de la LS fueron  $1147 \pm 1453$ ; del CECDAI,  $11,3 \pm 6,9$ ; de la CRP,  $0,92 \pm 1,5$  mg/dl, y del HBI,  $2,4 \pm 2,8$ . Hubo una correlación muy fuerte entre LS y CECDAI ( $r_s = 0,878$ ;  $p < 0,0001$ ) y los valores umbrales de 135-790 en la LS correspondieron a valores de corte de 7,7 a 10,3 en el CECDAI. Ni la CRP correlacionó con la LS ( $r_s = 0,068$ ;  $p = 0,72$ ) o con el CECDAI ( $r_s = -0,004$ ;  $p = 0,98$ ), ni el HBI con la LS ( $r_s = -0,15$ ;  $p = 0,40$ ) o con el CECDAI ( $r_s = -0,10$ ;  $p = 0,23$ )

**Conclusión:** la correlación entre las dos puntuaciones de actividad de la CE fue muy fuerte, con umbrales de la LS de 135-790 correspondientes a valores del CECDAI de 7,7-10,3. El HBI y la CRP no tenían correlación con el CECDAI y la LS.

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## Introduction

Since its introduction into clinical practice in 2001, capsule endoscopy (CE) has achieved an important role in the study of numerous small-bowel disorders, including obscure gastrointestinal bleeding, Crohn's disease (CD), small-bowel tumors, polyposis syndromes and celiac disease.<sup>1-4</sup>

CD is a chronic inflammatory disorder which may involve any segment of the gastrointestinal tract.<sup>5,6</sup> The small-bowel is affected in up to 80% of patients with CD, and is the only segment involved by the disease in up to one-third of the cases.<sup>5-9</sup> Since a single gold standard for the diagnosis of CD is not currently available, the diagnosis is confirmed by clinical evaluation and a combination of endoscopic, histological, radiological, and/or biochemical exams.<sup>10</sup>

Small-bowel CE should be reserved for patients with suspected CD despite negative evaluations with ileo-colonoscopy and imaging exams.<sup>1,10</sup> In patients with known

CD, CE should be reserved to assess the extent and location of the disease in cases with unremarkable or nondiagnostic findings from cross sectional imaging of the small-bowel, if deemed to influence patient management.<sup>1</sup> CE represents the non-invasive method with the highest sensitivity in the evaluation of small-bowel mucosa in CD, with a miss rate for ulcers of only 1%, and a negative predictive value ranging from 96% to 100%.<sup>1,7,11</sup>

Recent recommendations advocate the employment of validated CE scores for the assessment of small-bowel inflammatory activity in CD, allowing a standardized description of lesions and an objective assessment of severity and follow-up.<sup>1,7</sup> Lewis score (LS) and Capsule Endoscopy Crohn's Disease Activity Index (CECDAI) are the two validated scores currently available, but comparative studies are scarce.<sup>11,12</sup> Moreover, evidence concerning the correlation of these endoscopic scores with biomarkers and clinical activity in small-bowel CD is lacking.

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