DOI: 10.1590/0100-6991e-20253850-en

Introduction of digital chromoendoscopy for classification of colonic lesions and assessment of experience gain in a tertiary healthcare hospital

Introdução do uso de cromoendoscopia digital como ferramenta de classificação de lesões colônicas e análise do ganho de experiência em serviço terciário

Vitor Couri Blassioli[1]; Luiza Cadaval Rocha[1]; Guilherme Lopes Machado[1]; Lucas Alves Bessa Cardoso[2]; Marina Barbabela Grisolia de Oliveira[2]; Rodrigo Almeida Paiva[2]; Fabio Lopes Queiroz[2]; Antônio Lacerda Filho TCBC-MG[2].

ABSTRACT

Introduction: Colonoscopy is effective in reducing mortality by detecting and removing polyps, but invasive procedures remain common. New techniques, such as the NICE classification with Narrow-band Imaging (NBI), help predict the histology of polyps without resection. This study evaluates the impact of the NICE classification in colonoscopies at a tertiary healthcare service, analyzing examiner performance over time. **Methods:** A single-center prospective observational study. Patients who underwent colonoscopy with detected polyps were included, undergoing digital chromoendoscopy for NICE protocol classification, compared with histopathology as the gold standard. The analysis was stratified by two periods and among examiners. **Results:** Overall accuracy was 70.2%, with sensitivity of 0.663, specificity of 0.761, negative predictive value (NPV) of 0.590, and positive predictive value (PPV) of 0.813, with no significant improvement in the second period. There was a performance gain in sensitivity (0.606 vs. 0.825, p=0.002), with no difference in other variables. Discussion: An improvement was observed in sensitivity and a non-significant improvement in accuracy, NPV, and PPV. Variability among examiners, as indicated by a Kappa of 0.403, and the reduced sample size may have limited more robust results. **Conclusion:** Digital chromoendoscopy is effective for classifying colonic lesions and pre-resection histological identification; however, examiner performance is crucial and should not be the sole basis for clinical decisions. Implementing formal training and continuous practice is essential for improving performance.

Keywords: Colonoscopy. Continuing Education. Polyps. Adenomatous Polyps. Intestinal Polyps.

INTRODUCTION

Colorectal cancer (CRC) is one of the leading causes of cancer mortality in the world, being the second most common in women and the third among men[1-5]. Colonoscopy is one of the most effective methods for screening, with the ability to reduce incidence and mortality by up to 80% in the distal colon and 60% in the proximal one, through the detection and removal of polyps[1,3,6]. Although many polyps, especially those smaller than 5mm, are benign, resection for histopathological confirmation is still necessary, increasing costs and risks of complications[7-9].

Recent advances in endoscopy, such as digital chromoendoscopy, aim to optimize the diagnosis and efficiency of endoscopic procedures[10,11], allowing the prediction of lesions' histological type and guiding the conduct[9-12]. Among these tools, the NICE classification, which uses narrow-band imaging (NBI) without image magnification, has demonstrated high sensitivity in the detection of neoplastic polyps[13,14], being recommended by some societies[15].

In view of the implementation of new methods, it is essential to analyze their performance before their use directly impacts clinical decisions and patient outcomes. Continuous training and experience acquired over time can contribute to the improvement of these skills, resulting in a more assertive approach to the polyps detected. Therefore, the present study aims to analyze the introduction of the NICE classification in an outsourced colonoscopy service,

1 - Faculdade de Ciências Médicas - Belo Horizonte - MG - Brasil
2 - Hospital Felício Rocho, Departamento de Coloproctologia - Belo Horizonte - MG - Brasil

combined with the examiners' performance gain in the period analyzed.

METHODS

We conducted a prospective, observational, single-center study, with analysis of partial results of the work enrolled in the CAAE under number 63409022500005125. Patients who underwent colonoscopy with identification of polyps had their lesions analyzed by digital chromoendoscopy, with subsequent classification into one of the types of the NICE protocol: type 1 – hyperplastic, type 2 – adenoma, and type 3 – invasive neoplastic. The type of classification, determined by the performing professional, was recorded and later compared with the histopathological result, considered the gold standard. All examinations were performed by coloproctologists with at least 10 years of experience in colonoscopy, who, despite knowing the classification, did not use it routinely.

To compare the performance gain, the patients were divided into two periods: period 1, encompassing patients from January to March, and period 2, after the training of the participants, encompassing patients in April.

We included patients over 18 years of age who underwent colonoscopy in the Digestive Endoscopy Service of Hospital Felício Rocho between January and April 2023, who had polyps identified, regardless of the indication. The exclusion criteria were patients with inflammatory bowel disease or colitis evidenced during the examination, patients with colonic neoplasia submitted to the examination for endoscopic tattooing, indication for emergency colonoscopy (lower gastrointestinal hemorrhage, volvulus), and impossibility of signing of the Informed Consent Form (ICF), either by cognitive deficit or by guardians' unwillingness.

Sample calculation and statistical analysis

The sample size was calculated considering the confidence level, sensitivity, and specificity of articles in the literature review where these data were available[9,16,17]. The confidence interval was 95%, the margin of error ranged from 0.05 to 0.07. Considering the expected prevalence of 0.78, a sample of 250 polyps was reached. Categorical variables were described as absolute frequency and percentage. The quantitative variable first underwent the Shapiro-Wilk test, which evaluated the normality of the data. When non-normality was significant at the level of 0.05, the variable was described with median and interquartile range. In the comparison between data collections, we used the Mann Whitney test for the quantitative variables, and for the comparisons of categorical variables, the asymptotic Pearson's Chi-square test (when up to 20% of the cells had an expected value between 1 and 5 and 80% of the expected value greater than 5) and Pearson's exact Chi-square test (when more than 20% of the cells had an expected value between 1 and 5). In the comparisons between sensitivity, specificity, accuracy, positive predictive value (PPV), and negative predictive value (NPV), we used the 95% confidence intervals of these measures.

RESULTS

At the end of data collection, we obtained 399 polyps; 149 (37.3%) were later identified as hyperplastic, six (1.5%) as serrated, 243 (60.9%) as adenomatous, and one (0.3%) as invasive neoplastic. Most lesions were removed in period 1 (307 vs 92), although there was no difference between the distribution of histological types (p=0.280).

Regarding classification, there was a predominance of lesions classified as NICE type 1 (50.1%), but there was a difference between periods (p<0.0001). In period 1, there was a predominance of type 1 NICE lesions (55.4%), while in period 2 the predominance was of type 2 NICE lesions (67.4%).

When assessing overall accuracy, we observed an agreement rate between NICE and histopathology of 70.2%, and there was a non-statistically significant improvement in the second period (77.2% vs. 68.1%, p=0.0941. The data discussed are summarized in Table 1.

During data collection, we analyzed accuracy, sensitivity, specificity, PPV, and NPV of NICE types 1 and 2, since we observed no lesions classified as NICE type 3. The overall sensitivity of the method was 0.663 (95% CI 0.599-0.722). The overall positive and negative

predictive values were 0.813 (95% CI 0.752-0.865) and 0.590 (95% CI 0.518- 0.659), respectively. We found no statistically significant differences as to specificity, accuracy, PPV, and NPV variables when comparing periods 1 and 2. The accuracy of the classification was 0.701 (95% CI 0.653-0.746).

Table 1 - *Morphological characteristics of polyps.*

		Period 1* n=307	Period 2** n=92	Total n=399	p-value
Anatomopathological type	Hyperplastic	122 (39.7%)	27 (29.4%)	149 (37.3%)	0.2804
	Serrated	4 (1.3%)	2 (2.2%)	6 (1.5%)	
	Adenomatous	180 (58.6%)	63 (68.5%)	243 (60.9%)	
	Invasive cancer	1 (0.3%)	0 (0.0%)	1 (0.3%)	
NICE type	Type1 - Hyperplastic	170 (55.4%)	30 (32.6%)	200 (50.1%)	<0.00012
	Type2 - Adenomatous	137 (44.6%)	62 (67.4%)	199 (49.9%)	
Correct Identification	Yes	209 (68.1%)	71 (77.2%)	280 (70.2%)	0.0942
	No	98 (31.9%)	21 (22.8%)	119 (29.8%)	
Global accuracy		68.1%	77.2%	70.2%	0.09413

*[1]Mann Whitney test; [2]Asymptotic Pearson's chi-square test; Z-test for proportions; [4]Pearson's exact chi-square test. *Exams conducted until 03/31/2023; ** Exams conducted between 04/01/2023 and 04/30/2023.*

Sensitivity, in its turn, displayed a significant difference regarding the two study periods (0.606 vs. 0.825, p = 0.002), with overall performance of 0.663 (95% CI 0.599-0.722). The calculated Kappa coefficient showed moderate agreement between periods 1 and 2, with no significant differences (Table 2).

Table 2 - *Epidemiological variables (95% CI) and analyzed periods.*

	Period 1+2	Period 1	Period 2	p-value1
Sensitivity	0.663 (0.599;0.722)	0.606 (0.530;0.678)	0.825 (0.709;0.909)	0.002
Specificity	0.761 (0.686;0.826)	0.786 (0.704;0.854)	0.655 (0.457;0.821)	0.151
Accuracy	0.701 (0.653;0.746)	0.680 (0.624;0.732)	0.771 (0.672;0.853)	0.094
PPV	0.813 (0.752;0.865)	0.801 (0.761;0.846)	0.839 (0.723;0.920)	0.695
NPV	0.590 (0.518;0.659)	0.582 (0.504;0.657)	0.633 (0.439;0.801)	0.689
Kappa	0.403 (0.315;0.490)	0.372 (0.273;0.451)	0.476 (0.284;0.668)	-

[1]Fisher's exact test.

As for the professionals conducting the exams, we found no significant difference in specificity, PPV, NPV, and Kappa coefficient between them. Professional E obtained a better sensitivity result (0.875, 95% CI 0.732-0.958) than professional A (0.532, 95% CI 0.381-0.679), while no significant difference was observed among the other examiners. When assessing accuracy, professional D (0.826, 95% CI 0.747-0.889) obtained a better result than professional A (0.616, 95% CI 0.495-0.728), and there was also no difference among the others (Table 3).

DISCUSSION

NBI was initially described in Japan by Sano et al., in 2001, with the aim of aiding in the diagnosis and management of lesions found in colonoscopy. Since its creation, numerous classifications have been made[18,19] to improve diagnostic accuracy, and its use is currently recommended for the identification of polyps, according to Kaltenbach et al., in 2020. For these reasons, we decided to analyze the performance of colonoscopists

from a tertiary hospital when incorporating the NICE classification into the service, as well as to evaluate the impact of the classification training on the performance of the participants.

Table 3 - *Epidemiological variables by examiner.*

	Examiner				
	A	B	C	D	E
Sensitivity	0.532 (0.381;0.679)	0.708 (0.489;0.874)	0.739 (0.589;0.857)	0.725 (0.604;0.825)	0.875 (0.732;0.958)
Specificity	0.769 (0.564;0.910)	0.800 (0.444;0.975)	0.520 (0.313;0.722)	0.806 (0.686;0.896)	0.844 (0.672;0.947)
Accuracy	0.616 (0.495;0.728)	0.735 (0.556;0.871)	0.662 (0.540;0.770)	0.826 (0.747;0.889)	0.697 (0.590;0.790)
PPV	0.844 (0.672;0.947)	0.875 (0.732;0.958)	0.697 (0.590;0.790)	0.551 (0.402;0.693)	0.875 (0.732;0.958)
NPV	0.476 (0.320;0.636)	0.533 (0.266;0.787)	0.520 (0.313;0.722)	0.725 (0.604;0.825)	0.806 (0.686;0.896)
Kappa	0.265 (0.068;0.462)	0.444 (0.150;0.738)	0.259 (0.027;0.491)	0.528 (0.384;0.672)	0.410 (0.237;0.583)

The overall accuracy of our study was 0.701 (95% CI 0.653-0.746), with a sensitivity of 0.663 (95% CI 0.686-0.826) and specificity of 0.761 (95% CI 0.686-0.826). When comparing with the results of Hewlett et al., in 2012, who introduced the NICE classification and achieved accuracy of 0.890 (95% CI 0.830-0.930), sensitivity of 0.980 (95% CI 0.940-1), and specificity of 0.690 (95% CI 0.500 – 0.800), or with Hamada et al., 2021, with sensitivity of 0.992 (95% CI 0.979–0.998), specificity of 0.852 (95% CI 0.729–0.934), and accuracy of 0.978 (95% CI 0.961–0.988), our results were inferior except for specificity, which showed superior performance. This discrepancy can be explained by examiner-dependent variations and lack of familiarity with the tool.

To evaluate the impact of training on the performance of participants when using NICE, we compared period 1, considered as the training phase, with period 2, deemed as the evaluation phase. We observed an improvement in the results in the second period, as evidenced in Table 2. When analyzing accuracy, we saw a trend of improvement between periods (0.681 vs 0.772, p=0.094). At the end of period 2, professional D obtained an accuracy of 82%. It is important to note, however, that there was no statistical difference between the results, except for the sensitivity, which went from 0.606 to 0.825 (p=0.002). This finding, related to the non-difference in the histological distribution of polyps between periods, as shown in Table 1, evidences the trend towards improved performance, which suggests that familiarization with the tool can improve NICE's accuracy. When comparing the results with those of Neumann et al. (2013), where accuracy increased from 73.9% to 94.3%[9], or with the study by Kang et al. (2021), which observed an accuracy of 96.27% in the trainees group after training6, the possibility of other variables that may have influenced our data should be raised, as a shortened evaluation period and the examiner-dependent variation.

The five colonoscopists included in the study had at least 10 years of experience with endoscopic examinations and were familiar with NBI and its classifications, though they did not routinely use it for polyp classification. Professional E had higher sensitivity than professional A (0.875 x 0.532), with no statistically significant difference between the other participants. Regarding accuracy, professional D obtained better results than professional A (0.826 x 0.616), with no difference between the other colonoscopists, evidencing an examiner-dependent characteristic of the classification reliability in histopathological prediction, a hypothesis reinforced by the Kappa coefficient of 0.403.

Despite the improvement in the observed parameters, the lack of statistically significant difference in variables such as specificity and accuracy raises the

possibility that the small sample size, despite having achieved statistical significance, or the relatively short collection period after training may have limited the detection of more robust differences. Wang et al. (2023) also analyzed the impact of two types of short training to assess accuracy gains, but failed to show significant differences, unlike Neumann et al. (2013) and Kang et al. (2021), who showed improvements with longer training regimes. Future studies could benefit from larger sample sizes and longer observation periods to assess improvements' sustainability and intensification over time. Another explanation for the improvement observed in some metrics, such as specificity, may be related to the Hawthorne effect. This effect describes the tendency of individuals to modify their behavior when they know they are being watched. Because this study is a single-center study, the results presented may not be generalizable to other centers. The application of the NICE technique has inter-examiner variations, as demonstrated by the study, which can be further exacerbated in professionals with less experience. Therefore, we emphasize the need for formal training programs to optimize the use of these tools in different clinical contexts[20,24].

Although advanced imaging techniques, such as virtual chromoendoscopy, can be learned relatively quickly, expert-level performance requires continuous training and real-time feedback[24]. This aligns with our results, where we have seen progress in examiners' performance. Examiner D achieved an accuracy of 82% in the last month. In addition, research suggests that even brief training, such as the one implemented in our study, can result in gains in sensitivity and specificity[24,25]. In addition, the integration of artificial intelligence tools could help standardize the technique and provide real-time feedback, further enhancing examiners' performance[20,25,26].

CONCLUSION

The findings suggest that endoscopists' familiarization with the NICE protocol may indeed improve accuracy in detecting and classifying colonic polyps, especially adenomatous ones, as evidenced by the improvement in accuracy and sensitivity over the course of the study. However, it is crucial to exercise caution when applying these results in clinical practice, as differences may not reflect a relevant clinical impact in all scenarios. Observations with a greater number of examiners and for a longer time can help clarify the results proposed by the study.

RESUMO

Objetivo: *A colonoscopia é eficaz para reduzir a mortalidade ao detectar e remover pólipos, mas procedimentos invasivos ainda são comuns. Novas técnicas, como a classificação NICE com Narrow-band Imaging (NBI), ajudam a prever a histologia dos pólipos sem ressecção. O presente estudo avalia o impacto da classificação NICE em colonoscopias em serviço de saúde terciário, analisando a performance dos examinadores ao longo do tempo.* **Métodos:** *Estudo prospectivo observacional unicêntrico. Incluídos pacientes submetidos à colonoscopia com pólipos detectados, que passaram por cromoendoscopia digital para classificação do protocolo NICE comparando com a histopatologia como padrão-ouro. Foi estratificado a análise em 2 periodos e entre os executantes.* **Resultados:** *A acurácia geral foi de 70,2%, sensibilidade de 0,663, especificidade de 0,761, valor preditivo negativo (VPN) de 0,590, valor preditivo positivo (VPP) de 0,813 sem melhora significativa no segundo período. Houve um ganho de performance na sensibilidade (0,606 vs 0,825, p=0,002), não houve diferença nas outras variáveis. Discussão: Observou melhoria na sensibilidade e melhoria não significativa na acurácia, VPN, VPP. A variabilidade entre os examinadores, demonstrado pelo Kappa 0,403 e o tamanho reduzido da amostra podem ter limitado resultados mais robustos.* **Conclusão:** *A cromoendoscopia digital é eficaz para a classificação de lesões colônicas e identificação histológica pré-ressecção, mas a performance dos examinadores é crucial, não devendo ser a única base para decisões clínicas. A implementação de treinamento formal e prática contínua é fundamental para melhorar o desempenho.*

Palavras-chave: *Colonoscopia. Educação Continuada. Pólipos Adenomatosos. Pólipos Intestinais.*

REFERENCES

1. De Paula Pires ME, Mezzomo DS, Leite FM, de Lucena TM, Pinheiro MJ, Vargas LJ, et al. Rastreamento do câncer colorretal: revisão de literatura. Braz. J. Hea. Rev. 2021;4(2):6866-81. DOI: 10.34119/bjhrv4n2-233.
2. De Oliveira Santos M, de Lima FC, Martins LF, Oliveira JF, de Almeida LM, de Camargo Cancela M. Estimativa de incidência de câncer no Brasil, 2023-

2025. Rev. Bras. Cancerol. 2023;69(1):e-213700. DOI: 10.32635/2176-9745.

3. Mármol I, Sánchez-de-Diego C, Pradilla Dieste A, Cerrada E, Rodriguez Yoldi MJ. Colorectal carcinoma: a general overview and future perspectives in colorectal cancer. Int J Mol Sci. 2017;18(1):197. DOI: 10.3390/ijms18010197.
4. Gupta S, Lieberman D, Anderson JC, Burke CA, Dominitz JA, Kaltenbach T, et al. Recommendations for follow-up after colonoscopy and polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer. Gastrointest endosc. 2020;91(3):463-85. DOI: 10.1016/j.gie.2020.01.014.
5. Assis RV. Rastreamento e vigilância do câncer colorretal: guidelines mundiais. GED gastroenterol. endosc. dig. 2011;30(2):62-74. DOI: 10.25248/reas.e7130.2021.
6. Kang YW, Lee JH, Lee JY. The Utility of Narrow-Band Imaging International Colorectal Endoscopic Classification in Predicting the Histologies of Diminutive Colorectal Polyps Using I-Scan Optical Enhancement: A Prospective Study. Diagnostics (Basel). 2023;13(16):2720. DOI: 10.3390/diagnostics13162720.
7. Walsh JM, Terdiman JP. Colorectal cancer screening: scientific review. Jama. 2003;289(10):1288-96.DOI: 10.1001/jama.289.10.1288.
8. Iwatate M, Ikumoto T, Hattori S, Sano W, Sano Y, Fujimori T. NBI and NBI combined with magnifying colonoscopy. Diagn Ther Endosc. 2012;2012:173269.
9. Neumann H, et al. Learning curve of virtual chromoendoscopy for the prediction of hyperplastic and adenomatous colorectal lesions: a prospective 2-center study. Gastrointest Endosc. 2013;78(1):115-20. DOI: 10.1016/j.gie.2013.02.001.
10. Winawer SJ. Colorectal cancer screening. Best Pract Res Clin Gastroenterol. 2007;21(6):1031-48. DOI: 10.1093/jnci/83.4.243.
11. Kaltenbach T, Anderson JC, Burke CA, Dominitz JA, Gupta S, Lieberman D, et al. Endoscopic removal of colorectal lesions: recommendations by the US Multi-Society Task Force on Colorectal Cancer. Am J Gastroenterol. 2020;115(3):435-64. DOI: 10.14309/ajg.0000000000000555.
12. Paggi S, Rondonotti E, Amato A, Terruzzi V, Imperiali G, Mandelli G, et al. Resect and discard strategy in clinical practice: a prospective cohort study. Endoscopy. 2012;44(10):899-904. DOI: 10.1055/s-0032-1309891.
13. Radaelli F. The resect-and-discard strategy for management of small and diminutive colonic polyps. Gastroenterol Hepatol. 2013;9(5):305.
14. Kaltenbach T, Hewett D, Rex D, Sato T, Ponchon T, Sano Y, et al. Resect and Discard Strategy in Real-Time Colonoscopy Using the Validated Narrow Band Imaging International Colorectal Endoscopic (NICE) Classification Provides Accurate Surveillance Interval Recommendations: 428. Am J Gastroenterol. 2011;106:S167-8. DOI: 10.1038/ajg.2011.336_6.
15. Paiva RA, Queiroz FL, França Neto PR, Costa BX, et al. Uso de cromoscopia com corante para detecção de pólipos em ceco e cólon ascendente-Deve ser utilizado de rotina?. Rev Col Bras Cir. 2023;50:e20233562. DOI: 10.1590/0100-6991e-20233562.
16. Júnior HF, Bonardi MD, Schiochet VJ, Júnior AB, Carmes ER, Sartor MC, et al. Importância da colonoscopia no rastreamento de pólipos e câncer colorretal em pacientes portadores de pólipos retais. Rev Bras Coloproct. 2005;25(3):226-34.
17. Zorron Cheng Tao Pu L, Yamamura T, Nakamura M, Koay DS, Ovenden A, Edwards S, et al. Comparison of different virtual chromoendoscopy classification systems for the characterization of colorectal lesions. JGH Open. 2020;4(5):818-26. DOI: 10.1002/jgh3.12382.
18. Sano Y, Tanaka S, Kudo SE, Saito S, Matsuda T, Wada Y, et al. Narrow-band imaging (NBI) magnifying endoscopic classification of colorectal tumors proposed by the Japan NBI Expert Team. Dig Endosc. 2016;28(5):526-33. DOI: 10.1111/den.12644.
19. Oba S, Tanaka S, Sano Y, Oka S, Chayama K. Current status of narrow-band imaging magnifying colonoscopy for colorectal neoplasia in Japan. Digestion. 2011;83(3):167-72. DOI: 10.1159/000321807.
20. Pu LZ, Cheong KL, Koay DS, Yeap SP, Ovenden A, Raju M, et al. Randomised controlled trial comparing

modified Sano's and narrow band imaging international colorectal endoscopic classifications for colorectal lesions. World J Gastrointest Endosc. 2018;10(9):210. DOI: 10.4253/wjge.v10.i9.210.

21. Sano Y, Kobayashi M, Kozu T. Development and clinical application of a narrow band imaging (NBI) system with builtin narrow-band RGB filters. Stom. Intest. 2001;36:1283-7.
22. Hewett DG, Kaltenbach T, Sano Y, Tanaka S, Saunders BP, Ponchon T, et al. Validation of a simple classification system for endoscopic diagnosis of small colorectal polyps using narrow-band imaging. Gastroenterology. 2012;143(3):599-607. DOI: 10.1053/j.gastro.2012.05.006.
23. Hamada Y, Tanaka K, Katsurahara M, Horiki N, Yamada R, Yamada T, et al. Utility of the narrow-band imaging international colorectal endoscopic classification for optical diagnosis of colorectal polyp histology in clinical practice: a retrospective study. BMC gastroenterology. 2021;21(1):336. DOI: 10.1186/s12876-021-01898-z.
24. Wang J, Qiao WG, Ren YT, Chen Y, Gong W. Interactive training versus self-driven training in the prediction of colorectal polyp histology by trainees using the NICE classification. BMC gastroenterology. 2023;23(1):47. DOI: 10.1186/s12876-023-02680-z.
25. Wu L, Li Y, Li Z, Cao Y, Gao F. Diagnostic accuracy of narrow-band imaging for the differentiation of neoplastic from non-neoplastic colorectal polyps: a meta-analysis. Colorectal Dis. 2013;15(1):3-11. doi:10.1111/j.1463-1318.2012.02947.x.
26. Hattori S, Iwatate M, Sano W, Hasuike N, Kosaka H, Ikumoto T, et al. Narrow-band imaging observation of colorectal lesions using NICE classification to avoid discarding significant lesions. World J Gastrointest Endosc. 2014;6(12):600.

Received in: 07/10/2024
Accepted for publication: 09/07/2025
Conflict of interest: no.
Funding source: none.

Mailing address:
Lucas Alves Bessa Cardoso
E-mail: cardluc@hotmail.com