(21189) - DEEP LEARNING AND CAPSULE ENDOSCOPY: AUTOMATIC PANENDOSCOPIC DETECTIONOF VASCULAR LESIONS

Pedro Marílio Cardoso[1]; Miguel Mascarenhas[1];Miguel Martins[1]; João Afonso[1]; Tiago Ribeiro[1]; Francisco Mendes[1]; Patrícia Andrade[1]; Hélder Cardoso[1]; João Ferreira[2]; Guilherme Macedo[1]

1 - Centro Hospitalar São João; 2 - Faculdade de Engenharia da Universidade do Porto

Introduction: Capsule endoscopy (CE) is commonly used as the initial exam in situations of suspected mid- gastrointestinal bleeding, after normal upper and lower endoscopy. Although the assessment of the small bowel is its primary focus, detection of upstream/downstream of vascular lesions may also be clinically significant. This study aimed to develop and test a Convolutional Neural Network (CNN)-based model for panendoscopic automatic detection of vascular lesions during CE.

Methods: A multicentric retrospective study was conducted, based on 1125 CE exams. We used a total of 152275 frames, from seven types of CE devices, of which 13523 had vascular lesions (angiectasia or varices) after triple validation. First, weconducted a 5-fold cross validation with patient-split for assessing CNN's robustness. Then, we evaluated CNN's global performance in a patient-split train and test division of data, assessing the latter. Our outcome measures were sensitivity, specificity, accuracy, positive predictive value (PPV), negative predictive value (NPV) and area under the conventional receiver operating characteristic curve (AUC-ROC) and the precision-recall curve (AUC-PR).

Results: Sensitivity and specificity were 80.8% and 98.0%, respectively. PPV was 85.6%, while the NPV was 97.1%. Overall accuracy was 95.7%. The AUC-ROC value was 0.92, while AUC-PR value was 0.99. The CNN processed 115 frames per second.

Conclusion: This is the first proof-of concept AI deep learning model developed for panendoscopic automatic detection of vascular lesions during CE. The high diagnostic performance of this CNN in multibrand devices addresses an important issue of technological interoperability, allowing it to be replicated in multiple technological

settings.

Palavras-chave : Capsule Endoscopy, Panendoscopy, Artificial Intelligence, Vascular Lesions, Gastrointestinal Bleeding