CO-002 - AUTOMATIC DIAGNOSIS OF MALIGNANCY IN IN DIGITAL SINGLE-OPERATOR CHOLANGIOSCOPY IMAGES USING ARTIFICIAL INTELLIGENCE: A PILOT STUDY

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Introduction: Diagnosis and characterization of biliary strictures is challenging. The introduction of digital single-operator cholangioscopy (D-SOC) allowing direct visual inspection of the lesion and targeted biopsies significantly improved the diagnostic yield in patients with indeterminate biliary strictures. However, the diagnostic efficiency of D-SOC, including guided biopsies remains suboptimal. Visual classification of these lesions, while sensitive for the diagnosis of malignancy, is non-specific, and no consensual classification system for D-SOC findings is currently endorsed. Convolutional neural networks (CNNs) have shown great potential for the interpretation of medical images. We aimed to develop a CNN-based system for automatic detection of malignant biliary strictures in D-SOC images.

Materials and methods: A CNN based on D-SOC images (*Spyglass DS II®, Boston Scientific*) was designed, trained and validated. Each D-SOC frame was labeled as showing normal/benign findings or as a malignant lesion if histopathological evidence of biliary malignancy was available. The image dataset was split for constitution of training and validation datasets. The classification provided by the CNN was compared with the labelling of the lesion. The performance of the CNN was measured by calculating the area under the curve (AUC), sensitivity, specificity, positive and negative predictive values (PPV and NPV, respectively).

Results: A total of 14250 images from 142 D-SOC exams were included (10280 of malignant strictures and 3970 of benign findings). The model had an overall accuracy of 96.1%, a sensitivity of 96.9%, a specificity of 94.2%, a PPV of 97.7% and a NPV of 92.1%. The AUC for the detection of malignant strictures was 0.99. The image processing speed of the CNN was 3 ms/frame.

Conclusion: The developed deep learning algorithm accurately detected and differentiated malignant strictures from benign biliary conditions. The introduction of artificial intelligence algorithms to D-SOC systems may significantly increase its diagnostic yield for malignant strictures.