SS03	Scientific Session 3
09:20-10:50	GBR 101
Chairperson(s):	
Chang-Hee Lee (Korea University Guro Hospital, Korea)	
Dong Ho Lee (Seoul National University Hospital, Korea)	

09:30-09:40 (SS03-P2)

Deep Learning-Based Triage of Acute Gallbladder Pathologies Using Ultrasound Cine Video Clips

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PURPOSE: For patients with suspected gallbladder pathology, differentiating between symptomatic cholelithiasis and acute cholecystitis is crucial as the latter requires urgent intervention. Although ultrasound is recommended as first-line imaging, ultrasound identification of acute cholecystitis is known to be highly operator-dependent and is subject to interpretation variability. There is significant unexplored potential in how deep learning tools can be implemented for real-time triage and clinical decision-making for these patients. In this preliminary study, we aimed to develop a deep learning model that distinguishes between ultrasound imaging of normal gallbladder, non-urgent cholelithiasis, and acute cholecystitis requiring urgent intervention.
MATERIALS AND METHODS: Adult patients presenting to the ED between 2017-2022 with right upper quadrant pain were screened, and ultrasound clips of normal imaging, non-urgent cholelithiasis, and acute cholecystitis were included based on final clinical diagnosis. Long-view cine video clips were de-identified and cropped, and time intervals containing gallbladder pathology were annotated for model training. Cines were randomly sorted into training(70%), validation(10%), and testing(20%) sets and divided into 12-frame segments. The deep learning model classified patients as normal (all segments normal), cholelithiasis (normal and non-urgent cholelithiasis segments), and acute cholecystitis (any cholecystitis segment present).
RESULTS: 116 patients with 266 cines were identified with normal imaging (46 patients;104 cines), non-urgent cholelithiasis (35;88), and acute cholecystitis (35;74). Average cine duration was 4.8s and classification of each required on average 0.33s. The model achieved a 91% accuracy for detecting normal imaging vs. abnormal imaging, and an 82% accuracy for detecting acute cholecystitis vs. non-urgent cholelithiasis or normal imaging.
CONCLUSION: Our deep learning model was able to classify normal imaging and acute cholecystitis requiring urgent intervention on a single-view ultrasound cine video with high accuracy. These results are promising and suggest that deep learning models may facilitate the triage and clinical decision-making for acute gallbladder pathologies.