V2 Use of a novel radiation-free fluoroscopy emulator (iPERC) to improve surgical skills in percutaneous nephrolithotomy

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INTRODUCTION & OBJECTIVES: Percutaneous nephrolithotomy (PNL) is a fluoroscopy-guided surgical procedure for kidney stones extraction requiring a high level of precision and skill. Currently available training models using animals and fluoroscopy are costly and have the disadvantage of radiation exposure. I-PERC is an ex vivo model that does not use fluoroscopy designed to train urologists in PNL. Our objective was to evaluate the efficacy of this model in improving PNL skills among urological surgeons.

MATERIAL & METHODS: 14 residents and 16 urologists with no more than 5 previous PCNL procedures and without the use of drugs affecting CNS were enrolled in this prospective study. Participants were instructed to perform 20 puncture attempts at the i-PERC model, trying to reach the posteroinferior calix. The first and last attempt were video-recorded and these videos were evaluated at the end. Evaluated parameters included kidney access time, emulated radiation time, number of c-arm movements and number of needle adjustments at 0 and 30 degrees.

RESULTS: At the end of the training program the time required to complete the evaluated tasks decreased significantly: kidney access time from a median of 148 to 77 seconds (p=0.000), the median emulated radiation time from 101.5 a 45.5 seconds (p=0.000), the median number of C-arm adjustments from 9 to 5 (p=0.004), and of needle adjustments at 0 and 30 degrees from 3 to 2 (p=0.000), and 6 to 4 (p=0.001), respectively.

CONCLUSIONS: The iPERC model constitutes a safe and effective device in PNL training. Not only does this novel tool avoids radiation exposure and the use of laboratory animals, but adequately simulates the challenges encountered a surgeon faces while performing this complex procedure.