Radiation dose in patients undergoing peripherally-inserted central catheter procedure

Abstract:

BACKGROUND: Although peripherally-inserted central catheter (PICC) insertion is commonly performed under fluoroscopic guidance, few reports have addressed performance and dosimetry when PICC is inserted under C-arm fluoroscopy.

PURPOSE: To evaluate the risk factors of radiation dose in performing PICC insertion using flat panel detector-based mobile C-arm fluoroscopy and a conventional angiography machine.

MATERIAL AND METHODS: Ninety-eight patients underwent the PICC procedure using conventional angiography equipment (n=49) or flat panel detector-based mobile C-arm fluoroscopy (n=49). Data were prospectively analyzed from July to November 2012. Dose-area product (DAP), tube voltage, tube current, fluoroscopy time, and image quality measured on a 5-point scale were estimated and compared using appropriate statistical tests.

RESULTS: There were no significant differences in tube voltage, fluoroscopy time, and image quality between conventional angiography and mobile C-arm fluoroscopy. DAP, mean arm
Tube current, and tube current in chest fluoroscopy were significantly lower in mobile C-arm fluoroscopy than using the conventional angiography machine (P < 0.05). Multivariate analysis identified tube current in chest fluoroscopy, arm tube current, and fluoroscopy equipment as significant risk factors for elevated radiation dose in PICC insertion.

CONCLUSION: PICC insertion can be performed using flat panel detector-based mobile C-arm fluoroscopy instead of a conventional angiography machine. Image quality and fluoroscopy time were not different between the two systems and the use of C-arm fluoroscopy significantly reduced radiation dose.