

Effectiveness of diagnostic coronary angiography with low frame rate on reducing radiation exposure in the cardiovascular laboratory

Background: Potential adverse consequences of radiation dose include skin radiation injury and predicted increased in lifetime cancer risk. Transradial approach for coronary angiogram associated with increased radiation exposure. Low rate fluoroscopy and cine-angiography have the potential to reduce radiation exposure. Methods: Patients undergoing diagnostic coronary angiogram were enrolled to conventional protocol (Fluoro 15 FPS/Cine 15 FPS) or low frame rate protocol (Fluoro 7.5 FPS/Cine 10 FPS) according to operator's discretion. We compared body mass index (BMI), cumulative air Kerma, cumulative dose area product (DAP), Fluoroscopy time, contrast use and image quality by the two independent cardiologists between conventional group and low frame rate group. Results: Forty three patients were enrolled into conventional group and 54 patients were enrolled into low frame rate group. There was no statistical significance on baseline characteristics including BMI. Cumulative air kerma was higher in conventional group than low frame rate group (436.6 ± 211.1 vs. 326.6 ± 157.4 mGy, $p=0.004$). Cumulative DAP and fluoroscopy times were higher in conventional group than low frame rate group (3407.7 ± 1858.1 vs. 2661.3 ± 1280.9 $\mu\text{Gy}/\text{Cm}^2$, $p=0.022$ and 244.5 ± 248.7 vs. 166.5 ± 116.0 seconds, $p=0.044$). Mean contrast use was not different between conventional and low frame rate group (136.1 ± 27.4 vs. 131.5 ± 29.6 ml, $p=0.438$). Images quality were quite acceptable between two groups. Conclusion: Radiation dose was lower in low frame rate protocol than conventional protocol and image quality was not different significantly. Therefore, low frame rate protocol can be an alternative method for reducing radiation dose.