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Fluoroscopic-guided tunnelled haemodialysis catheters are associated with a low delivered dose of radiation

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Introduction: Fluoroscopy-guided insertion of tunnelled haemodialysis catheters is considered routine practice in cases where timely native dialysis access cannot be achieved. However there is no current guidance available to define an acceptable and safe radiation exposure specific to this procedure aside from the requirement to keep doses as low as reasonably practicable for the intended clinical purpose of each examination.

The closest procedure for which a National Reference Dose for fluoroscopic procedures is available are Hickman lines where the mean screening times is 61s and a dose-area product (DAP, a measure of the absorbed dose multiplied by the area irradiated) of 2Gy.cm2. We set out to establish our practice to support local guidance.

Methods: We conducted a single-centre retrospective study of all tunnelled haemodialysis catheters inserted by either a nephrologist or transplant surgeon, outside a formal radiology department. All lines were placed in a dedicated procedures room adjacent to a ward using fluoroscopic screening by experienced operators who had undergone training in relation to Ionising Radiation (Medical Exposure) Regulations 2000. We collected information on all catheters inserted from March 2019 (right internal jugular catheters) and November 2018 (left internal jugular catheters) through to October 2019. Removal and reinsertion procedures were excluded due to the limited number.

Results: During the time period covered by this study 80 tunnelled-haemodialysis catheter were inserted using a right internal jugular (RIJ) vein approach, and 44 were sited via the left internal jugular (LIJ) vein. All catheters were Tesio long-term haemodialysis catheters comprising two separate lumens.

The mean DAP for RIJ tunnelled catheters was 0.35 Gy.cm2 (Median 0.24; 10th centile 0.08; 90th percentile 0.76). Mean DAP for LIJ tunnelled catheter was 0.56 Gy.cm2 (Median 0.39; 10th centile 0.03; 90th centile 1.27).

Mean RIJ screening time was 7.3s (Median 5.1; 10th centile 2.7; 90th centile 14.0). For LIJ, as might be expected given the greater complexity, screening time was longer at 16.1s (Median 9.42; 10th centile 5.6; 90th centile 29.8).

There was limited variability in both DAP and screening time between operators.

Conclusion: Our results show that in our centre, radiation exposure for tunnelled haemodialysis catheters is well below the diagnostic reference level for Hickmann line insertion. Our data should inform a diagnostic reference level specific to tunnelled haemodialysis catheters and help to ensure radiation exposure is kept as low as reasonably practicable for the procedure.