

RADIATION EXPOSURES TO PATIENTS DURING CARDIAC ANGIOGRAPHY AND CORONARY ANGIOPLASTY

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Of all medical radiological procedures currently undertaken, it has been well established that those which deliver the greatest radiation dose to the patient are associated with imaging of the heart; more specifically during coronary artery angiography and angioplasty. It is important, therefore, to measure the doses to patients associated with such procedures, as a preliminary step towards a programme aimed at dose reduction.

The method used in this study involved the mounting of a large area parallel plate ionization chamber, known as a Diamantor Chamber (PTW Freiburg), on the x-ray collimator housing. Such chambers were mounted on two machines, one being a Siemens Tridoros 5S, which employs an under-table tube, while the other is a Siemens Polydoros, employing a C-arm. The Diamantor system measures the exposure-area product emanating from the x-ray source. The skin dose to the patient was determined from this using a Capintec 192 Exposure Meter with a 28 ml air-equivalent chamber. The range of tube potentials for all the measurements was 60-110 kVp, while the frame rate during cine was 48/second for the under-table tube and 25/second for the C-arm.

The measurements obtained, which are illustrated in the following figures, were classified in accordance with the type of cardiac procedure performed, namely: Left and Right Coronary Angiography, Left Ventriculography and Coronary Angioplasty. For each procedure, the exposures obtained during the fluoroscopy and cine stages were combined. The relatively small dose received during catheter insertion is combined with that of Left Coronary Angiography, given that it is usually the first study performed in nearly all cases. The figures illustrating total dose per patient excludes Angioplasty and pacemaker insertion, but includes Right Heart Catheterization, Electrophysiological and Ergotamine studies, where they were performed in a small number of instances, along with the other studies. A total of 12 Cardiologists participated throughout this study.

It is evident from this study that some patients are receiving relatively high doses from cardiac catheterization procedures, especially in the case of coronary angioplasty. It is, therefore, imperative to implement means of reducing the total dose to patients undergoing such procedures, while maintaining an acceptable image quality.

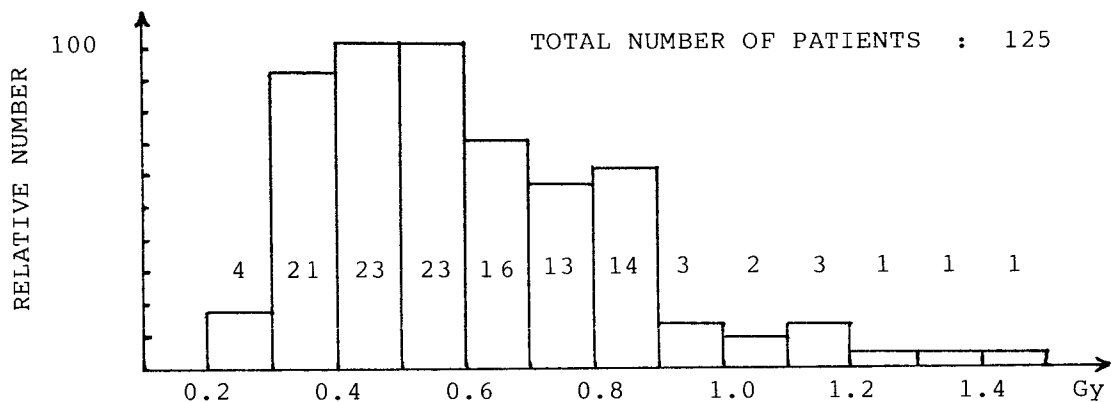


Fig. 1. Skin dose distribution for Left Coronary Angiography procedures, using an under-table tube.

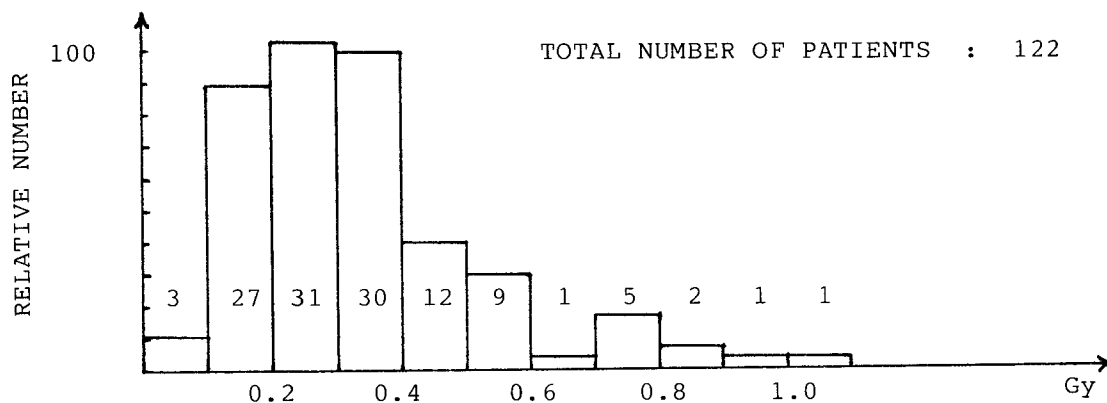


Fig. 2. Skin dose distribution for Right Coronary Angiography procedures, using an under-table tube.

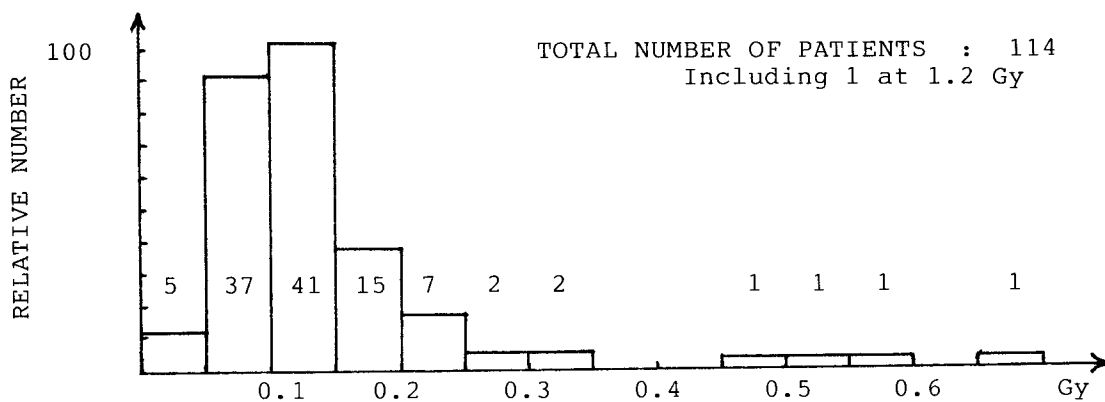


Fig. 3. Skin dose distribution for Left Ventriculography procedures, using an under-table tube.

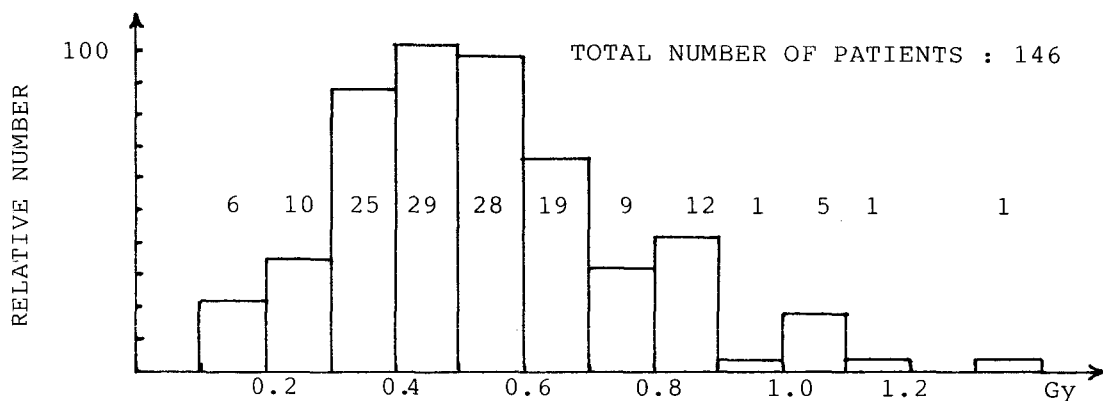


Fig. 4. Skin dose distribution for Left Coronary Angiography procedures, using a C-arm.

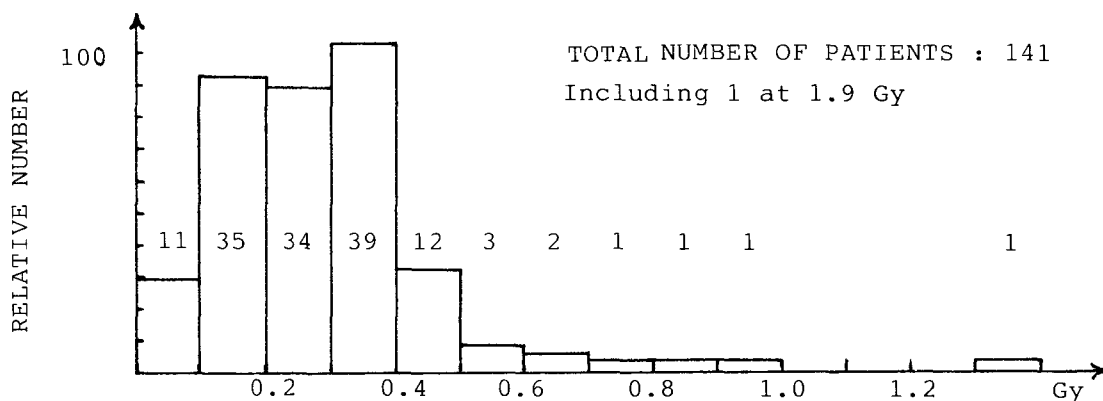


Fig. 5. Skin dose distribution for Right Coronary Angiography procedures, using a C-arm.

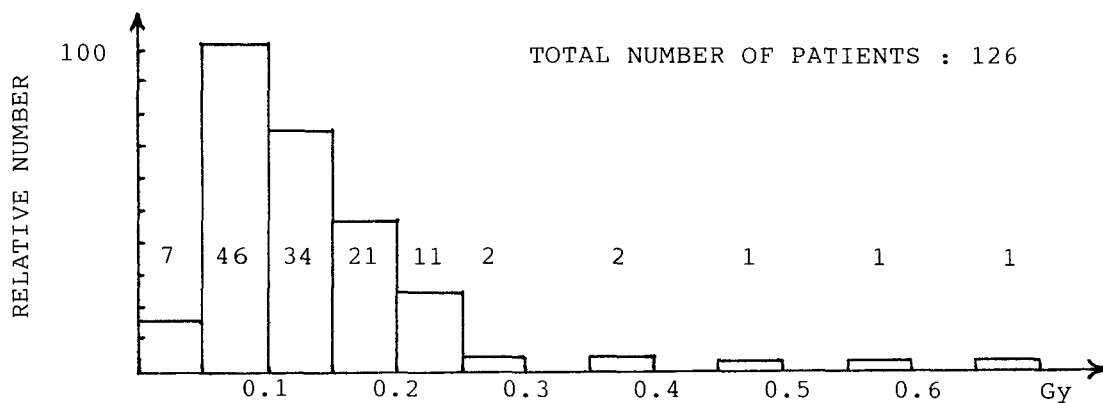


Fig. 6. Skin dose distribution for Left Ventriculography procedures, using a C-arm.

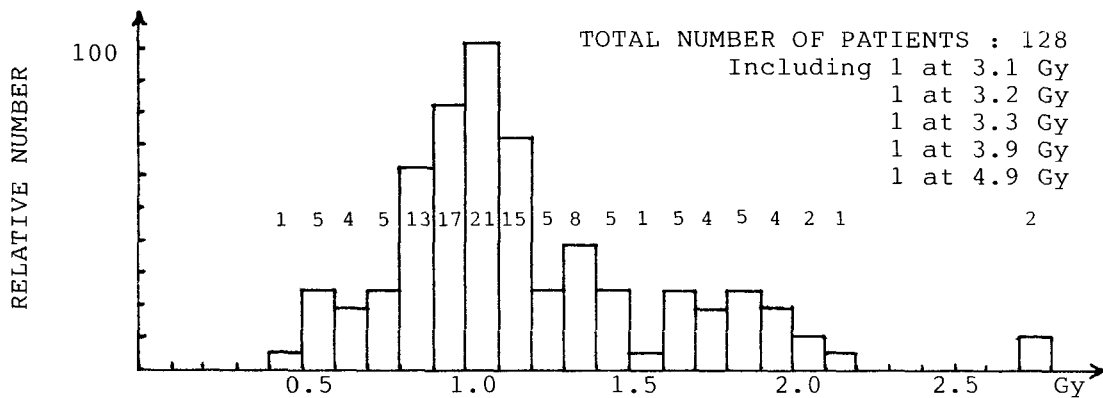


Fig. 7. Total skin dose distribution for all procedures, per patient, using an under-table tube.

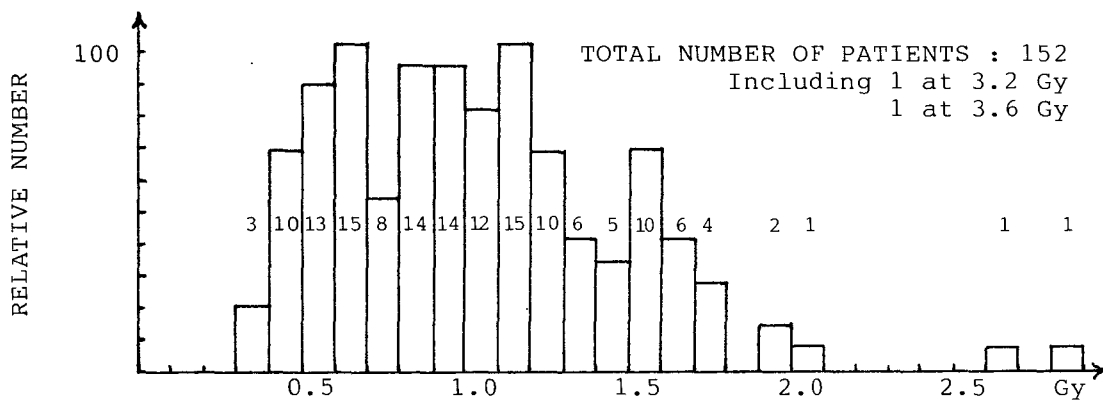


Fig. 8. Total skin dose distribution for all procedures, per patient, using a C-arm.

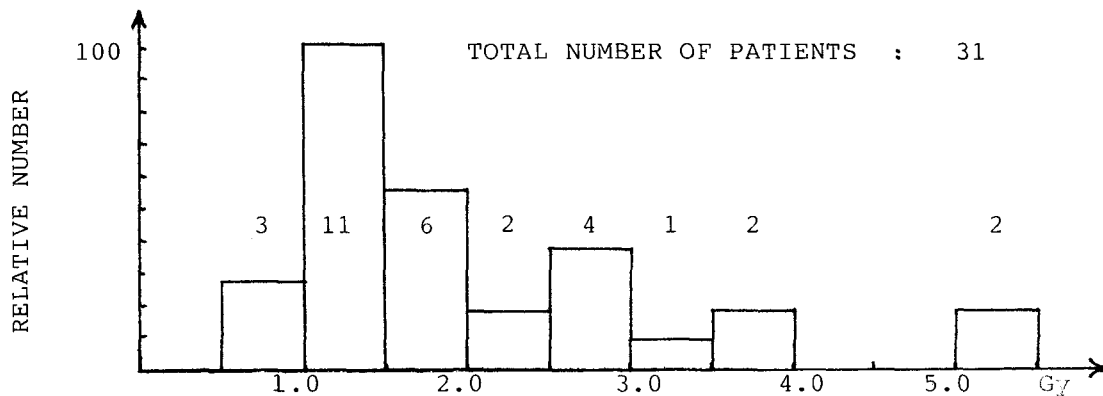


Fig. 9. Skin dose distribution for Coronary Angioplasty procedures, using a C-arm.