

# World Cardiology Summit 2020: The Comparison of Radiation Exposure between Application of Ultralow Dose Radiation Settings and Conventional Radiation Settings in Coronary CTO Intervention

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## Introduction:

CTO interventions are one of the greater tough approaches amongst cardiological interventions. One of the most important boundaries for coronary CTO is excessive radiation exposure. It has been properly mounted that whole radiation publicity basically relies upon on the body rate. In addition to that giant radiation lowering set-up can be utilized over it to limit publicity extra successfully. Three exceptional measures are these days used for the duration of interventions: (a) the entrance floor air kerma (ESAK), measured in Gray (Gy), which potential the radiation electricity launched at the factor the place the X-ray beam enters the patient's skin; (b) the dose region product (DAP), measured in Gy.cm<sup>2</sup>, which represents the product of the dose in air inside the X-ray beam and the beam vicinity and; (c) the fluoroscopic time (FT), measured in minutes. The ESAK is used to measure the deterministic hazard to the affected person such as pores and skin injury, whilst the DAP is used to measure the stochastic threat of the patient, which includes the probability of growing malignancies or genetic defects in the future. FT does not consist of cine acquisition imaging and is consequently insufficient to investigate affected person radiation.

The techniques for lowering radiation throughout CTO interventions protected preoperative and intraoperative strategies:

a) Pre-procedural strategies: Patient determination except chance elements like latest radiation publicity is the mainstep. And if it is possible, preceding photographs should be evaluated prior to process for planning. Also computed tomography coronary angiography (CTCA) is a beneficial device for CTO pre-procedural planning. Although the contribution of multislice CT (MSCT) is about 19 mSv. Finally, CTO team, which encompass doctors, technicians and nurses must be trained about radiation protection prior to procedures.

b) Intra-procedural strategies: Staff radiation dose must be carefully monitored often with dosimeters. Protective 0.5 mm lead aprons, thyroid shielding, shin leg covers and radiationspecific glasses can quit up to 95% of the scattered radiation and have to be worn by means of all CTO group members. CTO interventions with beneath and above desk set up protecting and the these days developed Trinity Radiation Protection system. All CTO operators ought to be acquainted with and observe the ALARA principle, which ability the usage of all applicable strategies and techniques in order to reduce radiation dose.

Radiation publicity need to be intently monitored at any time for the duration of the procedure. A dose of 10 Gy ESAK is as a threshold at which a CTO operator ought to give up the procedure.

Adjusting the distance between the affected person and the X-ray tube by using positioning the desk at a greater degree can result in great discount of radiation dose. Higher magnification will increase the patient's dose and need to solely be utilized in exceptional circumstances. Moreover, all CTO operators have to be familial with present process processes at decrease framing fees per 2d (fps) (6.0- 7.5 fps rather of 15 fps) and the usage of pulsed fluoroscopy mode as an alternative than the digital cine mode storage. Altering the beam angulation at some stage in the manner by using rotating the X-ray tube extra than 40° can decrease the patient's pores and skin dose and reduce irradiation of a unique element of the patient's

skin. Steep angles have been linked to greater radiation doses due to penetration thru greater layers of tissue and need to consequently be avoided. Collimation decreases scatter radiation and the universal dose obtained via the patient. The use of extra copper filters reduces predominant beam publicity and can decorate targeted visualization.

### Materials and Methods:

The Institutional Ethics Committees of Medical Park Izmir hospital/Turkey accepted the find out about protocol. The learn about used to be performed in accordance to the present day model of Helsinki Declaration. All topics have been knowledgeable and signed written consent prior to their enrollment. All forty seven patients, aged 62, four  $\pm$  12 and forty (85, 1%) male, have been chosen based totally on prior angiographic snap shots and medical findings from 2017 to 2019. The imply age of the find out about team was once 62, four  $\pm$  12. Duration of CTOs used to be between 1, 5-10 years. All strategies have been carried out by using skilled operators; every of them carried out about five hundred CTO tactics between from 2005 to 2019. Patients divided two companies (31 (66%) and sixteen (34)) based totally on sufferers resolution after knowledgeable consent and lesion anatomical resemblance in prior images. All operators knowledgeable about operation prior to method and all of them, together, determined strategies and units for procedures. All methods carried out with identical angiography machine (Siemens Artis Zee VC14H) with identical CTO group without operators. Total fluoroscopy time, wide variety of cineangiographic runs, Cumulative dose (CD, mGy), the dose region product (DAP, Gy cm<sup>2</sup>) had been reviewed for every procedure. Three operators have been performing these procedures, one of whom used to be working with ALARA standards (Operator Group 1), the closing operators had been working in wellknown cine mode (Operator Group 2). 31 (66%) of the interventions had been carried out by way of Operator 1 and the ultimate sixteen (34%) by using the different operators.

All feasible radiation decreasing adjustments have been used by means of Operator 1, such as pulse width (5.0 ms) Kv and publicity dose (0.10 mGyf<sup>-1</sup>), placing for copper filter protection, shielding, a longer line for Y connector, pedaling two seconds after distinction injection methods as nicely as low body price (7.5 f s<sup>-1</sup> for cine and fluoroscopy). All methods have been accomplished correctly via operators. The counts of used wires, balloons and stent had been comparable for two groups. All measurements of whole fluoroscopy time, range of cineangiographic runs, cumulative dose(CD, mGy), the dose region product (DAP, Gy cm<sup>2</sup>) have been in contrast statistically.

Statistical analysis: The statistical package deal SPSS (Statistical Package for the Social Sciences, model 17.0, SSPS Inc, Chicago, Ill, USA) was once used for statistical analysis. Continuous variables have been expressed as skill  $\pm$  wellknown deviation. Categorical variables had been expressed as the complete quantity (percentage). Analysis was once carried out the use of Student t-test. Categorical information have been in contrast in opposition to a chisquared distribution. A p cost <0.05 was once considered as significant.

### Conclusion:

Besides body price and fluoroscopy time, above noted ALARA concepts and shielding methods like different publicity settings, adaptive copper filter, longer line, protecting and pedaling methods have been proven to be critically fantastic on radiation protection. All radiation publicity reducing strategies need to be robotically used in catheterization laboratories to be decreased deterministic and stochastic results of radiation exposures.

