بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Evaluation of Radiation Exposure and Image Quality in Congenital Catheterization Laboratory; A Single Centre Comparative Study Using Different Acquisition Modes

THESIS

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List of Abbreviations

Abb.	Full term
AEC	*Automatic exposure control*
AK	*Air kerma*
ALARA	*As low as reasonably achievable*
CHD	*Congenital heart disease*
CM	*Centimeter*
CM^2	*Centimeter square*
CT	*Computed tomography*
DAP	*Dose area Product*
DNA	*Deoxyribonuncleic acid*
Fps	*Frames per second*
Gy	*Grey*
$Gy.cm^2$	*Grey per centimeter square*
IQR	*The interquartile range*
KG	*Kilo gram*
M^2	*Meter square*
mGy	*Milligrey*
$mGycm^2$	*MilliGray per centimeter square min.*
Min	*Minute*
MRI	*Magnetic resonance imaging*
mSv	*Millisievert*
N	*Number of cases*
Y	*Year*

INTRODUCTION

Survival for patients with congenital heart disease (CHD) has improved dramatically over recent decades and more than 85% of people born with a heart defect are now expected to survive to adulthood. With more advanced technology and expert doctors the CHD intervention procedures become more advanced and complex with more time length and more radiation exposure***(Lang and Walker, 2018).***

Technological advances in percutaneous structural intervention, usually under fluoroscopy guidance, have allowed patients to avoid redo surgery or, in some cases, to avoid any conventional surgical intervention whatsoever. Many of these patients need multiple catheterization procedures, multiple multislice CT scan, chest x-ray pre-and post-operative, the risk of cumulative radiation form all these procedures with improvement of prognosis is gaining attention***(Lang and Walker, 2018).***

The radiation dose delivered to patients are approximately 10–20 times lower in the fluoroscopy mode than in the conventional cine angiography mode, the dose can be minimized by the appropriate utilization of stored fluoroscopy images or films at relatively lower doses. This method is known as fluoro angiography; however, this is on the expense of image quality with poorer spatial resolution***(Olcay et al., 2014).***

The adverse risks of radiation exposure may be described in terms of **stochastic** and **deterministic** effects. The development of malignancy due to radiation exposure is a stochastic risk***(Olcay et al., 2014).***

Developing a skin burn as a result of a prolonged radiation exposure is a deterministic effect. The **deterministic** effect is a dose-dependent direct health effect of radiation for which a threshold is believed to exist***(Olcay et al., 2014).***

Radiation exposure is usually described in terms of the following parameters:

1. Fluoroscopic time (min.):

This is the time during a procedure that fluoroscopy is used but does not include cine acquisition imaging. Therefore, considered alone, it tends to underestimate the total radiation dose received***(Brindis et al., 2014).***

2. Cumulative (total) air kerma (Gy):

The cumulative air kerma is a measure ofx-ray energy delivered to air at the interventional reference point (15 cm from the center in the direction of the focal spot). This measurement has been closely associated with deterministic skin effects***(Brindis et al., 2014).***

3. ***Dose-area product (Gy.cm2):***

This is the cumulative sum of the instantaneous air kerma and the x-ray field area. This monitors the patient dose burden and is a good indicator of stochastic effects***(Brindis et al., 2014).***

AIM OF THE WORK

The aim of our study is:

To study the effect of lowering radiation dose by using a fluoro angiography on image quality in pediatric cardiac catheterization.