Radiation Dose Measurement in Gastrointestinal Studies

Abdelmoneim Sulieman[1,2*], Maisa Elzaki[1]
C. Kappas[2] and Kiki Theodorou[2]

[1]College of Medical Radiologic Science, Sudan University of Science and Technology, P.O.Box 1908, Khartoum. Sudan

[2]Medical Physics Department, University Hospital of Larissa, P.O.Box 1425, Larissa 41110, Greece.

*Corresponding author: Abdelmoneim_a@yahoo.com

International conference on Radiation Protection in Medicine. Varna, September 1st -3rd , 2010, Bulgaria

Introduction

- Endoscopic retrograde cholangiopancreatography (ERCP) and barium studies (Barium meal, Enema, follow through and barium swallow) rely on the use of ionizing radiation.

- During those procedures, fluoroscopic and radiographic images are taken with paramedical and medical staff near the patients.

- Even if the level of exposure to X-rays during ERCP is low, it is important to stress that it is a chronic exposure that can lead to potentially unhealthy condition.

Purpose

The purpose of this study was to:

Measure the radiation dose received by personnel performing fluoroscopic procedures and patient under it , mainly in ERCP and barium studies (barium: Swallow, Enema and Meal) in gastro-intestinal department.

Materials and Methods

- A total of 48 procedures of ERCP and 33 investigations of barium studies measured by using TLD chips mounted on the patient and examiners (doctor, x ray technologist and nurse).

- The patients were divided into three groups according to the hospital (Fedail Hopspital, Soba university hospital, and Ibn seena hospital).

Materials and Methods I

Dosemeter

- A total of 200 thermo luminescence dosimeters (TLD) of lithium fluoride (LiF:Mg,Cu,P) were used in this study.
- TLD calibrated under reproducible reference condition against ionization chamber PTW.CONNY II connected to radiation monitor controller at 100 cm SSD, 75 kV and 20 mAs (this equals the average energy used during ERCP).
- The TLD signal was read using an automatic TLD reader (Fimel PCL3, France) in an atmosphere of inert nitrogen.
- The read-out was at a 155 0C preheat temperature and the signal was acquired from 155 to 260 0C with heating rate of 110C /s.

Materials and Methods II
X-ray machines

A. Soba University Hospital (under couch X ray tube)

B. Fedail hospital (under couch X ray tube)

C. Ibn sena hospital (over couch X ray tube)

Results

Table 1:Patient radiation dose in barium studies (*mGy*)

Type of Exam	Mean±Sd	minimum	1st Quartile	median	3rd Quartile	maximum
Barium Swallow	12.6±10.6	0.23	4.05	10.7	19.62	26.94
Barium Meal	44.5±49.9	7.16	9.84	24.9	58.86	163.04
Barium Enema	35.7±50.9	0.21	7.33	13.2	32.27	165.77

Table 2: Patient's organ dose for ERCP in three Hospitals

Organs	**organ dose (*mGy*)**		
	Fedail	Soba	Ibn sena
Pancreas	2.69±7	1.60±1.3	8.3±10.3
Red bone marrow	1.24±3	0.77±0.4	3.69±4
Liver	3.14±9	6.84±5	9.51±11
Breast	0.06±1	0.04±0.1	0.20±0.3
Ovaries	1.56±4	0.86±0.7	5.13±6
Testicles	0.14±0.4	0.06±0.1	0.93±1.

International conference on Radiation Protection in Medicine. Varna, September 1st -3rd , 2010, Bulgaria

Conclusions

- The indicates that there is a great need for radiation exposure reduction to patients during gastrointestinal studies.
- Optimization of technical and clinical factors are crucial for reduction in patient doses.
- The radiation absorbed doses to the different organs are relatively low. Additional studies need to be conducted for radiation dose optimization.
- Additional studies need to be conducted in order to establish reference dose levels for the entire procedures.