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FLUOROSCOPY IN MODERN INTERVENTIONAL RADIOLOGY: BIOPHYSICAL PRINCIPLES OF IMAGE QUALITY ENHANCEMENT AND RADIATION DOSE OPTIMIZATION

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Abstract

In progress modern intervention in radiology fluoroscopy biophysicist basics , image quality increase and radiation dose optimization strategies analysis does . In the study X-ray radiation physicist principles , image harvest to be mechanisms and dose reduce according to practical approaches seeing The purpose is diagnostic . accuracy and patient safety between balance provider scientific the basics presented to be

Keywords: Fluoroscopy , intervention radiology , imaging quality , radiation dose , biophysics , alara , x-ray radiation , optimization

Introduction

Intervention radiology (ir) modern medicine intense developing from directions one is minimally invasive diagnostics and therapeutic treatments done in increasing for fluoroscopy Fluoroscopy realistic time in mode the images presented to grow through surgery of practices accuracy and safety However ,

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this technology ionizer from radiation used because of the patients and medicine employees for potential danger The word "tug " means "birth" [1, 2].

Fluoroscopic image harvest to do process diagnostic quality and security supplier one row to the principles is based on [1]. Image of quality main from the indicators one spatial accuracy (spatial resolution) is , it small , one to another close located structures distinction opportunity This is what it is . in turn , clearly diagnosis to put for very important . Contrast adjustment image clarity increasing, different industries between brightness the difference strengthens and features further more precisely shows [1]. General image quality of the equipment type , get such as acquisition settings technician elements and patients and employees for radiation to minimize aimed at radiation security practices with is marked . Digital fluoroscopy traditional methods almost complete real time in mode more precisely the images noticeable at the level reduced radiation with also provides digital storage and manipulation opportunities gives . Modern fluoroscopic systems radiation level automatic accordingly optimization for dose reduce programs own inside takes . Lead ionizer radiation effective blocking what did because of protection in their aprons is applied . Optimal image density and relevant contrast and details for milliamper-second (ms) adjustment through is achieved [1].

Diagnostic fluoroscopy , real -time in mode to describe method as , to patients high radiation dose the risk gives birth , so for safe practices very important [2]. Radiation dose to the operator related although the equipment features alara (as low as reasonably achievable - possibility (as low as possible) principle compliance to do help The patient 's radiation minimization main strategies between fluoroscopy time reduction and team connection improve for treatment before inspection from the lists use enters.

Intervention in radiology fluoroscopy biophysicist principles analysis to do for qualitative, analytical approach was used. Research methodology there is scientific literature systematic seeing exit and synthesis to do based on. Given

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sources [1], [2], [3] critical evaluated and in them information image quality increase and radiation dose . Intervention in radiology fluoroscopy efficiency image quality and radiation dose between thin to balance related is, this balance biophysicist principles manages.

Spatial resolution : this of the image small the details separate to take ability represents . Biophysical in terms of , spatially accuracy X-ray of the pipe focal point size , detector of elements size and the image again work algorithms with is defined as [1]. Smaller focal point and detector elements high accuracy provides, but this often X-ray of the pipe heat to capacity and detector to the noise impact does .

Contrast : the contrast of an image various fate between brightness difference . Contrast X-ray of the rays energy level (kvp) , tissue density and atomic number (z), as well as contrast from substances use with Depends . High cc radiation from tissues transition ability increases , but contrast reduces , because photons less swallowed . Low kvp and contrast increases , but the patient falling dose increase possible [2]. Mas (milliamperere- second) X-ray rays amount control does this and image density and noise to the level impact does [1].

Noise: in the image random changes is , it is an image quality Reduces noise . mainly photon flux statistic vibrations (quantum noise), detector internal noise and electronic noises with related . Photon flux increase (i.e. , increase the dose) increase) quantum noise reduces , but this dose optimization to the purpose contrary comes . Digital the image again work algorithms the noise in reduction important role plays [1-13].

Digital technologies : digital fluoroscopy real -time image in mode again work , storage and manipulation to do opportunity gives .

Image quality and radiation dose optimization intervention in radiology permanent balance demand to do complicated is a task . High image quality diagnostic accuracy although it increases , often high radiation dose with related On the contrary , the dose sharp reduce image of quality to decrease take arrival

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it is possible , this and diagnostic to mistakes road open This is possible . each other dependency understanding and management biophysicist principles deep to know demand does .

Kvp and contrast: low kwp high contrast provides, this soft tissues and contrast substances for useful , but to the patient falling dose increases . Higher cc and dose reduces , but contrast reduces , this bone structures for acceptable to be possible . Optimal kvp what choice of the treatment type and the patients to the anatomy related

Summary : Modern intervention in radiology fluoroscopy biophysicist principles , image quality increase and radiation dose optimization strategies deep analysis did . Image quality spatial sharpness , contrast and noise such as factors with is determined , their every one X-ray of the rays physicist features and detector technologies with closely related . Radiation dose optimization and alas principle, time , distance , protection , collimation , pulsed fluoroscopy and technician parameters right adjustment such as biophysicist to mechanisms is based on . Research this shows that diagnostic efficiency and radiation security between balance provision for this principles complex in a way application necessary .

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