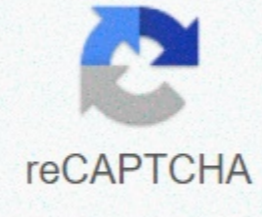




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1. Screen Film Radiographic Technique Muhammad Arif Afridi Lecturer in Medical Imaging Email: drarifafri@gmail.com MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 12. Exposure Factors Kilovolt Peak (kVp) Mill Amperes (mA) Exposure Time Distance 2MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 3. Exposure factors The factors that affect and determine the amount and quality of x-radiation that the patient is exposed to are called exposure factors. 3MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 4. Factors that may affect X-ray quantity and quality 4MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 5. The four main exposure factors are: 1. kilovolt peak (kVp), 2nd current (mA), 3rd exposure time(s) and 4. source-to-image receptor distance (SID). 5MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 6. Secondary factors 1. Focal-spot size, 2nd distance, and 3. filtering is may require manipulation for specific surveys. 6MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 7. Four Prime Exposure is: MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 7 8. 1. Kilovolt Peak (kVp) kVp controls screen film radiographic contrast. the beam penetrating. kVp has more effect than any other factor on image receptor exposure. kVp increases, less differentialabsorption occurs. Therefore, high kVp results in reduced image contrast. 8MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 9. 2. Milliampere MA selected determines the number of X-rays produced and therefore the amount of radiation. As more electrons flow through the X-ray tube, several X-rays are produced. With a constant exposure time, the mA controls the amount of X-ray and therefore the patient's radiation dose. X-ray quality remains fixed with a change in mA. A change in mA does not alter the kinetic energy of electrons flowing from cathode to anode. It just changes the number of electrons. 9MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 10. 3. Exposure time Radiographic exposure times are usually kept as short as possible. The purpose is not to minimize the patient's radiation dose, but rather to minimize the motion blur that can occur due to the patient's movement. Short exposure time reduces motion blur. 10MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 11. 4. Distance distance has no effect on radiation quality. Distance (SID) affects od. 11MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 12. Secondary factors are: MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL | DRARIFAFRIDI@GMAIL.COM 12 13. Image system properties 1. Focal-spot size region of the anode target where electrons interact with with X-rays. 2. Filtration Removal of low-energy X-rays from the useful beam with aluminum or another metal. It results in increased radiation quality and reduced patient dose. 3. High Voltage Generation 13MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 14. 1. Focal-Spot Size Most X-ray tubes are equipped with two focal spot sizes. On the operating console, these are usually identified as small and large, 0.5 mm, 0.6 mm or 1.0 mm/ 2.0 mm. X-ray tubes used in interventional radiology procedures or magnifying radiography may have 0.3 mm/1.0 mm burn sites. A difference between large and small focal spots is the capacity to produce X-rays. Many more X-rays can be produced with the high focal point because the anode heat capacity is higher. With the small focal point, electron interaction occurs over a much smaller area of the anode, and the resulting heat limits the capacity of X-ray production. 14MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 15. Changing the focus point of a given kVp/mAs setting does not change the X-ray count or quality. A small focal point is reserved for find detail radiography. 15MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 16. Generators The radiological technologist can not choose the type of high voltage generator to use for a given examination. Three basic types of high voltage generators are available: single phase, three-phase and high frequency. The amount of radiation and quality produced in the X-ray tube is affected by the type of high voltage generator used. 16MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 17. Half-wave improvement results in the same radiation quality produced by full-wave improvement, but the amount of radiation has been halved. Half-wave improvement is rarely used today. Some mobile and dental X-ray imaging systems are half-wave rectified. Radiation quality does not change when going from half wave to full wave improvement; However, the amount of radiation doubles. Remediation is the conversion of AC (AC) to direct power (DC). 17MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 18. Three-phase effect results in higher X-ray volume and quality. High frequency generation results in even greater X-ray quantity and quality. 18MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 19. PATIENT FACTORS The first group includes patient factors, such as anatomical thickness and body composition. The second group consists of image quality factors, such as OD contrast, details, and distortion. Also of significance is how these image quality factors are affected by the patient. The final group includes exposure engineering factors, such as kVp, milliamperage, exposure time and and box, box, focal-spot size, and filtration. An understanding of each of these factors is essential for the production of high-quality images. 19MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 20. The overall size and shape of a patient is called body habitus Sthenic- which means that strong, active hyposthenic patients are thin, but healthy hypersthenic patients are large in frame and usually obese. Asthenic patients are small, sometimes often older Radiographic technique diagrams are based on sthenic patients. 20MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 21. Thickness The thicker the patient is, the more x-radiation is necessary to penetrate the patient to reveal the photoreceptor. Composition The chest has a high emotive contrast; the stomach has low motive contrast. Pathology Type of pathology, its size and composition affect radiographic technique. 21MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 22. IMAGE QUALITY FACTORS Image quality factors refer to the characteristics of the radiographic image; these include OD, contrast, image details, and distortion. Image quality factors are considered the language of radiography 22MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 23. Optical density Optical density is the degree of blackening of the finished X-ray graph. In medical imaging, many problems involve that an image is too dark or too light. An X-ray that is too dark has a high OD caused by overexposure. This situation results when too much x-radiation reaches the image receptor. An X-ray graph that is too light has been exposed to little x-radiation, resulting in underexposure and low OD. Optical density can be controlled in radiography of two main factors: mAs and SID. 23MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 24. Contrast The function of contrast in the image is to make the anatomy more visible. Contrast is the difference in O.D. between adjacent anatomical structures, or the variation in the O.C. on an X-ray graph. Contrast is therefore perhaps the most important factor in radiographic quality. kVp is the most important factor used to control radiographic contrast. 24MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 25. Detail Detail describes the sharpness of the appearance of small structures on the X-ray image. With sufficient details, even the smallest parts of the anatomy are visible, and the radiologist can more easily detect tissue abnormalities. The sharpness of image details refers to the structural lines or boundaries of tissues in the image. The sharpness of image details is best measured by spatial resolution. 25MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 26. Distortion of misrepresentation object size and shape on the Due to the location of the X-ray tube, the anatomical part and the image receptor, the final image can give a misrepresentation of the object. Distortion is reduced by placing the anatomical part of interest in a plane parallel to the imaging receptor. 26MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 27. EXPOSURE TECHNIQUE DIAGRAMS kVp, mA, exposure time and SID are the main exposure engineering factors. It is important for radiological technologists to know how to manipulate these exposure technique factors to produce the desired OD, radiographic contrast, image details and distortion on the finished X-ray graph. However, it is not necessary to get creative with each new patient. For each radiographic imaging system, a diagram should be available that describes standard methods for consistent production of high-quality images. Such an aid is called a radiographic technique diagram. 27MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 28. AUTOMATIC EXPOSURE TECHNIQUES Automatic control X-ray systems are not completely automatic. Radiological technologist does not need to choose kVp and mA's settings and time for each survey. Patient positioning must be accurate because the specific body part must be placed above the phototime unit to ensure proper exposure. 28MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 29. Factors to consider when constructing an exposure diagram for automatic systems MUHAMMAD ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 29 30. Automatic exposure control Radiation exposure in most X-ray imaging systems is determined by an automatic exposure control system (AEC). AEC incorporates a device that records the amount of radiation event on the imaging receptor. Through an electronic feedback circuit, radiation exposure is terminated when a sufficient number of X-rays have reached the imaging receptor to produce an acceptable OD. MUHAMMED ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 30 31. To produce an image, the radiological technologist touches only an icon or a written description of the anatomical part to be depicted and the body habit. The microprocessor automatically selects the correct kVp and MAs settings. MUHAMMED ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 31 32. Thanks! MUHAMMED ARIF AFRIDI | LECTURER IN MEDICAL IMAGING | DRARIFAFRIDI@GMAIL.COM 32,32

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