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Effects of Radiological technique factor to the image quality & dose

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Introduction

Due to the recent development of medical technology, we are able to get lots of information which are unable to get from diagnostic radiology field. However, it is undeniable fact that general radiology provides tremendous information. Therefore, general radiology covers the major portion of the field of diagnostic radiology and interest about medical exposure is being encouraged. It is recommended to the system of dose limit and also justification and optimization of radiation protection by ICRP. The purpose of this experiment is; 1) To find out the method to obtain optimized image. 2) To find out the dose limit method corresponding to kVp & mAs which are technical factors among x-ray image generation factors.

Method

In order to measure the similar dose with the exposure dose of 80kVp and 40mAs, we use mAs value between the region of 50~110kVp. By making film characteristic curve from each radiation exposure to Al wedge step, the resultant contrast is compared. Also the dose variation according to the different depth is compared by exposure to the polystyrene phantom which is a tissue equivalent matter and the scattered dose from the phantom is measured at the distance of 50 cm from the center of tube.

Results

1) In the case of 50kVp/mAs, we get gradient(gamma value)=2.78. With 110kvp/20mAs, we get gradient(gamma value)=0.60. These result shows that we can get high contrast with high mAs and low kVp.
2) In the case of 50kVp/125mAs, the point when exposure dose reduces to 45% is 1.5 inches and the point is reduced to 4 inches when exposure dose is decreased to 10%. In the case of 110kVp/20mAs, it is reduced to 45% at the point of 2 inches and to 10% at the point of 5.5 inches. From these results, we can find that the decreasing rate regarding to the depth is low when kVp is high.
3) At 50 kVp/ 125mAs, we get 890mR/hr, and at 110 kVp/mAs we get 1748mR/hr. From these results, we can assume that high factor of kVp increases the rate of scatter.

Discussion

In diagnostic radiology field, radiology equipment factor and radiology technical factor could be the major parameters controlling the exposure dose. However, by varying technical factors such as kVp, mAs, time and distance, the exposure dose can be also reduced. Although the space scatter dose by patients shows a difference due to the above condition, the difference will be also produced to the measured positions with the same condition.

Conclusion

As the values of low kVp and high mAs are used, we can get high contrast, the high reducing rate according to the depth, relatively small penetrating dose and low scatter rate due to high penetrating dose.