

X-RAYS

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Some Problems Associated with Radiography of Children and how to minimise them

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From experience, paediatric radiography is very exerting and time-consuming. For most of these children who come to the X-ray department it is their first visit and they are very apprehensive. They are very sensitive to strangers touching or undressing them. The environment is strange to them and the looming X-ray equipment does not help to improve the situation. In this country, communication is also a problem as the radiographer may not always be able to speak the child's language. Some of these children come to the X-ray department after visiting the injection room. To them their visit to the X-ray department means another injection, therefore they must fight if only to avert the needle.

The child, especially the infant is not able to tell the radiographer where it hurts, in cases of road traffic accidents and battered babies, the latter category is no longer limited to the European countries. Cases of battered babies come up from time to time to our department; in cases of osteogenesis imperfecta their bones fracture very easily; all these categories of patients need very careful handling. Preparing children for any special radiological examination is always very problematic.

There is the problem of movement and adequate immobilisation during X-rays as these children are not always able to communicate fully with the radiographer; breath holding during chest X-rays is difficult. When we consider the hazards of radiation, we will find that the effects of X-radiation is more acute on children than adults since the rate of cell division is higher in children; there is less margin of exposure error in the child than in the adult.

In most departments, the X-ray equipment used is too bulky for paediatric radiography. In the busy X-ray department of today, there is

scarcely enough time to 'pamper' these children before they have their X-rays taken. There is the problem of separating sick children from sick adults in the X-ray departments while waiting for their turn to be X-rayed and the possibility of cross-infection is not remote. Where the radiographer wears rings or long finger-nails, either could scratch the tender skin of the child. May I just mention the agony of taking the radiograph of a child in an oxygen tent or in an incubator in an intensive care unit. Children need more time for their after-care after special X-ray investigations.

Now that we have seen some of the difficulties we could encounter in taking the X-rays of children I will mention a few methods of minimising these difficulties. First of all, it is very important to identify your patient because many anxious mothers will rush into the X-ray room with wrong child when any name is called and you could be taking the radiograph of the wrong patient before you know it. In taking the X-ray of children, it is necessary to come down to their level; smiling at them and calling them by their first names help a lot; introduce yourself to them and explain to them what you are about to do; try to start a dialogue or a mutual understanding between the child and yourself; describe the various parts of the equipment to them telling them what each part does (time-permitting). For the apprehensive child, let it see one or two people have their X-rays taken; never lie to a child; if an examination will hurt (e.g. the injection during an IVP), tell them it will hurt a bit and for a short period. If you lie to a child, it loses confidence in you and will not co-operate with you. Never undress children in the middle of the X-ray room in full view of everybody. Give them some privacy. Their preparation for special examinations should be simple and modest. They should, if possible have their X-rays before any injections

in the injection room. Children should be given preferential treatment whenever they come for X-ray investigations. They should not be kept waiting for long periods in the X-ray department, they become restless and impatient.

The installation of modern compact X-ray units for children should be encouraged. Talk to them nicely all the time; encourage them and tell them they are doing well. If you promise them anything for their good behaviour during the X-rays, you must keep your promise. Convey them up whenever necessary. Toys, drawings, and pictures should be used extensively to capture their attention. Immobilisation devices should be used to minimise movement during the process of taking the radiograph and prevent repeat films so as not to expose the child to x-radiation unnecessarily.

The hazards of x-radiation on the infant cannot be over-stressed so that all the processes used in protecting the patient from unnecessary ionising radiation in diagnostic radiography should be given full consideration. Is the investigation in question really necessary? Can diagnosis be made by employing an alternative method without using ionising radiation? Can the patient's previous X-ray films (if any) help in any way? The use of fast screen—film combination to

cut down on the dose, the use of protective lead rubber aprons, the use of gonad shields; the use of light beam diaphragm and cones to limit the size of the field; the use of standard exposure and processing technique; the use of conventional radiography instead of fluoroscopy whenever possible the use of long anode-film distances to reduce the skin dose; correct positioning of the patient and selection of correct exposure factors first time. Added to these is the need to train radiographers properly and re-train them so that they become masters of the equipment they are using. Good practice in radiography embodies all these.

3—phase generators are necessary in paediatric radiography; these equipments will give short exposure times to 'catch' the children before they move during the making of the radiograph

In certain examinations, the number of exposures to be made is reduced for example in Osgood Schlatter's disease (osteo chondritis of the tibial tubercle). Depending on the indication children's chest X-rays could be taken supine at the early ages as there are no special advantages in doing them postero-anterior in the erect position. Judicious technique, patience, confidence in ones self and skill are cornerstones of modern radiography and these only come with good basic training and consistent practice.

JOKES:

(Over-heard in a hospital operating theatre)

NURSE: Doctor, we have spent too much time operating on this patient. The operation is getting too long!

DOCTOR: Are we operating really, I thought it was a post mortem.

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PROTECTION OF RADIATION EXPOSED PERSONS: RADIOLOGISTS, RADIOGRAPHERS & PERSONNEL

The aim of the medical use of ionising radiation is to obtain maximum diagnostic or therapeutic effect with the smallest exposure of the patient, radiologist, radiographer and personnel.

How can this be achieved? It can only be achieved through sound protection. Radiation Protection Methods are classified under three main headings:-

- (a) Distance from the Primary
- (b) Reducing unnecessary exposure and dose to patient and personnel.
- (c) Use of Protective Devices and Techniques

(1) The Inverse Square law should always be remembered. It states that the intensity of radiation is inversely proportional to the square of the distance.

The above includes distance from Primary Radiation source and scatter Rays.

(2) An occupationally exposed person should never hold a Patient during the exposure period except in very exceptional cases e.g. during fluoroscopy. When this is absolutely necessary, lead aprons and gloves should also be worn during fluoroscopy when radiographer finds that standing behind the radiologist is not practicable.

(3) The radiologist should wear goggles for good adaptation when it is found necessary. This will help limit the time of fluoroscopy.

(4) Fluoroscopy should never be used as a substitute for radiography. It should be used for special studies of organs and spot film recordings.

(5) In case of Mobile X-ray Units, the radiographer should always take the cable of the control switch

to its full length. X-ray examinations in warus should be carried out only as a last alternative to departmental examinations. Protective methods must also be applied during theatre x-ray examinations.

(6) As regard the patients, the radiation beam should be coned down to the area of interest.

(7) All X-ray diagnostic equipments should have Filters of 2 mm - 2.5 mm Aluminium.

(8) The gonad should always be protected unless it falls within the area of exposure. The 10 days Rule should be applied in cases of women of child bearing age.

(9) Good darkroom work adds to the good standard of any X-ray department. Through adequate technique and film processing, retakes could be avoided.

(10) In case of check X-ray examinations, the radiographer should make it a point to see the previous films in advance as this would help in limiting the exposure to the affected areas only.

(11) If losses in diagnostic information could be held at minimum high speed screens should be used to decrease the exposure time and thereby limiting patient movement, which may lead to retakes.

(12) The construction of the X-ray department and installations of the equipments must meet with the set and recommended standards of the National Council on Radiation Protection and Measurements, NCRP. Reference could be made to NCRP. Report No. 33 Recommendations as laid down by the International Commission on Radiation Protection. Results of studies on both the somatic and genetic effects of ionizing radiations led to the recommendations by ICRP. of Maximum Permissible Dose (MPD).

i. The main objective in establishing the MPD is to keep the exposure of the radiation worker below a level at which effects could be seen during his life time.

ii. To minimise the genetic effects for the population as a whole.

THE MPD IS AS FOLLOWS:

Controlled Area	Average Weekly D	Maximum 13 Week	Maximum Yearly	Maximum Accumulated
Whole body, gonads blood forming organs, lens of eyes	0.1	3	—	5(N-18)e
Skin of whole body	—	10	30	—
Hands and forearms head neck and ankles	1.5	25	75	—
Non-Controlled Areas	0.01	—	0.5	—
The MPD does not include exposure as Patient.				

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