Q.A. Collectible

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Grids

Many facilities utilize a grid for thicker body part radiography. It is suggested that a grid be used for every body part that measures more than 13 cm, the size of a large knee, if the kilovoltage is greater than 70. (Fuchs 1986) The following definitions should be helpful in explaining the purpose and use of grids.

GRID:

A device used in radiography to absorb scatter radiation. This scattered radiation has no diagnostic value because it has strayed or been scattered from its original course through the body. If this stray radiation was allowed to reach the film, the image would lose much of its sharpness (contrast). A grid "cleans up" the radiographic image, but requires an increase in patient dose.

STATIONARY GRID:

In 1913 Gustav Bucky introduced the stationary radiographic grid. It consisted of wide strips of lead arranged in two parallel series that intersected at right angles. The modern stationary grid consists of closely spaced lead strips that are extremely thin, and are separated by radiolucent material, usually plastic or aluminum. The grid may be either a parallel grid, in which the lead strips are parallel to each other, or a focused grid, in which the lead strips are canted or angled toward the center. One disadvantage of the stationary grid is that the lead strips leave "blank" or white lines on the film. These lines are referred to as "grid lines." Newer grids reduce the visibility of grid lines and require less of an increase in patient dose than conventional grids. However, this type of grid is very expensive and has found widespread use only in mammography.

MOVING GRID:

One of the disadvantages of using a grid is that a pattern of clear (white) lines is cast on the film. This pattern of grid lines can be distracting to the radiologist. One solution to this problem, first conceived by Dr. Hollis Potter in 1920, was to move the grid sideways across the film during the exposure. The shadows of the grid strips are blurred out and are, therefore, not visible. Over the years, various mechanisms, from cocked springs to electric motors, have been utilized to achieve this movement. Two physical factors responsible for grid efficiency are the grid ratio and grid frequency.

GRID RATIO:

The height of the lead strip in relationship to the distance between them. Example: An 8:1 grid has lead strips 8 mm tall and these strips are 1 mm apart. The strips are eight times as tall as the distance between them.

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GRID FREQUENCY:

Defined as the number of lead strips per centimeter (or per inch). The greater the frequency, the thinner the strips, and the greater the likelihood of scattered photons passing through.

PRECAUTIONS WHEN USING STATIONARY GRIDS:

Care must be taken if the beneficial effects of a grid on radiographic quality are to be fully realized. The information listed below is most critical with focused grids.

- Focus-film distance and centering must be precise to avoid grid cutoff. This results when the lead strips absorb all or most of the primary radiation, instead of absorbing only the scattered radiation.

- The tube must not be angled, unless it is in a direction parallel to the lead strips.

- In addition, grids have a "tube side" and a "film side." Both sides of the grid should be clearly marked with the appropriate notation, "TUBE SIDE," meaning the side that faces the x-ray tube, and "FILM SIDE," the side closest to the film. This marking should be done before the grid is placed into service. Additional information that should appear on both sides of the grid is the grid ratio and the type of grid, i.e., focused or parallel.

Grid selection involves a compromise between film quality and patient exposure. High-ratio grids produce films with better contrast at the cost of increased patient exposure; however, proper alignment is more critical. Generally, low-ratio grids are adequate for low-energy radiation; 8:1 grids should be used with energies less than 90 kVp, and 12:1 grids for higher-energy radiation.

Additional information and recommendations can usually be obtained from the equipment or film representative.