

ENLARGING GAMMA-CAMERA SCANS

Charles D. Teates

University of Virginia School of Medicine, Charlottesville, Virginia

Although the Anger camera is very useful in clinical isotopic studies because it records scans quickly and easily, definite problems can arise as a result of the small size of the scan image. For example, physicians who are accustomed to the large scans produced by conventional rectilinear scanners find it difficult to adapt themselves to the Polaroid prints used to record the oscilloscopic image of the Anger camera, and the small print does not lend itself to superimposition on radiographs. Moreover, a large display is convenient for group demonstrations and measurement of organ size.

ENLARGING CAMERA

To overcome this size problem, we have designed a simple "box camera" which lets us enlarge the Polaroid image to life size on regular x-ray film. A pinhole substitutes adequately for a lens system, and a shutter mechanism is not needed.

The box camera consists of a wooden light-proof box painted inside with a dull black finish. Light-proof felt-lined slots hold the 14 × 17-in. cassette from the photorecording component of commercial rectilinear scanners. Opposite the cassette, an 0.3-mm-diameter pinhole in an aluminum plate forms the lens (Fig. 1). A 20-watt circular fluorescent lamp illuminates the Polaroid print which is mounted in slots directly in line with the pinhole. Any of the 3-on-1 Polaroid print images can be enlarged depending on its position in the print holder.

The dimensions of the box and the distance between the pinhole and the print determine the enlargement one obtains. To make an image that can be superimposed on routine radiographs, one needs a magnification of approximately 8 times. The magnification might be different with other scintillation cameras depending on the gain of the amplifier driving the oscilloscope, the lens characteristics of the

Polaroid camera recording the image and the collimator. We chose the 28-in. film-to-pinhole distance empirically because the corresponding 3.5-in. print-to-pinhole distance is convenient to use (this latter distance is adjustable). Clearly the ratio of distances is the factor controlling the magnification.

When we use an 0.3-mm pinhole, exposures vary from 90 to 150 sec depending on the density of the Polaroid print. Although a larger pinhole would shorten exposure time, it would also blur the image. A lens shutter is unnecessary because one simply removes and replaces the front of the cassette for the proper exposure time.

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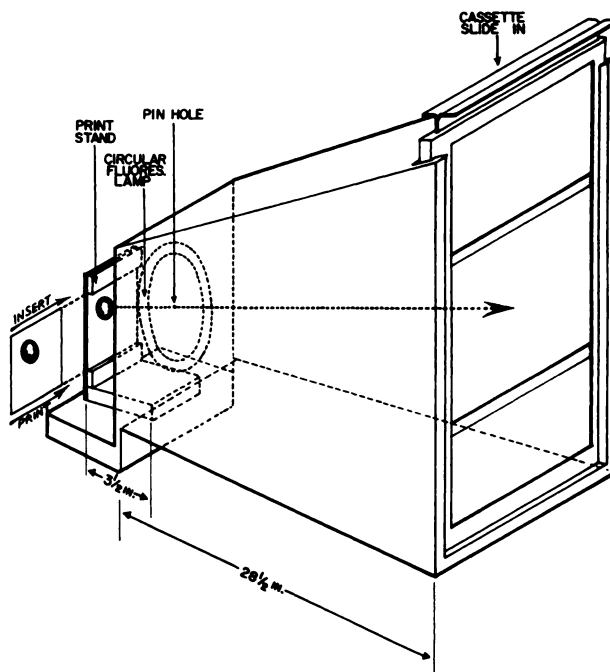


FIG. 1. Design of box camera used to enlarge Polaroid images.



FIG. 2. Original Polaroid image, made with gamma camera, of brain in patient with glioblastoma multiforme of parietal lobe.

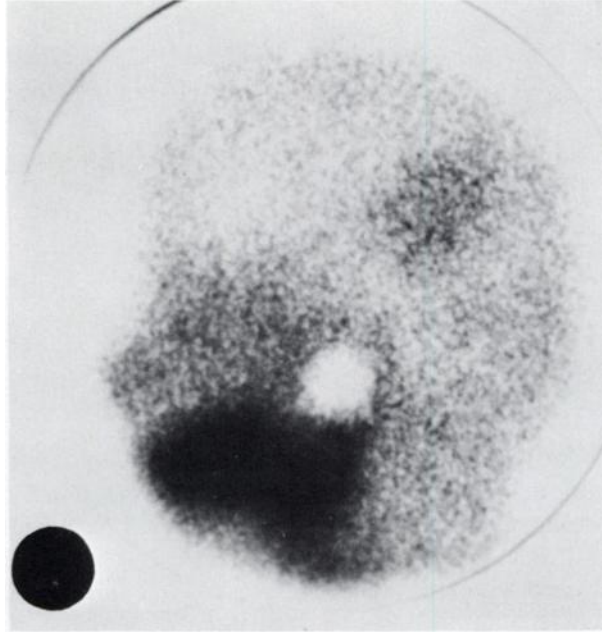


FIG. 3. Enlarged negative image with box camera. Inserted black spot shows relative size of original Polaroid image.

We currently use Cronex II radiographic film, but a faster film would shorten exposure time. High-contrast films might improve image quality in some cases, but we have not yet investigated this aspect.

Figure 2 shows the lateral Polaroid image of the calvarium in a patient with a glioblastoma multiforme in the parietal lobe. The scintiphoto was made 1.5 hr after an intravenous dose of 10 mc ^{99m}Tc pertechnetate. Figure 3 shows the pinhole camera enlargement of this image. Note that little blurring occurs although some loss of definition is inevitable with the pinhole technique. The enlarged image is a negative of the original print. Figure 4 shows the superimposition of the enlarged image on the lateral radiograph of the same patient.

SUMMARY

We use the pinhole-camera technique to make life-size enlargements of Anger-camera Polaroid images. The components of the pinhole camera are readily available, and construction is possible in any wood-working shop. No significant loss of detail occurs, and the enlarged image has definite advantages for certain applications.

ACKNOWLEDGMENTS

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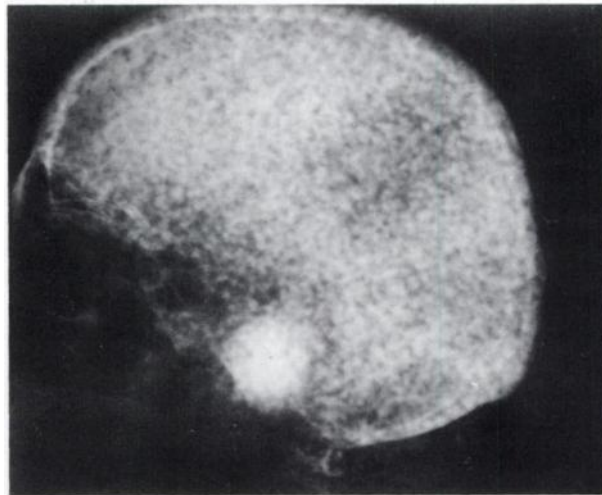


FIG. 4. Superimposition of enlarged scan on lateral radiograph of skull in same patient. This comparison is helpful in correlating scan with other studies such as arteriography.