ROENTGEN-RAY DUPLICATING HEAD REST FOR PALLIDECTOMY

FRANCIS A. CARMICHAEL, M.D.*, AND ROBERT W. FORSYTH, M.D.*

Kansas City, Missouri

(Received for publication October 28, 1959)

Certain intracranial procedures, most notably pallidectomy, have often proved haphazard, and therefore both dangerous and ineffectual, by the inability of the operator to be assured of successively identically oriented roentgen-ray films.

Three simple "man-made" errors contribute to most of this anatomical confusion. They are as follows:

1. Variation in the position of the head between exposures.
2. Alteration in the position of the cassette in relation to the head.
3. Variability of the position of the roentgen-ray tube in relation to the head.

The occurrence of one of these variables is handicapping. The occurrence of all three of these variables, which is often the case, leads to utter anatomical disorientation of the operator.

The apparatus illustrated herein (Fig. 1) was designed with the hope of reducing these sources of "man-made" errors to some tolerable level.

The apparatus possesses these desirable attributes: It is relatively small and light in weight and is fully portable, being fabricated chiefly of aluminum. It is designed to fit presently available equipment, namely, the American Sterilizer Series #1080 operating tables. To these tables it attaches in much the same fashion as other auxiliary neurosurgical head rests. The apparatus does not require the services of additional operating-room personnel. The apparatus, in no way, hampers or dictates the precise technique to be used in actual placement of the lesion. This remains the choice of the operator. Likewise, the apparatus affords a good radiological scope of all the presently used intracranial reference points.

The fundamental principle of the head rest is to secure in a never varying relationship (1) the roentgen-ray cassette, (2) the patient's head, and (3) the roentgen-ray beam. This is accomplished by having the head rest and the cassette holders fabricated in one rigid frame. The head is secured by either 3- or 4-point bony fixation. In this accomplishment the drill points serve the dual purpose of fixation points so that no change of instruments is necessary after the holes for fixation are drilled. The drill points may be pre-set to any depth of penetration from 0–\(\frac{1}{4}\) inch.

The rigidly attached but removable cassette holders, being spring-loaded, are so designed that they invariably attach in precisely the initial position. The cassette holders permit the use of standard 8\(\times\)10 cassettes, with or without various types of grids. Roentgen-ray exposure is possible in the anteroposterior plane and laterally from either side.

An additional feature is a method of optical range-findings, using the non-taking cassette as the "cross-haired" localizing reference, this arrangement assuring identical angular incidence of the emission of the anodal roentgen-ray beam at each succeeding exposure.

* Address: 411 Nichols Road, Kansas City 12, Missouri.
This is accomplished simply by a device for optical range-finding projecting a beam of light upon the scalp. Many portable and roentgen-ray operating-room installations are already equipped with such a beam range-finder. The cassettes are constructed with a radiolucent back on which are affixed cross-hairs. The beam is then projected through the cross-hairs of the cassette nearest the roentgen-ray tube and this image is superimposed upon a dot of gentian violet painted on the scalp. The tube-scalp distance is then adjusted, after which the cassette range-finder is removed, since the opposite cassette holder contains the film to be exposed. After exposure the roentgen-ray apparatus may also be removed if it hampers the surgical manipulation. In this way exact duplication of the position of the tube and its incident beam of rays is assured successively.

The latitude inherent in the head rest permits the operator a wide choice of electrode-cannula-holding apparatus. No provision for such is incorporated in the head rest, which is merely intended to assure that each successive roentgen-ray exposure is an exact duplicate of the previous "take."

The operator then, after securing these standard factors, may take his first survey projections and upon these films calculate and mark his target area in wax pencil. Then, after introduction of the instruments by any technique he prefers, the roentgen-ray exposures are duplicated. These plates may be superimposed over the original plates to ascertain the position of the cannula or electrode in relation to the previously marked target area. It should be possible to introduce the instrument into
the target area by correction of 9 exposures in each plane (anteroposterior and lateral) or by a total of four corrections. This being accomplished, the error is then reduced to individual anatomic variations of the patient and the inevitable complexities of neuroanatomic circuitry.

The head rest is portable because of the fact that it can be disassembled completely. It then fits into a portable container approximately $12 \times 18 \times 24$ inches in size. There are several modes of disassembly to facilitate the sterilization of the prongs of the fixation drill to the taste of the individual operator or his dictatorial surgical nurse.

This project was made possible by the suggestions and financial support of Drs. W. R. Lipscomb, H. G. McClintock, Denver, Colorado, and Drs. W. B. Patton, H. S. Cowley and R. Mudd, Mobile, Alabama.