Heat Gains in Brain During Electrocoagulative Lesions*

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The irregular and uncontrollable destruction of brain tissue by lesions with a balloon cannula and injection of alcohol for the treatment of parkinsonism is demonstrated in the autopsy specimens of 2 patients (Figs. 1 and 2). Personal experience with this method led to a search for a more controllable technique for the production of intracerebral lesions.

In 1961, as part of an investigation of the stereotaxic treatment of intractable pain, Logue and Watkins\textsuperscript{15} developed a technique for making “small” lesions. Our interest was stimulated by the report of the work of Mark et al.\textsuperscript{19} on the relief of pain by posterior ventromedial thalamic lesions. At this stage, it was also becoming apparent that “large” bilateral or even “large” unilateral thalamic lesions for the treatment of parkinsonism were producing serious mental deficits.\textsuperscript{13,15,28} These fears have been confirmed since by Gillingham and his co-workers,\textsuperscript{10,11} Walsh,\textsuperscript{27} and others.

The use of the terms “large” and “small” for the description of the size of a lesion is necessarily vague, as so much depends on the stage of development and healing at which the observation is made.

Experimental Techniques

A series of experiments was carried out placing intracerebral lesions in white New Zealand rabbits of standard size using a stereotaxic machine and the atlas devised by Sawyer et al.\textsuperscript{20} Unipolar electrolytic and electrocoagulative lesions were made and the animals were examined after differing survival times. The brains were prepared, serially sectioned and stained at 10-μ intervals to determine length, breadth, and height of the lesion by use of a mechanical micrometer stage.

The detailed results of the electrolytic lesions are of little interest except to confirm the irregularity of such lesions at 40 hours and at 6 months (Figs. 3 and 4). Absence of significant heat gain in such lesions is indicated by thermocouple measurements in the lesion and at a distance of a few mm. (Table

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Figs. 1 and 2. Irregular destructive lesions in human brains produced by balloon cannula and alcohol injection technique. The patient whose brain section is shown in Fig. 1 died from pulmonary embolus 10 days after the lesion was performed. Fig. 2 shows the appearance of a massive capsulo-pallidal lesion 15 months after infliction, the patient dying during convalescence from an operation for fractured femur.
Figs. 3 and 4. Irregular lesions resulting from electrolysis in rabbit brains examined at 40 hours and 6 months respectively following infliction.