A PLASTIC BALL-AND-SOCKET TYPE OF STEREOTAXIC DIRECTOR*

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The purpose of recent attempts to perform stereotaxis in humans has been to localize a destructive agent in some predetermined area of the brain to correct existing pathology. Most attempts to do this have been with the aid of a needle, placing the tip of the needle in the desired structure and then producing localized necrosis by use of either a direct current or high frequency current, or else by injecting some coagulating chemical agent. Methods employing electrocoagulation by direct current or high frequencies have had the disadvantage that different types of tissue, including blood vessels and small interstitial pools of fluid, have had different resistances. This makes the size of the lesion somewhat difficult to control although reproducible lesions can be made in dead tissue or cadavers. The disadvantage of the method of injecting a chemical coagulant has been that often it is difficult to predetermine the exact area over which the fluid spreads and attempts to control this have been based largely on making the fluid medium more of a gel to increase the tendency to remain localized at the tip of the needle.

Difficulties in localizing the tip of the needle have been twofold. First, the target area of brain tissue has been related to anatomical structures consisting of certain bony landmarks in the skull, the pineal body, and soft tissue landmarks such as the posterior commissure and the ventricular system. These landmarks are all based on the idea of an average normal position usually derived from an atlas based on several autopsy preparations. This means that at best our method is only approximate, and hence the approach should be made as simple as possible. A second difficulty in stereotaxic

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procedures has been the unwieldiness of the instruments employed. Some of them are based on a plaster cast being fixed to the head, with the stereotaxic frame then being attached to this cast. Others have been complex and difficult to handle for other reasons, including size and weight. These instruments, however, have all had considerable accuracy as far as maneuvering the needle and placing the tip where the operator wanted it to be. However, as already discussed, the problem has not been primarily that of placing the tip where the operator wants it, but making sure that where the operator wants it to be, is where the desired subcortical structure really lies.

For these reasons it seemed to us that the ideal type of stereotaxic instrument should be based on simplicity and ease of handling in order not to become confused with the idea that the more elaborate the instrument the more accurate the subsequent injection or coagulation. Our previously designed instrument weighing only a pound and a quarter,1 and being constructed of anodized aluminum, was easy to mount on the skull by fixation with three screws to the external table. Nevertheless, this instrument required more time and preparation before the actual injection than we feel is indicated considering the present knowledge of the accuracy of the final electrode position. Undoubtedly, as others have suggested, the day must come when accuracy is determined by the physiological and electrical response from stimulation.

**DESIGN AND APPLICATION**

The present instrument consists of a three-piece ball-and-socket type of joint made entirely of sterilizable plastic (Fig. 1). The instrument weighs only 2 ounces and is used by threading the outer shell in to a previously trephined and tapped hole in the skull (Fig. 2). The initial trephine hole is placed wherever desired so as to be well away from the motor, sensory, or speech cortex. We prefer a somewhat superior type of approach in order to stay away from the larger branches of the circle.