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NOTES

A stereotaxic positioning platform for double-angle placements

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A simple and inexpensive device for double-angled positioning of electrode carriers during stereotaxic surgery is described. The device consists of a base and adjustable vertical point that is used to locate the position of final stereotaxic coordinates in space. This allows reproducible placements for deep midline brain structures that require double-angle approaches. Such placements are easily obtained with this instrument on standard and even single-carrier stereotaxic instruments.

The study of brain-behavior relationships was facilitated by the introduction of stereotaxic methods for reliably manipulating various brain structures (Horsley & Clarke, 1908). However, stereotaxic placement at subcortical sites has been complicated by penetration and damage to structures overlying the target area that may be essential to the experimental variables. The common solution to this problem is to tilt and/or rotate the carrier, allowing angular penetration to avoid damage to these potentially important areas (i.e., Spiegel & Wycis, 1961). Determination of coordinates for these double-angle placements is normally complicated by the need to separately align the working carrier through multiple planes, as well as the need to employ two carriers. The device described here greatly simplifies this procedure.

CONSTRUCTION

Construction of the positioning platform is simple and straightforward. The triangular base, measuring 4 in. on each side (Figure 1), is fabricated from .5-in.-thick Plexiglas. For legs, three .25-in.-diameter holes are drilled .25 in. deep into the base .5 in. from each corner, and a pointed 1-in.-long, .25-in.-diameter Plexiglas dowel is cemented into each hole using dichloroethane. On the opposite side of the base, a 1-in.-diameter, 3-in.-long Plexiglas post, drilled completely through its length and tapped to accommodate a .25-in. threaded stainless steel rod, is cemented. After all parts are firmly hardened, the 4-in. threaded rod, which is sharpened at one end, is screwed into the post at a desired height, and a wing nut is screwed over the point and run down to the top of the post to secure the rod in place. For use with small stereotaxic instruments (e.g., David Kopf, No. 900), dimensions should be reduced accordingly.

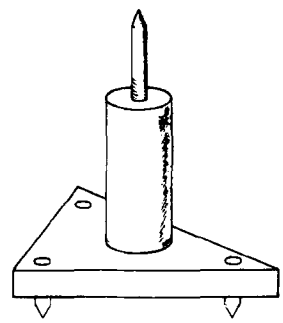

Figure 1. Diagram of the stereotaxic positioning platform, illustrating the main assembly and target point.

APPLICATION

Either one or two electrode carriers may be used for this procedure, as opposed to the standard technique, which requires two. The new technique is illustrated for one electrode and one carrier. First, an electrode is inserted into the carrier and the coordinates corresponding to stereotaxic zero are determined. Values corresponding to the position of the desired structure are added to these coordinates. The electrode tip is brought to the position within the instrument frame corresponding to the target, and the carrier is secured. The platform is then brought directly below the electrode, and the threaded rod is unscrewed from the post until it just touches the electrode tip. This procedure may be performed with the aid of an ohmmeter if additional accuracy is required. The carrier is then rotated and/or tipped until the desired angle is obtained and adjusted until the electrode reference point again touches the tip of the platform-threaded rod. Finally, anterior-posterior, lateral, and dorsal-ventral values are read from the carrier and recorded as final placement coordinates. Surgery then proceeds in the normal fashion.

We have found this simple technique to be of value during stereotaxic surgery in which double angles are required in order to penetrate deep structures and avoid nonspecific damage to overlying areas.

REFERENCES

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