Stereotaxic Surgery

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Definition

Stereotaxic surgery is a minimally invasive form of surgical intervention which uses three-dimensional coordinates to locate a precise target within the body without having to open a large surgical field.

Current Knowledge

Introduced in neurosurgery to guide operative management such as resections, biopsies, and implantations, this technique requires the use of a reliable frame of reference such as a frame rigidly fixed to the skull. Ernest Spiegel and Henry Wycis developed the first stereotactic frame using the Cartesian coordinate system. Based upon a stereotactic atlas which outlined targeted anatomical structures, surgeons could

position the frame or apparatus using bony landmarks such as the external auditory meatus, inferior orbital ridges, and the bregma which could be identified in conventional radiographs. Current technology allows for the identification of the targeted tissue via a preoperative CT or MRI and placement of the surgical frame based on the target coordinates. Stereotactic localization also can guide radiosurgery such as Gamma Knife and CyberKnife treatments. Technology has now expanded to include the use of intraoperative imaging via MRI or ultrasound as well as robotic devices based upon the coordinates available.

Further Readings

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