Stereotactic laser ablation and neurostimulator placement represent an evolution in staged surgical intervention for epilepsy. As this practice evolves, optimal targeting will require standardized outcome measures that compare electrode lead or laser source with postprocedural changes in seizure frequency.

Miller et al., proposed and presented a novel stereotactic coordinate system based on mesial temporal anatomical landmarks to facilitate the planning and delineation of outcomes based on extent of ablation or region of stimulation within mesial temporal structures.

The body of the hippocampus contains a natural axis, approximated by the interface of cornu ammonis area 4 and the dentate gyrus. The uncal recess of the lateral ventricle acts as a landmark to characterize the anterior-posterior extent of this axis. Several volumetric rotations are quantified for alignment with the mesial temporal coordinate system. First, the brain volume is rotated to align with standard anterior commissure-posterior commissure (AC-PC) space. Then, it is rotated through the axial and sagittal angles that the hippocampal axis makes with the AC-PC line.

Using this coordinate system, customized MATLAB software was developed to allow for intuitive standardization of targeting and interpretation. The angle between the AC-PC line and the hippocampal axis was found to be approximately 20°-30° when viewed sagittally and approximately 5°-10° when viewed axially. Implanted electrodes can then be identified from CT in this space, and laser tip position and burn geometry can be calculated based on the intraoperative and postoperative MRI.

With the advent of stereotactic surgery for mesial temporal targets, a mesial temporal stereotactic system is introduced that may facilitate operative planning, improve surgical outcomes, and standardize outcome assessment [1].

1)
Miller KJ, Halpern CH, Sedrak MF, Duncan JA, Grant GA. A novel mesial temporal stereotactic coordinate system. J Neurosurg. 2018 Jan 1:1-9. doi: 10.3171/2017.7.JNS162267. [Epub ahead of print] PubMed PMID: 29372873.