Clinical Accuracy of Customized Stereotactic Fixtures for Stereo-EEG

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Patient-customized stereotactic fixtures for SEEG

- Computer-generated model, 3D printed
- Incorporates all trajectories in a single device
- Can reach any part of the brain
- No moving parts
- Appropriate for pediatric applications
Presurgical step

- Anchor implantation – one week in advance
- CT scan - anchors act as fiducials
Trajectory Planning

- Computer-generated 3D model of the fixture
- Physical device manufactured using 3D printing at manufacturer’s facility
Surgical Theatre
Cannula-Based Insertion Method
Anchor-based or Anchorless Implantation Method
Implantation Accuracy

- 21 patients, 173 electrodes
- Automated lead detection using DEETO (Arnulfo et al., BMCI 2015)
- Lateral and total errors at entry and target
Implantation Accuracy

- All 173 electrode endpoints, relative to planned target location
Implantation Accuracy and Safety

- **21** patients
- **Localization errors** (Median + interquartile range)
  - Lateral Entry Point: **1.17** [0.82-1.76] mm
  - Lateral Target Point: **1.22** [0.86-1.91] mm
  - Target Depth: **3.86** [0.55-7.13] mm – rounding, ruler reading, and anchorless attachment
- One incidence of small asymptomatic hemorrhage that did not result in any adverse clinical effects
Personalized stereotactic fixtures are a safe and accurate alternative to using robotic arm for the implantation of depth electrodes in patients undergoing presurgical evaluation for drug-resistant epilepsy.
Thank You !
Additional Information

- Brain shift!