iSYS1 robot

Robotics have been introduced in stereotactic neurosurgery in order to overcome the limitations of frame-based and frameless techniques in terms of accuracy and safety. The aim of this study is to evaluate the feasibility and accuracy of the novel, miniature, iSYS1 robotic guidance device in stereotactic neurosurgery. METHODS A preclinical phantom trial was conducted to compare the accuracy and duration of needle positioning between the robotic and manual technique in 162 cadaver biopsies. Second, 25 consecutive cases of tumor biopsies and intracranial catheter placements were performed with robotic guidance to evaluate the feasibility, accuracy, and duration of system setup and application in a clinical setting. RESULTS The preclinical phantom trial revealed a mean target error of 0.6 mm (range 0.1-0.9 mm) for robotic guidance versus 1.2 mm (range 0.1-2.6 mm) for manual positioning of the biopsy needle ($p < 0.001$). The mean duration was 2.6 minutes (range 1.3-5.5 minutes) with robotic guidance versus 3.7 minutes (range 2.0-10.5 minutes) with manual positioning ($p < 0.001$). Clinical application of the iSYS1 robotic guidance device was feasible in all but 1 case. The median real target error was 1.3 mm (range 0.2-2.6 mm) at entry and 0.9 mm (range 0.0-3.1 mm) at the target point. The median setup and instrument positioning times were 11.8 minutes (range 4.2-26.7 minutes) and 4.9 minutes (range 3.1-14.0 minutes), respectively. CONCLUSIONS According to the preclinical data, application of the iSYS1 robot can significantly improve accuracy and reduce instrument positioning time. During clinical application, the robot proved its high accuracy, short setup time, and short instrument positioning time, as well as demonstrating a short learning curve [1)].

1)
Minchev G, Kronreif G, Martínez-Moreno M, Dorfer C, Micko A, Mert A, Kiesel B, Widhalm G, Knosp E, Wolfsberger S. A novel miniature robotic guidance device for stereotactic neurosurgical interventions: preliminary experience with the iSYS1 robot. J Neurosurg. 2016 Apr 22:1-12. [Epub ahead of print] PubMed PMID: 27104847.