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Optical Topographic Imaging for Intra-Operative Three-Dimensional Navigation in the Cervical Spine: Accuracy Validation and Initial Clinical Feasibility

A presentation at the 2017 American Association of Neurological Surgeons Annual Scientific Meeting

Los Angeles, Calif. (April 26, 2017) — Winner of the Sanford J. Larson, MD, PhD, Award, Daipayan Guha, MD, presented his research, *Optical Topographic Imaging for Intra-Operative Three-Dimensional Navigation in the Cervical Spine: Accuracy Validation and Initial Clinical Feasibility*, during the 2017 American Association of Neurological Surgeons (AANS) Annual Scientific Meeting.

Computer-assisted, three-dimensional navigation may guide spinal instrumentation. Current systems are hampered by cumbersome registration and inability to account for intraoperative tissue movement. A novel optical topographic imaging (OTI) system was developed for craniospinal neuronavigation and has been described previously in the thoracolumbar spine. In this study, the authors validate its accuracy in the mobile cervical spine.

Initial validation was performed in four human cadavers. Intraoperative registration was performed to thin-slice preoperative CT imaging. A tracked drill-guide was used to navigate screw tracts at all levels. Lateral mass screws were placed at C1 and C3-6, pars screws at C2 and pedicle screws at C7. Navigation data were compared to screw positions on postoperative CT imaging, and the absolute translational and angular deviations computed. Clinical validation was subsequently performed in six patients undergoing open posterior cervical instrumentation.

Fifty-three cadaveric screws were analyzed; five lateral mass screws at C1 and 32 at C3-6, eight pars screws at C2 and eight pedicle screws at C7. In hierarchical linear modelling, adjusting for differences between cadavers, C7 pedicle screws demonstrated decreased axial translational error relative to all other screws. Twenty-two clinical screws were analyzed: two pars screws at C2, 14 lateral mass screws at C3-5 and six pedicle screws at C7.

Optical machine-vision is a novel navigation technique allowing efficient initial and repeat registration. Accuracy, even in the more-mobile cervical spine, is comparable to current spinal neuronavigation systems.

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Media Representatives: The 2017 AANS Annual Scientific Meeting press section will include releases on highlighted scientific research, AANS officers and award winners, Neurosurgery Awareness Month and other relevant information about the 2017 program. Releases will be posted under the “Media” area on the 2017 AANS Annual Scientific Meeting [website](#). If you have interest in a topic related to neurosurgery or would like to interview a neurosurgeon — either onsite or via telephone — during the event, please contact Alice Kelsey, AANS associate executive director, via email at aik@aans.org.

About the 2017 AANS Annual Scientific Meeting: Attended by neurosurgeons, neurosurgical residents, medical students, neuroscience nurses, clinical specialists, physician assistants, allied health professionals and other medical professionals, the AANS Annual Scientific Meeting is the largest gathering of neurosurgeons in the nation, with an emphasis on the field’s latest research and technological advances. The scientific presentations accepted for the 2017

event will represent cutting-edge examples of the incredible developments taking place within the field of neurosurgery. Find additional information about the 2017 AANS Annual Scientific Meeting and the meeting program [here](#).

Founded in 1931 as the Harvey Cushing Society, the American Association of Neurological Surgeons (AANS) is a scientific and educational association with more than 10,000 members worldwide. The AANS is dedicated to advancing the specialty of neurological surgery in order to provide the highest quality of neurosurgical care to the public. Fellows of the AANS are board-certified by the American Board of Neurological Surgery, the Royal College of Physicians and Surgeons of Canada or the Mexican Council of Neurological Surgery, A.C. Neurosurgery is the medical specialty concerned with the prevention, diagnosis, treatment and rehabilitation of disorders that affect the spinal column, spinal cord, brain, nervous system and peripheral nerves.

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