



Universität
Basel

Research Project

Angle-assisted instrumentation of the spine

Third-party funded project

Project title Angle-assisted instrumentation of the spine

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Organisation / Research unit

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Successful implantation of screws in the spine depends on choosing correct starting points and insertion angles. Although modern intraoperative navigation facilitates instrumentation of the spine, the equipment is costly and availability is limited. Intraoperative fluoroscopy is the most widely available tool to guide implantation of screws but it usually shows only one plane at a time and repetitive imaging may be required which raises concerns of radiation exposure. Thus the surgeon's understanding of spinal anatomy and the familiarity with the technique of implanting screws "bridge" the missing information of monoplane fluoroscopy. For instance, a laterally positioned fluoroscope will display the depth of the screw and if it is oriented more towards the head or feet (sagittal angulation), but not the latero-medial (axial) angulation. To assist the surgeon in adjusting the screw into the correct orientation, we have developed a prototype device (called *AngleGuide*) which measures angular tilt in the sagittal and axial plane. The technology is based on a microelectromechanic system as it is used in smartphones to orient the screen according to how the user holds the device. The *AngleGuide* can be used to align the surgical instruments to pre-defined angles that were measured on preoperative computed tomography (CT). We hypothesize that the *AngleGuide* can be used to maintain a safe trajectory when implanting screws in the spine while minimizing radiation exposure to the patient and surgical staff. We will implant more than 250 screws in seven cadaveric human thoracic and lumbar spines and compare accuracy of *AngleGuide*-assisted implantation of screws versus accuracy of non-*AngleGuide*-assisted implantation. A preoperative CT scan will be used for planning of the surgery and a postoperative CT scan will be used for analysis of the screw trajectories. Given successful implementation of the *AngleGuide* prototype, this technology could be developed for clinical use and become an affordable tool to ensure proper implantation of screws with minimal radiation exposure to the patient and staff.

Keywords image-guided therapy, surgical navigation, spine

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Add publication

Published results

3289154, Jost, Gregory F.; Walti, Jonas; Mariani, Luigi; Cattin, Philippe C., A novel approach to navigated implantation of S2 alar iliac screws using inertial measurement units, 1547-5646, Journal of Neurosurgery. Spine, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

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3510230, Jost, Gregory F; Bisson, Erica F; Schmidt, Meic H, iPod Touch-Assisted Instrumentation of the Spine: A Technical Report, 0148-396X, Neurosurgery, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

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