Section: **E-Learning und Simulation**

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Abstract-Title:
„CRANIOTRAIN" – EIN NEUES KONZEPT ZUM ERLERNEN DER KRANIOTOMIELOKALISATION „CRANIOTRAIN" – A NOVEL CONCEPT FOR TRAINING OF CRANIOTOMY-LOCALISATION

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Abstract-Text:
Purpose
Neurosurgical procedures in pathologies like tumour, haemorrhage or vascular pathologies can be complicated by imprecise craniotomy localisation. The correct localisation of the craniotomy for these neurosurgical procedures can be difficult to learn due to the complex anatomy and the different angulation of the various cross-sectional imaging modalities available. Although neuronavigation provides widespread access to spatial information on image data during surgery today, it is not commonly used for standard intracranial procedures or emergency cases. A novel concept for training of the correct craniotomy localisation, called "Craniotrain", is presented in this study. Method
A standard anatomical skull phantom was prepared with an engraved grid used as a coordinate system (see figure 1). The intersection points of the grid were labelled. The skull phantom was scanned using helical multi-slice CT (120 kV, 80 mA, pitch 3, collimation 1.25 mm). Images were reconstructed using 180 LI with a FOV of 25 cm and 1 mm reconstruction interval. Electro-optical navigation was used for measuring the skull phantom (see figure 2). With a Mayfield clamp the skull phantom was attached to a reference frame. A landmark-based registration was performed. Coordinates of the intersection points of the grid as given by the navigation system were acquired as well as coordinates for the reference anatomical landmarks. Using the CT data a 3D-model of the phantom was generated and aligned with the coordinates of the grid acquired using navigation. A software was developed allowing the user to first view the focus to be reached by the craniotomy in the CT-slices. A case report was attached to the CT-data and depending on the case either axial images alone or axial, coronal and sagital images could be assessed. The craniotomy spot was determined by the user measuring distances between the pathology and reference anatomical structures. Then the user had to determine the centre of the craniotomy using the skull phantom. The corresponding intersection point of the grid used as a coordinate system had to be entered in the software. Then the software showed the entered point of the craniotomy centre along with the calculated centre of the craniotomy (see figure 3). The surface distance of the two points was given. Results
The presented concept for training the craniotomy localisation worked precise and robust. Evaluation of the teaching benefit suggests that craniotomy localisation with the software was more precise, if training cases had been performed before. Measuring the distances

between the pathology and reference anatomical structures produced good localisation of the craniotomy spot if varying angulation of the cross-sectional data sets and the surface bend of the calvaria were taken into account. Conclusion

The presented concept for learning the correct craniotomy localisation called “Craniotrain” is easy to handle and can be beneficial in neurosurgical training.

Bild 1/JPG

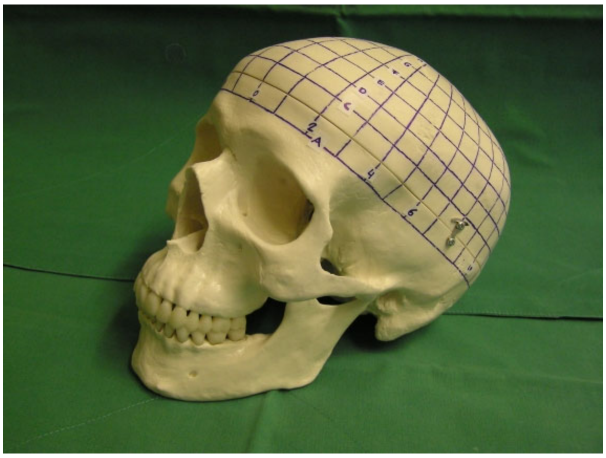
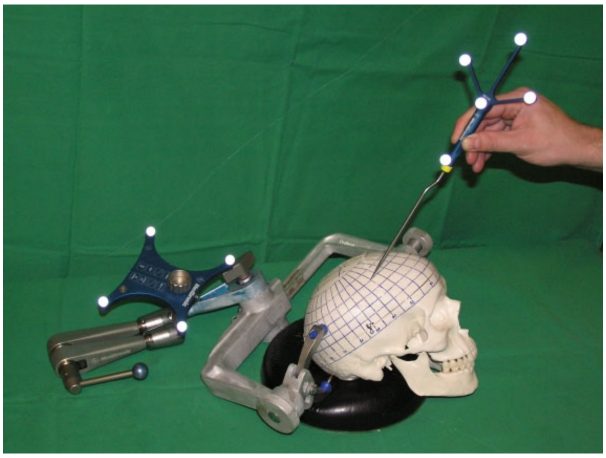


Bild 2/JPG



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