Image guided intracranial sonography

Image guidance (IG) could simplify secure vessel identification and reduce interinvestigator and intrainvestigator variability.

Systems

The Kolibri IG system

Indications

It is a practical supporting method for the resection of intracranial metastasis, but further studies comparing this method with other intraoperative exams are needed to evaluate its actual contribution and reliability [1].

Misinterpretation of the vascular source of the Doppler signal is a common source of errors in conventional TCD. Visualization of the vascular anatomy by image guidance offers improved accuracy and reliability of TCD results and may positively influence the learning curve for inexperienced investigators [2]

Although the skull limits applicability of sonography, bedside intracranial endosonography might be an alternative to computed tomography scans to detect adverse events in patient with sedation.

IGIS was evaluated in a cranial phantom and a porcine intracranial hemorrhage (ICH) model. Two anesthetized animals underwent an initial magnetic resonance imaging (MRI) scan, followed by placement of an endosonography catheter in the frontal lobe. After anatomic imaging, an experimental ICH was placed in the contralateral hemisphere. B-scan imaging, duplex, Doppler sonography, and a second MRI were performed. A standard image-guiding device tracked the ultrasound catheter.

Endosonography provided high-definition imaging of intracranial structures. Image guidance allowed direction of the catheter to and intuitive identification of anatomic structures. Doppler imaging allowed analysis of blood flow in intracranial vessels. Ultrasound imaging was used to monitor evolution of ICH and the resulting brain edema in real-time. Coregistration of ultrasound and MRI images acquired after ICH placement demonstrated the high accuracy of the spatial resolution of IGIS(largest mismatch <5 mm).

IGIS provides high-definition images of intracranial structures, Doppler analysis of blood flow, and real-time monitoring of intracranial structural lesions. IGIS might prove a valuable tool for intracranial monitoring of sedated patients over extended time periods [3].

1)
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[3]

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