Surgical microscope

see also Xenon light microscope.

History

see Surgical Microscope History.

Surgical microscopes

Leica

Möller Wedel

Zeiss

Information supplied by an image-guidance system can be superimposed on the operating microscope oculars or on a screen, generating augmented reality. Recently, the outline of a patient's head and skull, injected in the oculars of a standard operating microscope, has been used to check the registration accuracy of image guidance.

A commercially available image-guidance system and a standard operating microscope were used. Segmentation of the brain surface and cortical blood vessel relief was performed manually on preoperative computed tomography and magnetic resonance images. The overlay of segmented digital and real operating-microscope images was used to monitor image-guidance accuracy. Adjustment for brain shift was performed by manually matching digital images on real structures.

Experimental manipulation on a phantom proved that the brain surface relief could be used to restore accuracy if the primary registration shifted. Afterward, the technique was used to assist during surgery of 5 consecutive patients with 7 deep-seated brain tumors. The brain surface relief could be successfully used to monitor registration accuracy after craniotomy and during the whole procedure. If a certain degree of brain shift occurred after craniotomy, the accuracy could be restored in all cases, and corticotomies were correctly centered in all cases.

The proposed method was easy to perform and augmented image-guidance accuracy when operating on small deep-seated lesions [1].

1)
Kantelhardt SR, Gutenberg A, Neulen A, Keric N, Renovanz M, Giese A. Video-Assisted Navigation for Adjustment of Image-Guidance Accuracy to Slight Brain Shift. Neurosurgery. 2015 Jul 30. [Epub ahead of print] PubMed PMID: 26230043.