Neuroendoscope

Advances in video and fiber optics since the 1990s have led to the development of several commercially available high-definition neuroendoscopes. This technological improvement, however, has been surpassed by the smartphone revolution. With the increasing integration of smartphone technology into medical care, the introduction of these high-quality computerized communication devices with built-in digital cameras offers new possibilities in neuroendoscopy. The aim of a study of Mandel et al., was to investigate the usefulness of smartphone-endoscope integration in performing different types of minimally invasive neurosurgery.

They presented a new surgical tool that integrates a smartphone with an endoscope by use of a specially designed adapter, thus eliminating the need for the video system customarily used for endoscopy. They used this novel combined system to perform minimally invasive surgery on patients with various neuropathological disorders, including cavernomas, cerebral aneurysms, hydrocephalus, subdural hematomas, contusional hematomas, and spontaneous intracerebral hematomas.

The new endoscopic system featuring smartphone-endoscope integration was used by the authors in the minimally invasive surgical treatment of 42 patients. All procedures were successfully performed, and no complications related to the use of the new method were observed. The quality of the images obtained with the smartphone was high enough to provide adequate information to the neurosurgeons, as smartphone cameras can record images in high definition or 4K resolution. Moreover, because the smartphone screen moves along with the endoscope, surgical mobility was enhanced with the use of this method, facilitating more intuitive use. In fact, this increased mobility was identified as the greatest benefit of the use of the smartphone-endoscope system compared with the use of the neuroendoscope with the standard video set.

Minimally invasive approaches are the new frontier in neurosurgery, and technological innovation and integration are crucial to ongoing progress in the application of these techniques. The use of smartphones with endoscopes is a safe and efficient new method of performing endoscope-assisted neurosurgery that may increase surgeon mobility and reduce equipment costs [1].

Existing neuroendoscopes have been limited in utility by either decreased range of motion or suboptimal image resolution. The flexible high-definition chip-camera endoscope has emerged as a potential remedy for the shortcomings of available instruments by combining superior flexibility and image quality in order to better operate within spatially constrained intraventricular operations.

The use of high definition flexible camera-on-a-chip endoscopy may provide enhanced intra-operative visualization and application for intraventricular neurosurgery [2].

https://www.aesculapusa.com/products/neurosurgery/neuroendoscopy

https://www.karlstorz.com/ar/en/neurosurgery.htm

Indications

Skull base surgery

May be done by a minimally invasive endoscopic procedure in which instruments are inserted through the natural openings in the skull—the nose or mouth—or by making a small hole just above the eyebrow. This type of surgery requires a team of specialists that may include ENT (ear, nose, and throat) surgeons, neurosurgeons, and radiologists.

Before endoscopic skull base surgery was developed, the only way to remove growths in this area of the body was by making an opening in the skull. Under some circumstances, this type of surgery may be necessary.

see Endoscopic endonasal approach

Vascular

see Endoscopic endonasal approach for intracranial aneurysm

1)
Mandel M, Petito CE, Tutihashi R, Paiva W, Abramovicz Mandel S, Gomes Pinto FC, Ferreira de Andrade A, Teixeira MJ, Figueiredo EG. Smartphone-assisted minimally invasive neurosurgery. J Neurosurg. 2018 Mar 1:1-9. doi: 10.3171/2017.6.JNS1712. [Epub ahead of print] PubMed PMID: 29529913.
2)
Friedman GN, Grannan BL, Nahed BV, Codd PJ. Initial Experience with High Definition Camera-On-a-Chip Flexible Endoscopy for Intraventricular Neurosurgery. World Neurosurg. 2015 Aug 5. pii: S1878-8750(15)00926-2. doi: 10.1016/j.wneu.2015.07.056. [Epub ahead of print] PubMed PMID: 26255242.