One of nature's basic rules: The simpler the better-why this is also valid for neuronavigation

Only a few decades ago the skull was a near-complete obstacle for surgeons. There was no way to look inside and thus no way to prevent opening it at large when surgical therapy of an inside lesion was required. Even the introduction of X-ray technology in 1895 by Wilhelm Conrad Roentgen did not improve that. The development of neuroimaging showing intracranial structures started in 1919 with the development of pneumencephalography by Walter Dandy.[1] Soon, cerebral angiography introduced by Egas Moniz (around 1927),[2] computed tomography by Godfrey Newbold Hounsfield in 1971 and magnet resonance tomography by Paul Christian Lauterbuhr and Peter Mansfield in 1973 followed. Based on frame-based stereotactic techniques Kwoh *et al*. reported the first use of a frameless navigation system in 1988.[3] Today after more than 20 years of co-evolution of neuroimaging and neuronavigation surgeons are getting used to having these systems available everywhere and any time. The questions arising are: Is that necessarily so and is it good?

Neuronavigation systems are complex and expensive machines, consisting of a computer, a screen, an input device, which is in many cases identical with the screen, and a system for localizing instruments in three-dimensional space. The latter usually works either magnetic or optic. Furthermore, there is at least one pointing device needed which can be tracked by the localizing system. Despite the cost for obtaining such a neuronavigation system, it will require constant maintenance to ensure its correct function.

Many hospitals all over the world will not be able to afford systems like this in the near future. On the other hand not all patients can be transported to those centers, which have high-end technology available.

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Last, not even in the world's richest countries it can be expected that every operating theater in every emergency department is equipped with neuronavigation. There is definitively need for simple and cost-effective solutions to facilitate precise and secure surgery of cranial lesions.

The idea to use a simple grid, which is pulled over the head, as a device for as-stereotactic localization of intracranial lesions as described by Nayak and Dutta[4] is smart and earns consideration all over the world.

What can be achieved by this simple technique is, compared to the relation between cost and use in neuronavigation systems, immense. Experience teaches that the simplest technique is usually the best for cases where a limited accuracy and flexibility compared to a neuronavigation system is appropriate.

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