

Case report

NBS as a navigation tool for resection planning of tumors in the precentral gyrus

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History

A 50 year old female, right-handed patient presented with weakness and acroataxia of the right hand. She was admitted to the neurological Department and after an MRI scan showed a single lesion within the left precentral gyrus which was suggestive to be a metastasis of her colon cancer (Fig. 1). For further treatment, she was transferred to our neurosurgical department.

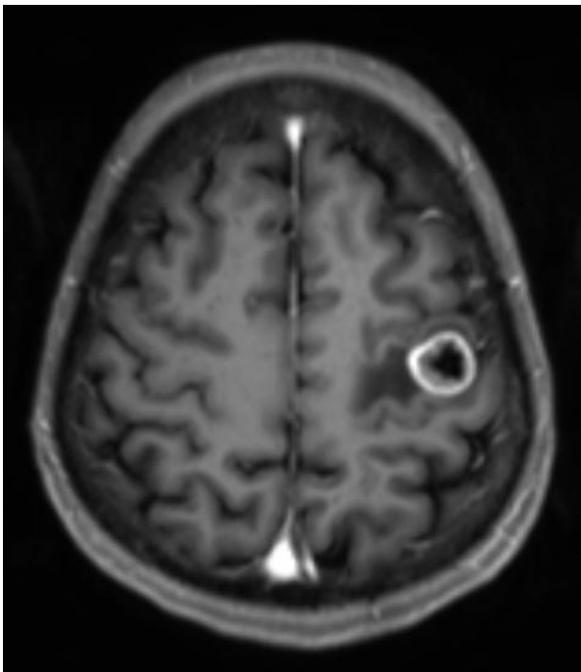


Fig. 1: Pre-operative MRI scan

Mapping

The MRI scan shows this space occupying lesion to be within the center of the supposed rolandic region. However, due to tumor and edema, the hand knob was not identifiable. Thus, non-invasive cortical motor mapping was performed. Due to edema, motor threshold was extraordinary high, but after determining motor threshold motor mapping of the left motor cortex was performed without any further problem with the Nexstim eXimia NBS system. Transcranial magnetic stimulation (TMS) of the tumor surrounding cortex was done. Motor evoked potentials (MEP) were recorded at the dorsal and medial borders of the metastasis (Fig. 2).

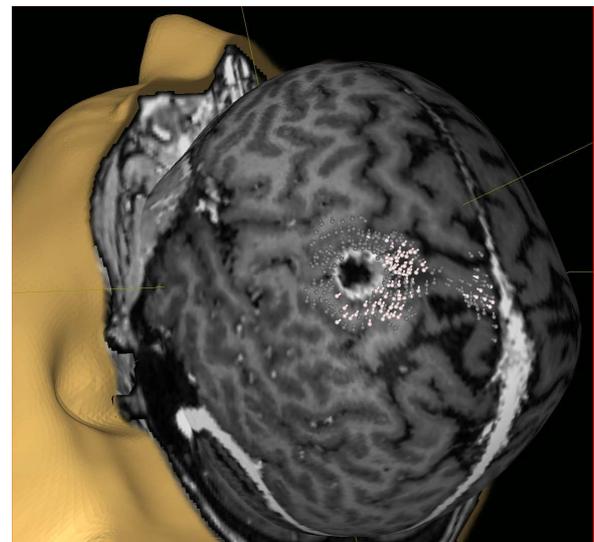


Fig. 2: Pre-operative motor mapping

These positive NBS stimulation points were exported via DICOM and fused with BrainLab neuronavigation data using iPlanet® and transferred to BrainLAB Vector Vision®.

Operation

Intraoperatively, navigated direct cortical and subcortical stimulation was used for intraoperative motor mapping based on the NBS data which was incorporated and presented with BrainLAB Vector Vision® (Fig. 3). Completed resection of the tumor was performed using an anterior approach, to avoid motor eloquent cortex (Fig. 4). Pathology confirmed a colon cancer metastasis.

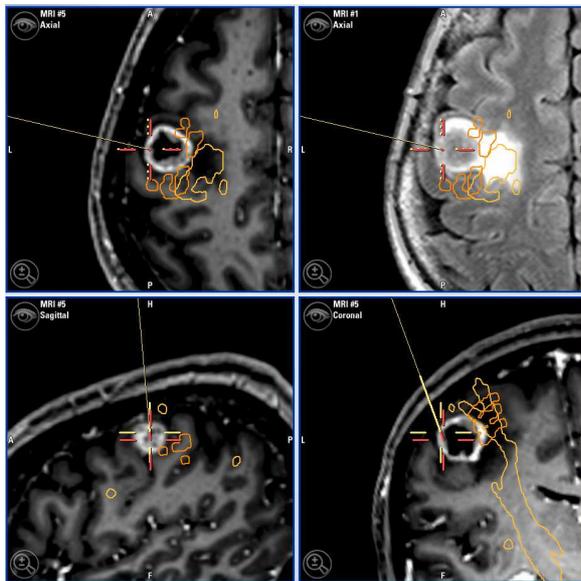


Fig. 3: Intra-operative neuronavigation: orange = Motor cortex; yellow: fiber tracking

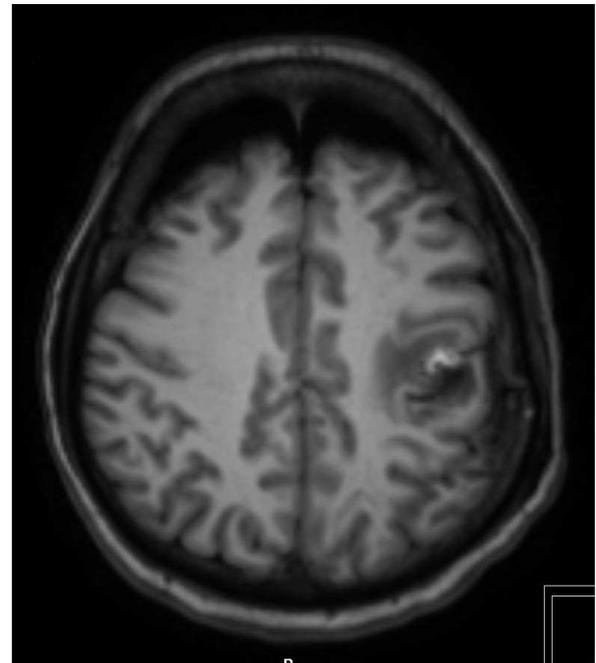


Fig. 4: Post-operative MRI scan

Post-operative outcome

Right after operation, the patient suffered from aggravated paresis of the right hand. However, by the time of discharge the weakness had turned to the pre-operative level and improved further during the following six weeks after operation.

Conclusion

Especially for metastatic lesions complete resection is of crucial importance. However, motor function has to be preserved anyhow. We noticed that NBS simplifies locating of the central region. In some cases, craniotomy might even become smaller. Furthermore, combination of NBS with navigated direct cortical mapping serves as a link between imaging and electrophysiological intraoperative neuro-monitoring.