The Role of Electrothrombosis in the GDC Technique

To the Editor:

The idea of having electrothrombosis as an effective mechanism for aneurysm occlusion was in the mind of many of us in the 1980s. In 1983, I was offered a device for intravasal electrothrombosis produced by a French company for testing in the animal lab. It turned out that with low electrical current, the production or occurrence of thrombus was null or minimal, whereas with higher current, electrothrombosis and also gas bubbles could be produced. This device never came near to any clinical application. In my article, I wanted to express that after the Guglielmi detachable coil system was announced as an electrothrombotic device, it shortly became clear that the mechanism of aneurysm occlusion was not that of immediate or early electrothrombosis. The reason for this has been detailed by Guido Guglielmi in his letter (1). It is interesting to read that an increase of the current applied for detachment could eventually lead to improved treatment results.

Bernd Richling
Salzburg, Austria

1. Guglielmi G: The role of electrothrombosis in the GDC technique. **Neurosurgery** 61:1340, 2007 (letter).

10.1227/01.NEU.0000296974.16170.70I

Hypertension, Age, and Location Predict Rupture of Small Intracranial Aneurysms

To the Editor:

The clinical study reported by Nahed et al. (1) was important in documenting the significance of hypertension and patient age as predictors for rupture of intracranial aneurysms of 7 mm or smaller. However, I was surprised that neither the authors nor the commentators questioned the location of the aneurysm other than simply "anterior" or "posterior." It has certainly been my experience that aneurysms that arise from the distal anterior cerebral artery commonly rupture when they are small, and commonly they are less than 7 mm in size. Mycotic aneurysms also often arise from small distal arterial branches, and they also not uncommonly rupture when very small; however, there was no mention of whether this type of aneurysm was excluded from the analysis.

Harold A. Wilkinson, M.D., Ph.D.
Boston, Massachusetts

1. Nahed BV, DiLuna ML, Morgan T, Ocal E, Hawkins AA, Ozduman K, Kahle KT, Chamberlain A, Amar AP, Gunel M: Hypertension, age, and location predict rupture of small intracranial aneurysms. **Neurosurgery** 57: 676–683, 2005.

10.1227/01.NEU.0000296965.06761.60

Mapping of Visuospatial Functions during Brain Surgery: A New Tool to Prevent Unilateral Spatial Neglect

To the Editor:

In the last decade, major advances in intraoperative functional mapping have dramatically improved the results of brain surgery. When removing a brain tumor, it is common clinical practice to awaken the patient and temporarily inactivate small (approximately 5 mm) brain regions with electrical stimuli, while the patient performs functional tasks. If the patient produces incorrect responses, the surgeon leaves the region intact, to preserve the patient's functional abilities (3). This procedure allows the surgeon to minimize the residual morbidity while increasing the quality of the resection, and the net result is to improve overall patient survival. However, although sensorimotor and cognitive functions such as language, memory, or calculation have been extensively mapped intraoperatively, visuospatial functions have received less attention.

Unilateral spatial neglect (USN) is a dramatic neurological condition resulting from damage affecting the temporoparietal or frontal cortex, or the thalamus or basal ganglia of the right hemisphere (1). Patients with unilateral spatial neglect behave as if the left part of the world does not exist (2). Their functional recovery is poor, and they endure major clinical and social consequences. USN typically results from vascular stroke, but other etiologies are possible. For example, USN was reported after a patient received right inferior parietal cortectomy for intractable epilepsy (4). Although this particular patient recovered from neglect after 2 years, other neurosurgical patients risk suffering from chronic USN as a result of more extensive, corticosubcortical resections, especially as required for cerebral glioma. In a recent series of eight patients who underwent resection of a glioma confined to the right parietal lobe (5), no new USN was clinically observed postoperatively, but there was no formal neuropsychological testing performed, and it is well known that USN may not be apparent at clinical observation (2). To prevent the occurrence of USN in these patients, we propose intraoperative assessment of visuospatial function by asking patients to bisect 20-cm horizontal lines (*Fig. 1*). If the patient shifts the subjective center more than approximately 6.5 mm rightward (1), then the neurosurgeon leaves the inactivated area untouched. Using this procedure, we were able to avoid postoperative USN in two patients (ages, 27 and 28 years) who underwent resection of low-grade gliomas in the right temporoparietal region (6). These left-handed patients were awakened during surgery because there was functional magnetic resonance imaging evidence of partial language representation in the right hemisphere. Patients gave their informed consent,

FIGURE 1. *Line bisection tasks performed during brain surgery are simple and feasible. Under test conditions, a 20-cm line (not shown) is presented, aligned to the subjects' eye axis, in a central position with respect to the patient's sagittal head plane.*

and the procedure followed the guidelines of the Ethical Committee of the Hôtel-Dieu Hospital in Paris. On line bisection, patients significantly deviated rightward upon inactivation of the supramarginal gyrus and the caudal portion of the superotemporal gyrus. In one of the patients (SB), subcortical inactivation of a parietofrontal pathway, the superior occipitofrontal fasciculus, brought about the most dramatic deviations (mean, 26.13 mm; standard deviation, 16.93 mm). These regions were accordingly spared by the resection. The day after surgery, the patient had left-inferior quandrantanopia on confrontation test and showed signs of left neglect and optic ataxia with his left, contralesional hand. When bisecting 20-cm lines, he erred rightward by 24.38 mm on average (standard deviation, 25.28 mm), and sometimes missed the line altogether, which had never occurred before or during surgery, thus showing left neglect on line bisection. On a target-cancellation task, he failed to cancel most targets on the left half of the display, particularly in the left superior quadrant of the test sheet. When copying a drawing of a landscape composed of a house with two trees on each side, he used the rightmost third of the sheet to copy the left part of the house, omitted to copy the left-sided trees, and tried to copy the right half of the house and the right-sided trees on the table, beyond the right margin of the test sheet. These signs gradually subsided during subsequent days, suggesting their dependence on perilesional edema. Five days after surgery, the patient bisected 20-cm lines accurately (mean displacement, 0.82 mm toward the left; standard deviation, 8.28 mm), and had no signs of optic ataxia or neglect on target-cancellation or drawing tests. The absence of neglect signs was confirmed at follow-up testing 51 days after surgery. Another patient (CAL) did not demonstrate any signs of neglect when tested on the paper-and-pencil battery 114 days after surgery. Visuospatial functions should be assessed systematically during surgery involving the temporoparietal region, even when language is not concerned, by using the simple, safe, well-tolerated, and cost-effective procedure of line bisection. Such a strategy can prevent postoperative USN, and consequently allow patients to resume the tasks of a normal socioprofessional life, such as driving.

Paolo Bartolomeo
Michel Thiebaut de Schotten
Hugues Duffau
Paris, France

1. Azouvi P, Samuel C, Louis-Dreyfus A, Bernati T, Bartolomeo P, Beis JM, Chokron S, Leclercq M, Marchal F, Martin Y, De Montety G, Olivier S, Perennou D, Pradat-Diehl P, Prairial C, Rode G, Sieroff E, Wiart L, Rousseaux M; French Collaborative Study Group on Assessment of Unilateral Neglect (GEREN/GRECO): Sensitivity of clinical and behavioural tests of spatial neglect after right hemisphere stroke. **J Neurol Neurosurg Psychiatry** 73:160–166, 2002.
2. Bartolomeo P, Chokron S: Levels of impairment in unilateral neglect, in Boller F, Grafman J (eds): *Handbook of Neuropsychology*. Amsterdam, Elsevier Science Publishers, 2001, pp 67–98.
3. Duffau H: Lessons from brain mapping in surgery for low-grade glioma: Insights into associations between tumour and brain plasticity. **Lancet Neurol** 4:476–486, 2005.
4. Hommet C, Bardet F, de Toffol B, Perrier D, Biraben A, Vignal JP, Scarabin JM, Corbineau M, Chauvel P: Unilateral spatial neglect following right inferior parietal cortectomy. **Epilepsy Behav** 5:416–419, 2004.
5. Russell SM, Elliott R, Forshaw D, Kelly PJ, Golfinos JG: Resection of parietal lobe gliomas: Incidence and evolution of neurological deficits in 28 consecutive patients correlated to the location and morphological characteristics of the tumor. **J Neurosurg** 103:1010–1017, 2005.
6. Thiebaut de Schotten M, Urbanski M, Duffau H, Volle E, Lévy R, Dubois B, Bartolomeo P: Direct evidence for a parietal-frontal pathway subserving spatial awareness in humans. **Science** 309:2226–2228, 2005.

10.1227/01.NEU.0000296966.83889.E3

Minimally Invasive Atlantoaxial Fixation with a Polyaxial Screw-rod Construct: Technical Case Report

To the Editor:

We read the article by Joseffer et al. (2) with great interest. The work presents significant advancement in the treatment of craniocervical junction instability problems by means of minimally invasive intervention. This technique protects the midline structures effectively and makes additional soft-tissue dissection unnecessary. However, some atlantoaxial rotary fixation cases present a challenging situation regarding the internal reduction procedure, even if a C1–C2 polyaxial rod construct is used. The screw insertion into the lateral masses of the atlas and pedicles of the axis can alone reduce the dislocation to some degree in these particular patients. If additional reduction is needed, more rotational force must be applied. For this purpose, midline structures such as the posterior arch of the atlas and/or the spinous process of the axis yield a desired lever function for necessary maneuvers, as we presented in our technical note (1). We believe that with minor modification of the tools, comparable manipulation can be provided in the technique described by Joseffer et al.

Deniz Belen
Serkan Simsek
Ankara, Turkey

1. Belen D, Simsek S, Yigitkanli K, Bavbek M: Internal reduction established by occiput-C2 pedicle polyaxial screw stabilization in pediatric atlantoaxial rotary fixation. **Pediatr Neurosurg** 42:328–332, 2006.
2. Joseffer SS, Post N, Cooper PR, Frempong-Boadu AK: Minimally invasive atlantoaxial fixation with a polyaxial screw-rod construct: Technical case report. **Neurosurgery** 58 [Suppl 2]:ONSE375, 2006.

10.1227/01.NEU.0000296967.91513.19

Preserving the Ligamentum Flavum in Lumbar Discectomy: A New Technique that Prevents Scar Tissue Formation in the First 6 Months Postsurgery

To the Editor:

We read with interest the article by Ozer et al. (8). The authors' work is interesting and praiseworthy in the sense that this is a prospective study on the evaluation of the efficacy of