The Cerebral Hyperperfusion Syndrome: What Every Family Doctor Should Know

Arie Bass MD

Department of Vascular Surgery, Assaf Harofeh, Zerifin, Israel
Affiliated to Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

Key words: cerebral hyperperfusion syndrome, carotid endarterectomy, carotid artery stenting, transcranial Doppler sonography

The authors of the article on hyperperfusion syndrome that appears in this issue of IMJ [1] should be congratulated on bringing to center stage this not so rare syndrome with its considerable morbidity and mortality. Cerebral hyperperfusion syndrome as a potentially devastating complication of carotid endarterectomy or carotid artery stenting has been widely reported in the surgical literature. It may occur within hours to 3 weeks after carotid endarterectomy and is characterized by symptoms ranging from headaches, fits, confusion, focal neurologic signs to intracerebral hemorrhage [2,3]. This syndrome may be more common and more variable in clinical presentation than previously thought [3].

It is believed that cerebral hyperperfusion is caused by loss of cerebral autoregulation resulting from chronic cerebral ischemia and that it occurs preferentially in patients with severe ipsilateral or contralateral carotid disease, increased intraoperative cerebral perfusion, or severe perioperative hypertension [4-6]. It is tempting to regard this subgroup of patients as those at increased risk of developing hyperperfusion syndrome, yet newly published data did not corroborate this common belief. It remains uncertain whether high middle cerebral artery flow velocities and severe hypertension after seizure onset are the cause or the effect. When examined closely, seizure was not associated with age, gender or pre-procedural presentation. Perioperative cerebral ischemic events, cerebral infarction (new and old), and the use of post-procedure anticoagulation therapy may be important but solid proof is lacking [7-10].

The incidence of intracranial hemorrhage after surgical carotid endarterectomy is approximately 0.6%, and after carotid artery stenting about 1.4% [4]. Clinically, cerebral hyperperfusion is defined as hypertension with symptoms of severe headache, seizures, and/or confusion. Physiologically, it is defined as a doubling of intraoperative cerebral blood flow values. Since the clinical findings in cerebral hyperperfusion syndrome may be subtle, ancillary investigations examining post-procedural cerebral blood flow such as brain perfusion computerized tomography, nuclear medicine single-photon emission CT, xenon CT, and transcranial Doppler sonography have been proposed as a means of detecting patients at risk [11-15]. All of these tests are expensive and time consuming and require special dedicated equipment and trained personnel. At the present time these tests are not performed often, and one may expect a significant reporting bias that may skew the published data [5]. Newly published data indicate that recently performed contralateral carotid endarterectomy (<3 months) as well as a decrease in cerebral reactivity measured preoperatively by looking at acetazolamide-induced changes in cerebral blood flow (Diamox test) [10,16] appear to be predictive for identifying patients at risk for the development of CHS.

Modern clinical guidelines for carotid artery endarterectomy and carotid artery stenting call for short hospital stay and early discharge. The use of an anticoagulant is routine after stenting as well as after surgery. In many vascular units patients are admitted on the day of operation and discharged within 48-72 hours, and carotid artery stenting is even becoming a day or even “same day” procedure. When patients are discharged so early, the post-procedure complication can develop quite late; thus it is of paramount importance that the information regarding cerebral hyperperfusion syndrome be part of the formal database of every family physician and primary care doctor. Unfortunately, clinicians treating these patients in acute medical units are generally unaware of the “post-carotid endarterectomy hyperperfusion syndrome” and tend to treat the patients and the ominous hypertension less aggressively [13].

In an effort to improve the early diagnosis of CHS the authors of the article in this journal recommend routine performance of transcranial Doppler in all patients “at risk” to develop the syndrome [1]. Unfortunately this is not a realistic or practical recommendation. We are yet uncertain as to who the patients at risk are; neither do we have any idea for how long such surveillance is needed. Furthermore, the role of transcranial Doppler is still under investigation and the technology is not readily available in most clinics and hospitals. The early discharge of most patients precludes any meaningful implementation of such a recommendation.

In the current atmosphere of economic restraints, rigid clinical guidelines and short hospitalizations, one cannot justify the costs of additional tests and prolong hospital stay on the grounds of the existing evidence. Until a simple and reliable method of identifying patients at risk for post-procedure CHS is developed, it will continue to be the family doctors, the primary care physician and the emergency room staff who take care of these patients. As the use of carotid artery stenting becomes widespread, it is absolutely
crucial that these doctors are aware of this complication, its clinical pattern and the need for aggressive antihypertensive therapy.

References

Correspondence: Dr. A. Bass, Dep. of Vascular Surgery, Assaf Haroche Medical Center, Zerifin 70300, Israel.
Phone: (92-8) 977-9188.
Fax: (92-8) 977-9186.
E-mail: arbass@post.tau.ac.ll

Psychiatry ... the care of the id by the odd
Anonymous

I do not fear computers. I fear the lack of them.
Isaac Asimov (1920–92), Russian-born American chemist and science-fiction writer.

Capsule

Perceptions and illusions

Imaging studies have revealed the underlying causes of two different illusions. A motion stimulus (for example, a moving pattern on a screen) can cause the perceived location of a nearby stationary stimulus to be shifted toward the direction of motion. Using functional magnetic resonance imaging, Whitney et al. (Science 2003;302:878) found that in early visual processing areas, the retinotopic location of the region activated by the stationary stimulus shifts in the opposite direction of motion. In contrast to what one would have predicted, the activation site shifts in the opposite direction to the perceived location. In the tactile tunneling illusion, stimulating the tips of two adjacent fingers results in the perception of a single, stronger point of stimulation between the two fingers. Chen et al. (p. 881) used optical imaging to investigate the neural basis for this illusion in the primary somatosensory cortex (area SI). Consistent with the perception, area SI contains a focus of activity at the perceived site, which is greater than in control conditions, whereas neural activity represented at the two actual stimulation sites is less than when either site is stimulated alone. Thus, the location of the neural focus in SI explains the perceived location of the illusion, whereas the pattern of activity that increases and decreases across the three sites (two actual, one illusory) explains the perceived intensity.

E. Israeli