

## Case Report

# Post Gamma Knife Headache: A New Headache Syndrome?

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Gamma knife surgery has become an effective alternative to microsurgery in the treatment of cerebral arteriovenous malformations. In a number of patients, a de novo headache syndrome has been produced after gamma knife surgery. A case report is presented of a 62-year-old man who developed a migrainous type headache 15 months after gamma knife surgery. The current neurosurgical literature has very poor documentation of postsurgical headaches. A review of the literature was made to try to identify a stereotypic "post gamma knife headache," as well as hypothesize about its mechanism of induction.

**Key words:** headache, gamma knife surgery, stereotactic radiosurgery, arteriovenous malformation, migraine

**Abbreviations:** AVM arteriovenous malformation

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Stereotactic radiosurgery has become an effective alternative to microsurgery in the treatment of cerebral arteriovenous malformations (AVMs). As of January 1993, over 4500 patients with AVMs have been treated with gamma knife surgery.<sup>1</sup> The goal of the gamma knife is to obliterate the AVM nidus via "endothelial cell proliferation, progressive vessel wall thickening, and eventual luminal closure."<sup>2</sup>

Headaches are a well-known manifestation of cerebral vascular malformations.<sup>3</sup> Microsurgery, as well as gamma knife surgery, is being used in some instances, solely, to help ameliorate headaches produced by an AVM.<sup>4</sup> In recent reports, a number of patients treated with stereotactic surgery have been shown to have an exacerbation of their presurgical headache after use of the gamma knife.<sup>2</sup> In addition, a de novo headache syndrome has following this type of radiosurgery in some individuals.<sup>4</sup> The extent of headache development as a side effect of ste-

reotactic radiosurgery is not well documented. More importantly, in the reports of postsurgical headaches, no mention has been made of the characteristics of the head pain syndrome.

A patient is presented who developed a migrainous type headache after treatment of an occipital AVM with gamma knife surgery. A review of the current neurosurgical literature was made in an attempt to identify a stereotypic "post gamma knife headache" as well as hypothesize on its mechanism of induction.

### CASE HISTORY

A 62-year-old, right-handed man, with a 30-year history of alcohol abuse, was brought to the emergency department in a confused state. The patient was found sitting in his kitchen, with blood on the floor near his chair. He complained of a mild frontal headache. He had been drinking alcohol earlier that morning, and had no recall of the previous events.

On admission to the hospital, he had bilateral periorbital ecchymoses. The remainder of the physical examination was normal. Neurologic examination was nonfocal, except for the presence of a right inferior homonymous hemianopsia. A CT scan of the head revealed a left occipital AVM. There was no evidence that the AVM had bled or of a skull fracture. The patient had a normal sleep and wake EEG. A cerebral angiogram revealed a high flow, high shunt AVM involving the left parieto-occipital cortex. The nidus of the lesion measured 5 cm (anteroposterior) x 2 cm (superior-inferior) x 4.5 cm (medial to lateral). The volume equaled 25 cm<sup>3</sup>. The arterial supply was from the left carotid and vertebral arteries. Specific arterial feeders included branches from the left pericallosal, posterior parietal, and angular arteries off of the carotid circulation, and branches from the left parieto-occipital, calcarine, and posterior temporal arteries off of the vertebral circulation. Venous drainage was predominantly

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