

MULTIPLE AURAS: NOT AN OMINOUS SIGN FOR EPILEPSY SURGERY

Multiple Auras: Clinical Significance and Pathophysiology. Widdess-Walsh P, Kotagal P, Jeha L, Wu G, Burgess R. *Neurology* 2007;69(8):755–761. Erratum in: *Neurology* 2007;69(19):1890. **BACKGROUND:** Patients with partial epilepsy may report multiple types of aura during their seizures. The significance of the occurrence of multiple auras in the same patient is not known. **METHODS:** The clinical and electrophysiologic characteristics of patients with more than one aura type (abdominal, auditory, autonomic, gustatory, olfactory, psychic, somatosensory, and visual auras), evaluated in the Cleveland Clinic epilepsy monitoring unit between 1989 and 2005, were studied. **RESULTS:** Thirty-one patients experienced multiple aura types during a seizure. Ninety percent of patients with at least two aura types ($n = 31$) and 100% of patients with at least three aura types ($n = 12$) had seizures arising from the right/nondominant hemisphere. EEG seizures remained restricted in all patients during their auras. Twenty patients had epilepsy surgery with seizure freedom in 53%. Subdural EEG recordings in six patients showed either a march of sequential auras, or in one case, several ictal onset zones resulting in separate isolated auras. Ictal SPECT in six patients with right-sided seizures showed a lack of activation in brainstem structures. **CONCLUSIONS:** Most patients who report multiple aura types have localized epilepsy in the nondominant hemisphere, and are good surgical candidates. A common mechanism for multiple auras may be a spreading but restricted EEG seizure activating sequential symptomatogenic zones, but without the ictal activation of deeper structures or contralateral spread to cause loss of awareness and amnesia for the auras.

COMMENTARY

The seizure aura reflects the initial involvement of nonsilent cortex after seizure onset. Although the initial symptoms may result activation of distant cortex following seizure propagation, they remain very useful for localization of the epileptogenic zone, in conjunction with other tests, during the presurgical evaluation. Some categories of auras have localizing and lateralizing value (1). For example, a visual aura with elementary visual hallucinations favors an occipital origin (2), a unilateral somatosensory aura suggests contralateral sensory cortex localization (3), an elementary auditory aura supports a lateral temporal lobe involvement (4,5), and olfactory (6) as well as abdominal (7) auras are most commonly associated with mesial temporal foci.

A report by the same patient of more than one aura raises concern for the presence of more than one seizure focus. Multiple auras can occur in different seizures or in the same seizure. Widdess-Walsh and colleagues specifically addressed multiple auras within the same seizure, either occurring simultaneously or sequentially. The authors found that a single epileptogenic zone was usually responsible for these phenomena and that the presence of multiple auras in the same seizure is not a negative prognostic indicator for epilepsy surgery. Some patients in the study received in-depth investigations with intracranial recordings or ictal single photon emission computed tomography, shedding light on the mechanism of multiple auras: multiple auras in the same seizure appear to be related to preservation of consciousness during seizure propagation. The multiple auras

appear to be experiences from sequential or simultaneous activation of multiple symptomatogenic zones.

All patients in the Widdess-Walsh et al. study with multiple auras had temporal or posterior quadrant foci. Patients with multiple auras and temporal foci often had somatosensory or visual auras, which may be a concern for parietal or occipital origin. However, somatosensory or visual auras usually followed abdominal, psychic, olfactory, or gustatory auras, which are typically associated with temporal lobe origin. Other studies have suggested that somatosensory or visual auras may occur with temporal lobe epilepsy (8,9), but at least some of the patients in these studies also had other symptoms more typical of temporal lobe origin, indicating multiple auras. Thus, the localizing value of an aura is reduced if it is not the first seizure manifestation.

Patients are more likely to remember their aura if the seizure is restricted and less likely to remember it if the following seizure is widespread or severe (10). In the study by Widdess-Walsh et al., it is interesting that the vast majority of patients with multiple auras had right hemisphere foci and seizures that tended to remain restricted to one hemisphere. Right temporal lobe seizures are generally less likely to affect consciousness than left temporal lobe seizures. The preservation of ictal responsiveness in association with automatisms is suggestive of right temporal lobe epilepsy (11). Thus, it is not surprising that the longer preservation of awareness during propagation of right temporal lobe seizures could lead to more ictal symptoms.

The study of Widdess-Walsh and colleagues did not address the situation of multiple auras not occurring in the same seizure. Intuitively, if some seizures start with one aura type and others start with a different aura type, the presence of distinct seizure foci is suggested. This finding could be a negative indicator with respect to epilepsy surgery candidacy. However, it is possible that different single auras reflect different propagation pathways

from the same focus. This phenomenon of distinct single auras also deserves formal study.

by *Bassel W. Abou-Khalil, MD*

References

1. Palmi A, Gloor P. The localizing value of auras in partial seizures: a prospective and retrospective study. *Neurology* 1992;42:801–808.
2. Williamson PD, Thadani VM, Darcey TM, Spencer DD, Spencer SS, Mattson RH. Occipital lobe epilepsy: clinical characteristics, seizure spread patterns, and results of surgery. *Ann Neurol* 1992;31:3–13.
3. Tuxhorn IE. Somatosensory auras in focal epilepsy: a clinical, video EEG and MRI study. *Seizure* 2005;14:262–268.
4. Florindo I, Bisulli F, Pittau F, Naldi I, Striano P, Striano S, Michelucci R, Testoni S, Baruzzi A, Tinuper P. Lateralizing value of the auditory aura in partial seizures. *Epilepsia* 2006;47(Suppl 5):68–72.
5. Clarke DF, Otsubo H, Weiss SK, Chitoku S, Chuang SH, Logan WJ, Smith ML, Elliot I, Pang EW, Rutka JT, Snead OC 3rd. The significance of ear plugging in localization-related epilepsy. *Epilepsia* 2003;44:1562–1567.
6. Acharya V, Acharya J, Luders H. Olfactory epileptic auras. *Neurology* 1998;51:56–61.
7. Henkel A, Noachtar S, Pfander M, Luders HO. The localizing value of the abdominal aura and its evolution: a study in focal epilepsies. *Neurology* 2002;58:271–276.
8. Bien CG, Benninger FO, Urbach H, Schramm J, Kurthen M, Elger CE. Localizing value of epileptic visual auras. *Brain* 2000;123(Pt 2):244–253.
9. Erickson JC, Clapp LE, Ford G, Jabbari B. Somatosensory auras in refractory temporal lobe epilepsy. *Epilepsia* 2006;47:202–206.
10. Schulz R, Luders HO, Noachtar S, May T, Sakamoto A, Holthausen H, Wolf P. Amnesia of the epileptic aura. *Neurology* 1995;45:231–235.
11. Ebner A, Dinner DS, Noachtar S, Luders H. Automatism with preserved responsiveness: a lateralizing sign in psychomotor seizures. *Neurology* 1995;45:61–64.