PATHOLOGICAL LAUGHTER*

W. EUGENE STERN, M.D., AND W. JANN BROWN, M.D.

Departments of Surgery and Pathology, University of California Medical Center and
the Wadsworth General Hospital, Veterans Administration, Los Angeles, California

(Received for publication June 27, 1956)

The relationship between spasmodic, abnormal movements of emotional expression and organic brain disease appears sufficiently interesting to prompt the following review and report of an additional well-documented example of this phenomenon, with its detailed pathologic description.

PREVIOUSLY RECORDED EXPERIENCE

Group I. Case studies documented by autopsy examination offer the strongest evidence of association of abnormal laughter with organic brain disease. Two of the most striking cases studied are those of Foerster and Gagel\textsuperscript{13} and Martin\textsuperscript{16}. In the former case removal of a papilloma of the choroid plexus was attended by bleeding into the 3rd ventricle. As the surgeon wiped the blood from the space the patient broke into laughter, joked, and was mirthful. The expression responded to repeated mechanical stimulation and ceased each time the manipulation was stopped. At death the ventricle was filled with blood. Martin's case was that of a 25-year-old man who laughed uncontrollably at the grave of his mother during the burial services. Following several recurrent attacks the man was found dead in bed. At autopsy an aneurysm of the termination of the basilar artery was found to extend vertically into the interpeduncular space, compress the corpora mammillaria, and elevate the anterior part of the floor of the 3rd ventricle. An equally notable case presented by Dott\textsuperscript{7} concerned an 8$\frac{1}{2}$-year-old girl without hydrocephalus who died with an astrocytic tumor that involved the corpora mammillaria and part of the floor of the 3rd ventricle and expanded into the interpeduncular fossa. She had suffered from frequent seizures during which a long aura of uncontrollable and meaningless laughter was always noted. The question as to whether laughter may constitute the aura or the convulsive phase of an epileptic discharge or act as an epileptic equivalent has been discussed by Marchand and de Ajuriaguerra\textsuperscript{15}. Among the autopsied cases of basilar artery occlusion reported by Kubik and Adams\textsuperscript{14}, it was noted that some of the patients had shown occasional pathological laughter and crying. The association of laughter in the prodromal stage of hemiplegia was documented by the autopsy findings on a 68-year-old woman as reported by Badt\textsuperscript{2} who found bilateral lesions in the pons, caudate nucleus, putamen, and internal capsule.

Cairns\textsuperscript{5} described a patient with a large spongioblastoma multiforme of

\* Read before the Western Neurosurgical Society, Santa Barbara, November 1955.
the pons without hydrocephalus who, each night, would cry, laugh, and make a noise like a dog. The attacks would last 5 minutes and, at times, consisted of piercing screams followed by laughter.

Davison and Kelman\textsuperscript{10} presented 33 examples of patients who exhibited pathologic laughing or crying and who were subsequently studied by autopsy examination. Although cortical and brain-stem lesions were encountered, the majority of the lesions in these patients were in the diencephalic or corticodiencephalic areas. There was no uniformity to the pathologic processes involved, however. Since examples of degenerative, demyelinating, neoplastic, and vascular occlusive disease were also found.

\textit{Group II}. Case studies in which confirmation of the exact location and nature of the lesions is lacking are less convincing, but pertinent. Férc\textsuperscript{12} noted 2 cases of 64-year-old patients in which abnormal laughter preceded the onset of hemiplegia. In 1927 Badt\textsuperscript{2} recorded a case of a 24-year-old man in which the occurrence of abrupt, short-lived laughter was the prodrome to collapse and a right hemiplegia. A similar case was reported by Martin.\textsuperscript{16} The latter author reported 2 additional cases of young people in which laughter preceded a probable attack of subarachnoid hemorrhage in one and death from an unconfirmed upper brain-stem lesion in the other. Clarke\textsuperscript{8} presented the case of a 25-year-old patient with a probable basilar artery aneurysm in which hilarity was the early and only symptom.

\textit{Group III}. The occurrence of emotional lability as evidenced by laughter, crying, and weeping, in association with single hemiplegia, double hemiplegia, pseudobulbar palsy, disseminated sclerosis, amyotrophic lateral sclerosis, and generalized arteriosclerosis, needs no emphasis.\textsuperscript{16,18}

\textit{Group IV}. Although the present discussion deals with facial movements as a part of the phenomenon of laughter, there are facial movements that occur from brain-stem lesions which, while not so highly organized as those occurring with laughter, may be pertinent to the subject under discussion. Abnormal movements of the face in the form of occasional fibrillary twitchings were noted by Pilcher\textsuperscript{17} in a patient with a spongioblastoma of the pons. Alpers and Yaskin\textsuperscript{4} described the attacks of a 19-year-old woman who had a glioma that invaded the collicular area, floor of the 3rd ventricle, posterior colliculi, 3rd nerve nuclei, posterior commissure, and pulvinar. During each attack, which lasted 3 to 4 minutes, the right side of the face drew up and the right eye closed. It is to be recalled that Cushing\textsuperscript{5} reported facial twitching in association with tumors of the acoustic nerve. His Case XXII was that of a 30-year-old man who, for 9 years, suffered left facial twitchings so pronounced as to lead to the diagnosis of focal epilepsy.

Edwards and Paterson\textsuperscript{14} recorded facial spasm caused by tumors of the 8th nerve in 17 cases. In 3 of them there was no associated facial weakness.

These examples of abnormal facial muscle movement occurring with brain-stem and diencephalic disease point up the fact that the occurrence of laughter, which involves some of the same musculature, is a separate complex which may utilize the same, final, common pathway, but has a