Structural Mechanisms of Trigeminal Neuralgia

Arterial Compression at the Pons
Peter J. Jannetta, M.D.

Petrous Ridge Compression
Leonard I. Malis, M.D.

Evidence for a Peripheral Etiology
Frederick W. L. Kerr, M.D.

Evidence for a Central Etiology
Robert B. King, M.D.
Arterial Compression of the Trigeminal Nerve at the Pons in Patients with Trigeminal Neuralgia*

PETER J. JANETTA, M.D.
Principal Contributor and Leader of Discussion

None of the theories offered in explanation of trigeminal neuralgia has proved acceptable. Dandy described vascular compression of the trigeminal root in 66 out of 215 patients with trigeminal neuralgia operated upon through the posterior fossa. He felt that gross abnormalities in the posterior fossa were found in 40% of his patients but was never able to prove this, having only keen eyesight, vivid description, and line drawings to prove his point. Dott proposed that the mechanism by which touch stimuli trigger painful paroxysms is one of demyelination with short-circuiting of the trigeminal pathway. Gardner stated that demineralization of the base of the skull with aging results in an upward tilt of the petrous pyramid and that consequent angulation of the sensory root over the petrous ridge would produce short-circuiting. He further described trigeminal neuralgia as an afferent response to a peripheral stimulus, a "short circuit" in which small low-velocity fibers of the sensory root excite pain fibers at a site of nerve compression in the root. 

King, et al., have suggested a central mechanism for trigeminal pain based on neurophysiological observations after alumina gel injections into the descending spinal nucleus. Kerr has proposed a mild, permanent, pulsatile contact of the carotid artery with the ventral surface of the Gasserian ganglion as the possible cause of trigeminal neuralgia.

In five consecutive patients with trigeminal neuralgia on whom we operated using the binocular dissecting microscope following exposure of the nerve through the tentorium, the trigeminal nerve was mildly to severely compressed and distorted by one or more small tortuous arteries. These arteries appeared to

Fig. 51. View of right trigeminal nerve at pons through dissecting microscope. Transtentorial approach to nerve from superolateral direction: (a) pons; (b) motor root; (c) intermediate fibers; (d) "fibrous cone" of major sensory root; (e) tortuous small artery which was compressing nerve before dissection; (f) site of selective transection; (g) right cerebellar hemisphere (retracted). (Reprinted with the permission of the Bulletin of the Los Angeles County Neurological Societies.) \( \times 10 \).

* This work was done in collaboration with Dr. R. W. Rand at U.C.L.A.