Trigeminal Neuralgia in a Patient with Multiple Sclerosis

An Autopsy Report

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Trigeminal neuralgia is said to occur more frequently in patients with multiple sclerosis than in the
general population.18 Müller,13 in a detailed study of disseminated sclerosis, found that 2
per cent of his group of patients with multiple sclerosis had trigeminal neuralgia and that the neuralgia
tended to appear at an earlier age in these patients than in those with "genuine" or idiopathic tic
doloreux.

Lack of knowledge concerning the cause of both
trigeminal neuralgia and multiple sclerosis in-
creases the difficulty of drawing inferences as to
the relationship of the two diseases. Are sclerotic
plaques involving the descending root of the 5th
nerve "the cause" of the neuralgia? Is a plaque on
the posterior root at the site of entrance of the
nerve to the pons the significant lesion? Is the
association of the two diseases a mere coincidence?

It might be hoped that postmortem examination
of patients afflicted with both diseases would
provide information to aid in answering some of
these questions. The 6 cases reported thus far
provide interesting clues, but the significance of
these cases is not clear and the facts presented in
them are subject to conflicting interpretations. If
additional information is to be gleaned from such
anatomic studies, the number reported must be
increased. We are reporting a 7th case and making
a brief comparison between it and the earlier cases
from the literature.

Case Report

A 58-year-old woman entered the Mayo Clinic on
September 3, 1958, complaining chiefly of right facial
pain of 2 years' duration. Her first neurological symp-
toms were noted in 1937, when she was 42 years old, in
the form of weakness of the left lower extremity. This
symptom disappeared after several months, and she
seemed well until 1948, when weakness of the left leg
recurred. In addition, she experienced a sensation of
unsteadiness while standing and a tendency to stagger
to either side while walking. These symptoms progressed
at a slow pace to the time of her visit to the clinic. She
had not experienced paresthesias in any part of the
body.

In the spring of 1951, at the age of 56 years, she had
first begun to suffer from episodes of severe, sharp,
shooting pains on the right side of the face. They began
in the right nasolabial fold and extended laterally about
2 inches. Less frequently, similar pain was felt in the
right lower gum. In each paroxysm the pain was sharp,
shooting and brief, lasting a minute or less. The bouts of
pain persisted for a few days to several weeks. The longest
period of freedom from pain had been 5 months. She
had not recognized any cutaneous trigger points but
knew that chewing, talking and similar activities often
precipitated her pain.

The familial history and the patient's history contrib-
uted nothing significant concerning her condition at the
time she was examined.

Examination. During examination she often held her
hand over the right side of her face in a vain effort to
prevent the flashes of pain. The general physical exami-
nation revealed no abnormalities except those attrib-
uted to disease of the nervous system. Her gait was wide
based, spastic and ataxic. Lateral gazing to either side
produced nystagmus of the out-turning eye. The optic
disks were of normal color and there was no sheathing
of the retinal veins. The muscle-stretch reflexes were hy-
peractive and Babinski's sign was elicited bilaterally.
All extremities were spastic, somewhat more so in the
legs than in the arms. Coordination was moderately
impaired, as demonstrated by finger-to-nose and heel-to-
toe tests.

Routine laboratory tests revealed no remarkable
abnormalities. The total protein content of the cerebro-
sinal fluid was 65 mg.; sugar, 129 mg., and chlorides,
651 mg., per 100 ml. of fluid; 2 lymphocytes, 4 poly-
morphonuclear leukocytes and 250 erythrocytes were
found per cu. ml. of fluid. Roentgenograms of the head
revealed no significant abnormalities.

Operation. The severity of this patient's pain was such
as to require an attempt to relieve it by surgical opera-
ton. On September 7, 1958, with the patient under
general anesthesia, decompression of the posterior root
of the right trigeminal nerve was performed. During the
early postoperative period the patient was alert and free
of the tic pain previously present. At 5 p.m. on Septem-
ber 9, 1958, the patient suddenly lost consciousness and
suffered a convulsion. Clonic-tonic movements of the
left side of the body (face, arm and leg) were precipi-
tated, and the right arm and leg were drawn up in flex-
on. The patient remained unconscious after the seizure.
The surgical incision was reopened and an epidural
hematoma 2 to 3 cm. in diameter removed.

Recovery from this second operation was prompt, and
the patient was free of trigeminal pain. On September
16, 1958, in the late afternoon, severe pain developed
in the left side of the thorax. A short time later the heart
pressure began to decline, and despite the use of vaso-
pressor drugs the condition of the patient became worse,
respirations became irregular and she died 5 hours after
the onset of the thoracic pain.

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Fig. 1. Brain stem sectioned at level of entrance of 5th cranial nerves, viewed caudally. Arrow indicates plaque at entrance of surgically sectioned right 5th nerve.

Fig. 2. Brain stem sectioned at level of entrance of the 5th cranial nerves. Arrow indicates notch made to identify the right side. Note plaque at entrance of the right 5th nerve (A). On the left is a plaque in the region of the descending tract of the 5th nerve (B). Luxol fast blue stain; $\times 2$. 
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Postmortem Examination. Aside from a focal area of recent softening of the undersurface of the right temporal lobe and a small epidural hemorrhage in the middle fossa on the right surrounding the area of the operative site, the brain grossly appeared normal. Coronal sections of the brain revealed multiple, sclerotic, translucent plaques of the white matter, most marked in the occipital lobes and in the lateral angles of the lateral ventricles. Sections made through the cerebellum and pons revealed similar, scattered, focal regions of demyelination. External examination of the medulla and spinal cord demonstrated several longitudinal, translucent regions. Cross sections of the spinal cord showed numerous regions of demyelination scattered indiscriminately.

The stump of the right 5th nerve measured approximately 2 mm. A section of the pons made through the roots of the 5th nerves revealed a plaque on the right nerve in the region where it penetrated the arachnoid (Fig. 1).

Histological examination of the brain disclosed typical, paraventricular sclerotic plaques of multiple sclerosis. The plaques were not always homogenous in that some showed greater acute destruction at the periphery and older, more complete breakdown of axis cylinders in the center.

Serial sections were made of the origins of the 5th nerve roots and stained by hematoxylin and eosin, Luxol fast blue and Bodian silver methods. At the junction of the right 5th nerve and the pons was a plaque which involved the greater part of the entering fibers (Fig. 2). In addition, in this area, there was early swelling of the myelin which appeared to be secondary to that which would be caused by surgical sectioning of the nerve. Along the intrapontine distribution of the left 5th nerve the fibers at the periphery were normally myelinated. As the nerve approached the floor of the 4th ventricle, a sclerotic plaque involved the penetrating fibers, the region of the mesencephalic root and the beginning of the descending portion of the 5th nerve (Fig. 2). Multiple sections were made in the lower portion of the pons and in the upper, middle and lower portions of the medulla to follow the descending fibers of both 5th nerves. No distinct difference was noted between the fibers of the two sides. In the sections of the medulla, there were scattered areas of perivascular inflammation unrelated to the 5th nerves. Sections throughout the spinal cord showed the classical picture of multiple sclerosis similar to that seen in the brain.

Comment

Reports of postmortem examination of patients with both multiple sclerosis and trigeminal neuralgia are so rare that a brief review of those published seems justified. We have read the papers of Marburg referred to by Parker,13 and find that they contain no information concerning the combination of the two diseases. We have been unable to find a report by Marburg concerning postmortem study of a patient who had had multiple sclerosis and trigeminal neuralgia.

The report of Oppenheim14 consists of a single sentence in his textbook: "I have seen a case in which trigeminal neuralgia was one of the first and most permanent symptoms of sclerosis, and in which a sclerotic focus was found post-mortem at the point of emergence of the trigeminal."

Parker15 published the first carefully studied case known to us. His patient, a man, suffered the onset of multiple sclerosis at the age of 24 years and neuralgia of the maxillary division of the left trigeminal nerve at the age of 38 years. At the age of 44 years surgical sectioning of the sensory root of the left trigeminal nerve was done. The patient died 4 days after operation from "acute dilatation of the stomach." The pertinent postmortem findings were stated thus: "Well-marked and relatively old plaques were found on the main sensory nucleus of the right fifth nerve. On the right side and on the lowest part of the spinal nucleus and root was a plaque. The right posterior root was normal, but on the left side at the point of emergence of the root from the pons and for a short distance along its extrapontine course, there were two relatively old sclerotic plaques."

In his discussion the author added, "It is a temptation to regard ... this lesion on the posterior root as the source of the patient's pain. . . ."

Amezúa's Reports

Amezúa reported two cases,1 one of which had previously been reported by Gurevich.8 The following is a modified translation of Amezúa's reports:

Case 1. Male. Onset of neuralgia of second and third divisions of the left trigeminal nerve at the age of 29 years, in 1935. In July, 1936, a surgical section of the outer two thirds of the sensory root of the left trigeminal nerve was done. This relieved the pain on the left side of his face. In January, 1937, he noted onset of ataxia and tremor along with neuralgia of the right trigeminal nerve (division not specified). The date and circumstances of his death are not stated.

At autopsy, plaques were found in the motor nucleus, chief sensory nucleus and descending tract of the trigeminal nerve on both sides. On the left side there was a plaque on the sensory root of the trigeminal nerve at its entrance into the pons.

Case 2. Male. Onset of neuralgia of the second division of the left trigeminal nerve at the age of about 35 or 40 years. In March, 1931, at the age of 54, surgical section of the lateral third of the sensory root of the left trigeminal nerve was done. Shortly after operation he developed paralysis of 5th, 6th, 7th and 14th nerves on the left as well as deafness on the left. A tumor of the left cerebellopontine angle was suspected and on May 1, 1951, a surgical exploration of the posterior fossa and left cerebellopontine angle was done. No tumor or other cause for the patient's symptoms was recognized. The patient died on May 23, 1951.

At autopsy, plaques were found in the motor nuclei and mesencephalic roots of the trigeminal nerve on both sides. There was a plaque on the right (?) sensory root at its entrance into the pons. The illustrations in his article do not indicate that the specimens were notched to mark
right or left side prior to sectioning. Furthermore, the sides are not always clearly identified in his photographs or in the legends beneath them. There is reason to doubt that the relationship between the clinical symptom (pain in the face) and the histological abnormality (plaque on the sensory root) can be established with certainty.

Other Reports

Garcin et al.\textsuperscript{7} reported upon a man in whom multiple sclerosis had begun when he was 35 years old, in 1920. He developed right 2nd and 3rd division trigeminal neuralgia at 64 and left 2nd division pain at 69. At the age of 72 years, a short time before his death in 1957, he complained of disagreeable paresthesia of the face in addition to the spasms of pain. Postmortem examination disclosed two plaques involving the sensory nucleus and descending root of the right trigeminal nerve. Another plaque was found involving the sensory root of the right trigeminal nerve at its entrance into the pons. On the left side a microscopic plaque was found in the descending root of the trigeminal nerve. There was no recognizable abnormality of the sensory root of the left trigeminal nerve.

Daum et al.\textsuperscript{8} described a woman in whom neuralgia of the second and third divisions of the right trigeminal nerve had begun when she was 64 years old, in October, 1953. The pain was unusual in that the patient felt it behind and beneath the right ear. In addition to the paroxysms of pain she reported a steady, dull ache and fornications in the right ear and side of the face. Although Daum and his associates reported this condition as trigeminal neuralgia, the description raises some doubt. The patient died of pulmonary embolism in February, 1954. The existence of multiple sclerosis was not suspected prior to death. Postmortem examination disclosed an ancient plaque on the sensory root of the right trigeminal nerve at its entrance into the pons. A more recent plaque was found to involve the descending root of the right trigeminal nerve in the medulla. On the left a plaque involved the intrapontine portion of the fifth nerve.

The report of Oppenheim\textsuperscript{14} is too brief to warrant anything but mention. We may summarize the significant findings in the remaining cases as follows: In all cases, including ours, a plaque was found on the sensory root of one trigeminal nerve near the site of entrance of the nerve into the pons. This lesion was located on the side on which the patient suffered pain in our case and in the cases of Parker\textsuperscript{15} and Daum et al.\textsuperscript{8}. In Case 2 of Amezúa\textsuperscript{1} the relationship between the left trigeminal neuralgia and the plaque on the sensory root is ambiguous. The pain was bilateral but a plaque was found on only one nerve root in the case reported by Garcin et al.\textsuperscript{7} and in Case 1 of Amezúa.\textsuperscript{1} In all cases including ours, plaques were found to involve the descending root of the trigeminal nerve bilaterally.

Discussion

If we choose to look upon either type of lesion (extrapontine or descending root) as being the cause of the patient’s pain, we are faced with obvious difficulties. Unilateral lesions of nerve roots do not explain bilateral pain, and bilateral lesions of the spinal tract of the trigeminal nerve do not explain unilateral pain. Furthermore, it is difficult to understand how either type of lesion can produce pain in only one division of a nerve.

Information gained from clinical observation\textsuperscript{2} and comparatively anatomical studies\textsuperscript{4,3} indicates that somatosensory (pain) fibers of the facial, glossohypopharyngeal and vagus nerves join the spinal tract of the trigeminal nerve. A sclerotic plaque affecting this tract might be expected at times to cause pain in the ear, tonsil or larynx if such a plaque were capable of causing trigeminal pain. To our knowledge, no instance of combined glossohypopharyngeal neuralgia and multiple sclerosis has been reported in those papers dealing with relatively large numbers of cases of glossohypopharyngeal neuralgia.\textsuperscript{5,10,12,16} A review of the histories of 116 patients with a diagnosis of glossohypopharyngeal neuralgia at the Mayo Clinic revealed no instance of combined multiple sclerosis and glossohypopharyngeal neuralgia.\textsuperscript{17} Multiple sclerosis has not been noted in those cases of combined trigeminal neuralgia and glossohypopharyngeal neuralgia reported in the literature.\textsuperscript{3,16}

Present knowledge about trigeminal neuralgia and multiple sclerosis does not provide satisfactory answers to these questions or resolve the inconsistencies which appear to exist. It is our impression that in the presence of combined multiple sclerosis and trigeminal neuralgia the sclerotic plaque involving the sensory root at the entrance of the root to the pons is the likely factor in the production of the pain.

Summary

We have reported a case of combined multiple sclerosis and trigeminal neuralgia. The significant autopsy finding was a plaque at the point where the affected 5th nerve entered the pons. We have discussed comparable cases previously reported and offered speculations concerning the significance of these findings.

References

2. Brodal, A. Central course of afferent fibers for pain
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