Herpes Zoster Mandibularis

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SUMMARY: *A case of Herpes zoster of the mandibular nerve in an 80 year old man is reported. Herpes zoster infection affecting only the mandibular branch of the trigeminal nerve is rare. It is proposed that the distribution of lesions is a consequence of a unique latent site of the virus within neurons of the gasserian ganglion innervating the mandibular division of the trigeminal nerve.*

RÉSUMÉ: *Nous rapportons un cas d'herpes zoster du nerf mandibulaire chez un homme de 80. Cette localisation à la branche mandibulaire du trijumeau est extrêmement rare dans la littérature. Nous proposons l'hypothèse que cette distribution des lésions correspond à un site de localisation unique, et latent, du virus à l'intérieur des neurones du ganglion gasser, neurones qui innervent la division mandibulaire du trijumeau.*

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INTRODUCTION

Herpes zoster (shingles) characteristically produces pain and vesicle formation limited to an area of the skin and mucous membranes served by a single sensory ganglion. Most cases occur in thoracic dermatomes. The trigeminal nerve is next in frequency and of the three divisions of the nerve, the ophthalmic branch is affected about twenty times more often than the maxillary and mandibular divisions (Juel-Jensen and MacCallum, 1972).

Involvement of the mandibular division of the trigeminal nerve is infrequent. Wilson (1954) reported that in Head's series of 416 cases, 22 belong to the trigeminal group, of which 18 concerned the ophthalmic division, 2 the maxillary division, and 2 the mandibular division. Hope-Simpson (1965) studied 197 cases of herpes zoster, of which 25 involved the trigeminal ganglia. Of these 25, 16 affected the first division, 5 the second, and 4 the third. The report of 1199 cases by Thomas and Howard (1972) indicated that of 213 patients with trigeminal zoster, only 10 had involvement of the mandibular division. The following case report demonstrates that in rare instances, only the mandibular division of the trigeminal nerve may be involved.

A CASE REPORT

An 80 year old man was referred to the neurology service of the University of Alberta Hospital complaining of pain around his left ear, on the left side of his tongue, and on the lower left gingiva. Pain in the area of the left mandible radiated upwards towards the left ear. Over a period of 24-48 hours, the left side of his tongue became swollen, small lesions appeared on the lower left gingiva and left lip, and red non-painful lesions developed on the left side of the cranium. In association with these symptoms, he felt nauseated and vomited twice.

On examination, the patient demonstrated multiple vesicles with erythema in the distribution of the left auriculotemporal nerve, a swollen tragus, and a few small vesicles on the anterior aspect of the external auditory canal. The tympanic membrane appeared normal. In addition, he presented a few lesions on the left lower lip, red swollen skin in the area of the left chin, a swollen tongue on the left side with multiple small white and red lesions, and lesions along the left lower gingiva which caused pain so that he could no longer wear his false teeth (Figure 1). He was able to open and close his mouth without difficulty. There were no lesions on the left forehead, and facial palsy was not present. Treatment with oxycodone and glucocorticoids was initiated for alleviation of pain and swelling.

One month after the episode of painful vesicular eruptions the patient was improving. He no longer had vesicles, and pain in the area of the left chin and left side of the tongue, though present at the time of examination, was subsiding. Pain around the left ear and mandible was no longer present.

A diagnosis of Herpes zoster mandibularis was made after complement fixation serology demonstrated a fourfold rise in antibodies to Varicella zoster virus (VZV). During the acute phase of the attack, the patient had a titer of Anti-VZV antibodies of 1:8. One month after his attack, the level had risen to 1:128. Both acute and convalescent sera showed titers of 1:128 to Herpes simplex virus Type 1 (HSV-1)

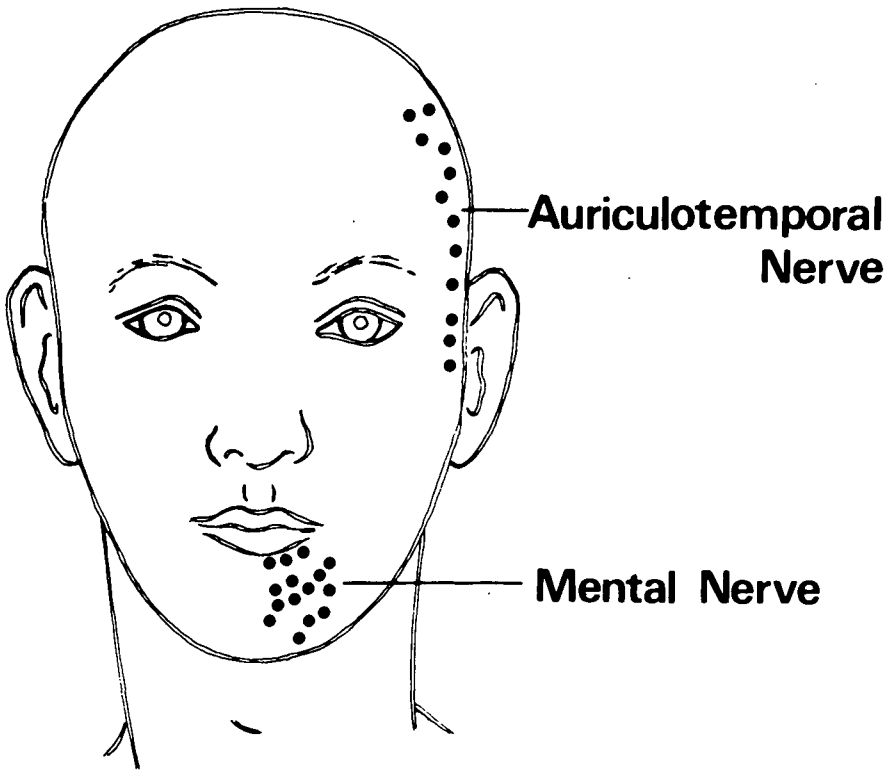

Figure 1 — Vesicles occurred along the distribution of the mental and auriculotemporal nerves.

antibodies and less than 1:8 to Herpes simplex virus Type 2 (HSV-2) antibodies as measured by indirect immunofluorescence.

The virus was isolated by placing a sample of vesicle fluid from facial lesions of the patient on a monolayer of a primary human brain cell line A142/79. Five to six days post-infection, a multifocal cytopathic effect (CPE) similar to that described by Gilden et al (1978) developed. When an inoculum of infected cells was transferred to a homologous uninfected culture, CPE identical to that seen in the original monolayer was observed. On the basis of indirect immunofluorescence on infected cells, the virus isolated was shown to be VZV.

DISCUSSION

Clinical and histological findings (Hope-Simpson, 1965; Ghatak and Zimmerman, 1973; Esiri and Tomlinson, 1972) support the belief that Herpes zoster infection results from reactivation of varicella virus latent in the dorsal sensory ganglia. In 1965 Hope-Simpson (1965) hypothesized that at the time of primary varicella infection, virus migrates from the skin up the sensory nerve to the ganglia where it remains dormant. When reactivated, the virus multiplies in the ganglia and travels down the sensory nerve to the periphery, producing lesions. The observation that the localization of zoster follows the pattern of varicella rash led Hope-Simpson to reason that dermatomes with dense varicella rash are the source of virus which becomes latent in associated ganglia. The virus residing in the ganglia is subsequently reactivated in the form of zoster.

To date there are no reports of recovery of clinically latent VZV from human ganglia. Bastian et al (1974) and Shibuta et al (1974) isolated VZV from spinal ganglia of patients with recent zoster infections; immunofluorescence, electron microscopic (Esiri and Thomlinson, 1972) and light microscopic (Ghatak and Zimmerman, 1973) studies demonstrated VZV in the sensory ganglia of affected segments soon after the episode of zoster. However, attempts to recover virus from patients without active lesions have been unsuccessful (Plotkin et al, 1977).

The related Herpes simplex virus (HSV) has been recovered from human trigeminal (Bastian et al, 1972; Baringer and Swoveland, 1973; Warren et al, 1977) and sacral (Baringer, 1974) ganglia from unselected cadavers. The isolation of HSV-1 from the superior cervical and vagus ganglia (Warren et al, 1978) indicated the virus was present in somatic and autonomic ganglia other than the trigeminal. The observation that latent HSV can be recovered from the ganglia but not from adjacent nerve or root tissues led Baringer (1975) to the conclusion that the virus was latent in the cell that was unique to the ganglia, namely, the neuron. That neurons harbor latent HSV was supported by experiments of Cook et al (1974), using explants from animals with latently infected ganglia. They demonstrated the neuron is the first cell in which viral DNA can be detected and that the DNA in reactivating neurons is HSV DNA as measured by in situ nucleic acid hybridization.

A case of Herpes zoster affecting only the mandibular branch of the trigeminal nerve is reported. The posterior division of the mandibular nerve divides into the auriculotemporal, lingual, inferior alveolar, and mental nerves. The auriculotemporal nerve innervates the helix and tragus, external acoustic meatus, and the side of the cranium adjacent to the superficial temporal artery. The lingual nerve innervates the anterior two-thirds of the tongue, and the inferior alveolar and mental nerves innervate the lower gingiva and skin of the chin. The painful vesicular eruptions of the patient described in this report corresponded with the distribution of these nerves. The reason this patient had Herpes zoster in the distribution of the mandibular nerve rather than in the more frequently affected ophthalmic nerve remains to be determined. The virus may have been latent in the mandibu-

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lar portion rather than in the ophthalmic portion of the gasserian ganglion, if indeed this ganglion is the site of Herpes zoster latency. It is possible that similar to HSV, VZV may be dormant in multiple ganglia and that the neural route taken during reactivation of the virus may be influenced only in part by a particular site of latency.

Ariens Kappers et al (1965) pointed out that the trigeminal ganglion derives embryologically from the fusion of the ophthalmic segment with the maxillo-mandibular segment, the latter forming the second and third divisions of the nerve. Thus, as Baringer (1975) stated, an anatomical division exists between the first, and the second and third divisions. In the case of Herpes zoster mandibularis, primary varicella infection may produce a latent state in ganglion cells belonging to the mandibular division which can not pass into ganglion cells subserving the ophthalmic division. Such an anatomical limitation could explain the preponderance of Herpes zoster ophthalmicus, wherein VZV may be "trapped" in ganglion cells innervating only the ophthalmic division of the trigeminal nerve.

The study of Herpes zoster pathogenesis has been greatly hampered by the problems of growing the virus in vitro and the complete lack of appropriate animal models. Unlike Herpes simplex virus which grows in a wide range of animal cells in culture, Varicella zoster virus can be propagated mainly in primate cells. HSV can be isolated with relative ease from the intracellular matrix and supernatant fluids of infected cells, whereas isolation of VZV is difficult due to the close association between virus and host cell and loss of infectivity of the virus upon release from the cell. The recent report of isolation and characterization of VZV DNA by Hyman et al (1978) will help further the investigation of the precise molecular relationship between latent virus and host cell. Whether or not all or parts of the VZV genome are integrated into the host cell chromosomes in latent infection may be resolved in the future by the use of VZV restriction endonuclease fragments as probes in both in situ and solution nucleic acid hybridization experiments. It appears newly developing technology may be valuable in defining the link between latent infection and clinical disease.

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