Nervus Intermedius*

ALBERT L. RHOTON, JR., M.D.,† SHIGEAKI KOBAYASHI, M.D.,‡ AND W. HENRY HOLLINSHEAD, PH.D.§

Mayo Clinic and Mayo Foundation, Rochester, Minnesota

The nervus intermedius, or pars intermedia of the facial nerve, contains the sensory fibers that are distributed in the branches of the facial nerve. The peripheral distribution of these fibers, whose cells of origin form the geniculate ganglion, is not yet entirely understood, but in addition to the fibers distributed with the motor branches of the facial and those distributed to taste buds, there is a small cutaneous component that includes fibers for pain. Hunt,10 on the basis of the location of the eruptions in herpes zoster of the geniculate ganglion, described the distribution of the cutaneous component as being to parts of both the medial and lateral surfaces of the auricle, to a strip along the external acoustic meatus, and to a part of the tympanic cavity. Although the accuracy of these observations has been questioned,15 and there may indeed be some variation in the extent to which the facial nerve participates, with the ninth and tenth, in supplying these regions, cutaneous fibers of the facial have been traced to the ear in the mouse17 and in human fetuses;13 section of the nervus intermedius may result in decreased sensitivity of the auricular zone in both man9 and monkey;23 and, most pertinent, stimulation of the nervus intermedius in man causes pain referred to the ear.9,24

In consequence of the pain fibers present in the facial nerve, the neurosurgeon is sometimes called upon to sever these to relieve otalgia caused by malignancy or the pain of idiopathic geniculate neuralgia. For the latter, at least, isolation and section of the nervus intermedius alone should suffice, but has not always been successful. Thus Clark and Taylor,6 who first sectioned the nervus intermedius for relief of neuralgia, cut the nervus intermedius and upper branches of the eighth nerve and injured the facial motor root to achieve complete disappearance of the characteristic pain;23 White and Sweet,24 after a “tiny” nervus intermedius had been sectioned by Jefferson without relief from pain, obtained such relief by a medullary tractotomy; and Sachs20 reported a case in which the nervus intermedius was so closely combined with the vestibular nerve that section of the latter was necessary to relieve pain.

It is usually stated that the nervus intermedius is a component of the facial nerve for a variable distance proximal to the geniculate ganglion, and that somewhere in the internal acoustic meatus it separates from the motor root of the facial to run to the brain stem between the latter and the eighth nerve; relatively little note has been taken of the fact that it may be closely bound to the eighth nerve for a variable distance before it enters the brain stem. Sachs29 found this to be true in his case, as already noted. Both Bischoff2 and Bruesch3 state that this may occur, but do not indicate its incidence. White and Sweet24 state that on “rare occasions” the nervus intermedius is bound to the vestibular part of the vestibulocochlear (acoustic) nerve for at least a part of its course. These reports, and the observation during a study of the afferent connections of the facial nerve18 that the condition is very frequent in the cat and monkey, suggested a study of its frequency in man. In connection with this study, vascular relations of the nerves were also noted.

The results indicate that adherence of the nervus intermedius to the eighth nerve for a variable distance distal to the entrance of these nerves into the brain stem is the rule rather than the exception; that fairly frequently, as the nervus intermedius leaves the eighth nerve to run freely before joining the
seventh, it consists of two or more filaments; and that in approximately one fifth of cases there is no separate nervus intermedius in the posterior cranial fossa. In the latter cases a separate nervus intermedius is found only within the internal acoustic meatus.

**Methods**

Seventy-three nerves from 37 adults were studied at autopsy. The calvarium was opened and the cerebral hemispheres and diencephalon removed after transecting the brain stem at the level of the colliculi. The tentorium was divided along its attachment to the petrous ridge bilaterally and that portion of the petrous bone over the internal acoustic meatus was removed. This exposed the superior surface of the seventh and eighth nerves throughout their course from the brain stem to the lateral end of the meatus (Figs. 1 and 2).

With the facial and the eighth nerves thus exposed, the relationship of the nervus intermedius to each was studied and recorded. Measurements made were the total length of the nerves between the brain stem and the distal end of the meatus; the distance through which the nervus intermedius was adherent to the vestibular portion of the eighth nerve; the distance through which the nervus intermedius ran an independent course between the eighth nerve and the motor root of the seventh; and the distance from the junction of the nervus intermedius and the motor root of the facial to the distal end of the internal acoustic meatus and the beginning of the facial canal.

**Results**

Between its attachment to the brain stem and the distal end of the internal acoustic canal, the nervus intermedius is usually divisible into three parts (Figs. 1 and 2): a proximal segment in which it is closely adherent to the eighth nerve; an intermediate segment in which it lies free between the

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**Fig. 1.** Cerebellopontine angle as exposed for measurements described in the text. The superior bony covering of the internal acoustic meatus has been removed thus exposing the nerves throughout their course from the brain stem to the lateral end of the internal auditory meatus. The nervus intermedius enters the brain stem along the ventral surface of the eighth nerve. Laterally the nerve forms a common trunk with the facial motor root. The facial motor root is retracted forward by a metal probe. A recurrent arterial branch passes between the nervus intermedius and the eighth nerve to supply the brain stem. The portion of the third nerve disconnected from the brain which was removed hangs down into the picture.