

cases without the slightest ailment, especially ailment of the nervous system, in which he has not been able to elicit the reflex of which he is speaking. In these cases pressure of the calf muscles of the legs gives no response at all or flexion, but in the cases where the motor tract is supposed to be involved, he very frequently has found this phenomenon.

He said he wished to emphasize one more point in regard to the value of this sign. As far as the relation of this reflex to Oppenheim's is concerned it is not an Oppenheim reflex at all or a modification of it. Dr. McCarthy, who at first expressed the opinion that it was perhaps a modification of Oppenheim's reflex has since retracted that opinion. It is a decided sign of involvement of the motor tract. He said he wanted to refer to another anatomical and clinical case. A boy entered the Jefferson Hospital with injury to his right temporal region; he had headache and was stuporous. He was put to bed, and on the opposite leg increased knee jerk was found, but no Babinski, no ankle clonus and no Oppenheim. Dr. Mills and Dr. Dercum examined the case and they saw that while all the other reflexes were absent, this reflex was present. Dr. Da Costa operated upon the right side of the skull and found marked pressure. After the operation the reflex disappeared, and Dr. Gordon has examined the patient many times since and has never been able to discover the paradoxical reflex.

(This case was reported before the Philadelphia Neurological Society and is to be published in the *American Journal of the Medical Sciences*.)

## THE SENSORY SYMPTOMS AND THE SENSORY AFFECTIONS OF THE FACIAL NERVE.

By Dr. J. Ramsay Hunt.

The facial nerve like the trifacial is a mixed nerve; consisting of a motor root, a sensory root and ganglion.

In this communication the symptomatology of the sensory mechanism of the seventh cranial nerve is discussed, with the practical importance of this group of symptoms to clinical neurology and otology.

1. Preliminary remarks on the embryology and anatomy of the facial nerve.

2. Pain and sensory disturbances in facial palsies (Falloppian neuritis).

3. Herpetic inflammations of the geniculate ganglion.

4. Primary otalgia (neuralgia of the facial nerve).

5. Secondary otalgia (tactile ear pains).

6. Reflex facial twitchings and spasms.

Dr. P. C. Knapp said he had had the opportunity lately of seeing two or three cases of facial paralysis very early in the onset of the disease. In them he found just for a day or two a very slight diminution of sensibility. It could only be obtained, as Dr. Hunt has suggested, by the comparative method of testing the two sides, and sometimes only by the comparison of exceedingly slight stimulus such as Frey's esthesiometer, and in a day or two even that difference had disappeared. He thought that if we could see the cases very early and test by the comparative method we should find sensory disturbance in facial paralysis more often.

Dr. H. H. Hoppe said he would like to ask Dr. Hunt whether he came across many cases of pain in the eyeball. Only a few days ago he (Dr. Hoppe) saw a patient who had been paralyzed some years before. The history was that the onset of the facial paralysis was accompanied by acute pain in the eyeball.

Dr. T. H. Weisenburg said that he always had thought that the facial nerve had also a sensory function. For many years he had followed a case of facial palsy in which he noticed that whenever the patient developed an ordinary coryza there would not be as much secretion from the paralyzed side as from the other. This he had observed in many similar cases of peripheral facial palsy. He had also observed that when, for instance, a general eruption like an acne would appear upon the body the paralyzed side of the face would escape. This freedom from general manifestations is also true of other so-called motor palsies. He had one patient, a hemiplegic, who would tan only upon the paralyzed side. It seemed to Dr. Weisenburg that the terms motor and sensory palsies were purely relative. Thus in a case with pure motor lesion there will always be some sensory symptoms. For instance, in hemiplegia there will always be loss of vasomotor tone, and this in a broad sense is a sensory manifestation. On the other hand, in cases of pure sensory lesion there are always some motor symptoms. As for instance, in a case of pure sensory involvement of the fifth nerve there will always be some difficulty in moving the muscles of the face on the involved side. In tabes, in which the lesions are almost wholly sensory, there will be some difficulty in movement, the so-called incoördinate movement of tabes.

Dr. L. P. Clark said that in the last two or three years he has been interested in the neurological surgery of the seventh nerve. He has noticed in a number of very old cases of facial palsy, even when by very careful sensory test no difference in the herpetic zoster zone is capable of detection, yet subjectively the patients state that there is alteration in the sensibility in that side. Heretofore he has supposed that the patients having the palsy would naturally think they ought to have a sensory defect also, but Dr. Hunt's explanation would be a complete justification of their contention.

Dr. S. I. Schwab said he would like to ask Dr. Hunt whether he includes deafness as a part of the syndrome in his cases. Dr. Schwab had an opportunity of observing a patient who had the herpes, deafness, vertigo and facial paralysis on one side, and the deafness was very distinct.

Dr. Hunt said in regard to Dr. Schwab's remarks, he of course includes deafness as a very important symptom in this syndrome. The simplest expression is the herpetic pain and the zoster, in the other clinical types there is facial palsy alone or in conjunction with auditory symptoms. These may be vestibular or cochlear or both. They are so marked in some cases the thought has occurred to Dr. Hunt that perhaps the sensory ganglia of the acoustic nerve may have to be brought into the realm of herpes zoster also, but he has explained these cases in his paper by an extension of the inflammation from the geniculate ganglion through the sheaths of the nerves.

In regard to the other questions, the tympanum canal, the auditory canal, the concha and the auricle have a very complex and a very varied innervation. This is from the auricular branches of the trigeminus and of the cervical and of the vagus nerves, and, he thinks also, from auricular branches of the facial. These all converge and innervate a very small area. As the auricular area of the facial nerve is small and the additional innervation so extensive, anesthesia probably would be of very short duration or very slight. There are also certain difficulties in examining the sensation of a canal like the auditory canal. Personally, he has never found a distinct anesthesia in the concha or the canal. He has, however,

only expected to find it in the early stage of severe facial palsy. Gowers, however, says distinctly that he has observed it in a number of cases, and Dr. Cushing says he has found in some cases a hypesthesia. There is no question as to the subjective sensation in the ear in these cases of facial palsy. If inquiry is made very definitely the patients say the ear seems full or there is something in it, which may be interpreted as a paresthesia.

In regard to Dr. Hoppe's case with pain in the eye, of course in cases of facial palsy or neuritis it is not infrequent to find pains in the trigeminal area, just as in affections of the trigeminal area it is very frequent to find a pain in the sensory area of the facial nerve. The anatomical connections of the two sensory systems he thinks afford a sufficient explanation.

### ON THE SPLITTING OF AFFERENT FIBERS IN PERIPHERAL NERVES.

(Observations of Dr. Elizabeth H. Dunn.)

Reported by Dr. H. H. Donaldson.

In a frog, the ventral roots of the spinal nerves supplying the leg were cut within the spinal canal. This left the limb supplied only by the afferent fibers derived from the dorsal nerve roots. A study of the supply to the skin and muscles showed that the muscles were abundantly innervated with afferent fibers. A study of the numerical relations showed also that the afferent fibers must split in their course, in such a way that each division of the split fiber passed to a different segment of the limb. It could not be determined, however, whether any of the splitting fibers were so distributed that one division went to the skin, and the other to a muscle.

We do not know whether this splitting is more developed in the frog or in man, but if it occurs in the frog, it probably occurs in man also, and is an anatomical fact to be taken into consideration in cases of disturbed sensation, and possibly also has a bearing on the phenomena of "referred" pain.

Dr. Langdon said it seemed to him that this subject has a practical bearing of clinical import. For instance, in the question of the origin of referred pain. He wished to ask Dr. Donaldson if he will give us his individual opinion as to whether this splitting of fibers, so-called, is really a histological splitting of a neurone process, or perhaps more likely a rearrangement of the fibrillæ; in other words, does a new structure arise at that point of splitting or is it simply a separation of pre-existing paths?

Dr. Bullard asked how much of what Dr. Donaldson had said applies to man and how much to the frog and lower animals.

In answer to the first question, Dr. Donaldson said he should hesitate to introduce a discussion of the fibrilla hypothesis at this stage.

As to the second point, there are no direct observations showing that this observation does apply to man. There are some indirect observations based on the size of the nerve trunks both in the limbs and in the nerve roots, which seem to favor this, but he said he was careful to emphasize the fact that his observations had been made upon the frog. There is, however, at each turn a high degree of similarity in the arrangement of the nerves even between the frog and the higher vertebrates, and he feels very strongly that we shall be able to corroborate these relations in mammals and in man.

(To be continued.)