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B. EXTRACRANIAL LESIONS.

The extracranial lesions are, on account of their great frequency, of an eminently practical significance and of scientific importance, inasmuch as valuable information about physiological questions—that is, the course of the trophic and the gustatory fibres—may be gained from them if the individual cases are carefully observed and accurately recorded. We shall first treat of the diseases of the facial branches of the nerve, and again separate in our consideration the paralytic from the irritative affections.

1. Trigeminal Neuralgia—Fothergill's Face-ache—Tic Douloureux—Prosopalgia.

Variable in its degree of intensity, beginning with a moderate, dull, boring, but always distressing and uncomfortable feeling of pain, and sometimes reaching a pitch of severity experienced in no other kind of neuralgia, tic douloureux forms one of the most common affections of the fifth nerve. It appears, as a rule, unilaterally, and by preference fastens upon the first and second branches. The sensory division of the third branch seems, at least by itself, rarely to be the seat of the pain, whereas it is not uncommon for all three divisions to be simultaneously attacked.

Almost every patient gives a different description of his pain. One declares that it feels as if a red-hot wire was being driven into the bone, another as if the face was buried in a heap of stinging nettles, a third fancies that the nerves are being pierced with a sharp instrument, etc. Almost every case presents its own peculiarities as regards the frequency and duration of the paroxysms, between which there are often intervals free from pain, but the course of the disease follows no hard and fast rules. The tender points of Valleix (*points douloureux*) can almost invariably be demonstrated. Almost always there is one on the supra- and another on the infra-orbital foramen, a third over the exit of the subcutaneous malæ, a fourth over the mental foramen, and a fifth in front of the ear,

where the auriculo-temporal passes over the zygomatic arch. The so-called palpebral point on the upper eyelid, the parietal point on the parietal eminence, the labial point on the upper lip, and many others are not always present. Firm pressure on these points is always, even in the intervals between the paroxysms, disagreeable to the patient and even liable to produce an attack.

The neuralgia of the first division of the fifth nerve is mostly an affection of the supra-orbital nerve, with pain in the forehead, the nose, the upper eyelid, and the eyeball (ciliary nerves). The other terminal branches are hardly ever affected. The neuralgia of the second division attacks the cheek, the lower eyelid, the nose, and the upper lip, often also the upper row of the teeth (n. alveol. sup.) and the palate (spheno-palatine branch). The branch most commonly affected, sometimes also by itself, is the infra-orbital. The neuralgia of the third division embraces the lower jaw, the chin, the cheek, sometimes also the auricle and the external meatus. The tongue and the mucous membrane of the mouth may be affected by themselves (glossodynia), and this may give rise to the fear on the part of the patient that he has cancer or ulceration of the tongue (Lefers, *imagin. ling. ulcerat.*, Med. News, 1888, xi, 17; cf. also Bernhardt, *Neurol. Centralbl.*, 1890, No. 13). Other isolated affections of this third division are comparatively rare. The only exceptions are the n. buccinatorius, the affection of which manifests itself by pain in the anterior part of the ear, which radiates to the cheek (Tillaux), and the inferior alveolar branch; the latter is not rarely attacked separately, and the consequent toothache has often induced patients to have one tooth after another extracted—of course, however, without any improvement.

That the vaso-motor and the trophic fibres of the nerves are also at times implicated is evident from certain symptoms, viz., intense flushing, hyperidrosis, strong pulsation of the temporal artery on the diseased side, together with increased secretion of tears and saliva, affections of the hair, which has a tendency to turn gray and fall out, especially over the most painful places. Such symptoms are not uncommon. Herpetic eruptions, especially zoster ophthalmicus and frontalis of the affected side, have been repeatedly described.

Pathology.—Of the pathology little can be said with certainty. The thickening and swelling of the neurilemma, the

degeneration of the Gasserian ganglion and of the nerve trunks, the small inorganic concretions which have occasionally been seen on the neurilemma—all these are changes which have sometimes been observed, but which quite as often were absent. At all events no particular importance can be attributed to them. Whether cortical lesions and affections of the nuclei and the roots are capable of bringing on the disease we do not definitely know, yet such possibilities can not be excluded (cf. the case published by myself in the *Berl. klin. Wochenschr.*, 1887, 27).

The paper of Dana (*Journal of Nervous and Mental Diseases*, 1891, xvi, p. 54), in which he claims that disorders in the blood-supply, produced by arterio-sclerosis, are often the cause of the affection, is interesting; and it is very desirable that the vessels should be carefully examined in such cases. Thoma also calls attention to the fact that he has found diffuse arterio-sclerosis, which was more marked in the neuralgic area (*Deutsches Arch. f. klin. Med.*, 1888, xliii, 4, 5).

Course.—The course of the disease is on the whole extremely tedious, and attacks which harass the patient to the end of his days are to be observed here as in migraine, the only difference being that in the disease under consideration the sufferings of the patient are still more unbearable. The disease throws a shadow over his whole existence far more gloomy than in migraine, and so we can well understand why again and again he tries all sorts of remedies and frequently even the most heroic measures to relieve his pain at a time when a migraine patient would have given up all medicine and all doctors.

Treatment.—Unfortunately, here also therapeutics is often powerless, as has already been indicated by the remark that the disease is often of life-long duration. Hope of recovery is only justifiable in cases where we have an underlying disease, as, for instance, malaria, in which case the neuralgia is to be regarded as a symptom, or where local causes exist—for instance, bone diseases, the presence of foreign bodies, or neoplasms which can be removed, etc. Such cases will repay the efforts of the physician, and a cure can be effected by proper internal medication or by surgical interference. In cases, however, where a primary cause, which would furnish us with data for our treatment, can not be discovered—where we, therefore, are forced to experiment with the nervines and the so-called specifics—let us beware of raising our expectations too high, for too often

all our efforts will be in vain. Arsenic, zinc, quinine, the bromide and iodide of potassium, asafoetida, castoreum, valerian, and many other medicines now completely obsolete have been tried, and still to-day sometimes are tried at random. The one uses this, the other that drug; under favorable circumstances each one does good once, but rarely is the improvement lasting. Here also the most confidence may be placed in antipyrine and phenacetine, and, if chlorosis be present, in iron (best administered in the form of Bland's pills), quinine, arsenic, and iodide of potassium; if these leave us in the lurch we can resort to salicylate of sodium, 4.0–6.0 (ʒj–ʒjss) a day, in capsules, or to salol or gelsemium, giving the latter in the form of the tincture, and pushing it perhaps until slight symptoms of intoxication appear (twenty drops every two hours). I have used corrosive sublimate, 0.05 (five-sixths of a grain a day) in pill form, several times successfully. Of butyl chloral I am unable to say anything favorable (butyl chloral hydr., 7.5 (ʒjss–ʒij); glycerin., 20.0 (ʒss.); aquæ, 130.0 (ʒiv). Sig.: A tablespoonful every ten minutes). In all my cases it proved very unsuccessful; the same holds good for methylene blue, which was administered in capsules of 0.1–0.5 and 0.8 pro die (2–7–12 grs.). This drug has, besides, disagreeable effects upon the urogenital system, giving rise to strangury and pain in the glans penis, etc. Other anæsthetics, chloroform above all, do at least as much good, and the narcotics are decidedly better, as Trousseau has already upheld, who declared large, or we should rather say huge, doses of opium or morphine to be the only effectual treatment. Whatever we may think about morphine, in cases of tic douloureux, especially in severe instances, we can not dispense with it. The combination of morphine with atropine, or the alternate use of the two separately, has been recommended (Althaus); chloral hydrate alone, 4.0–6.0 (ʒj–ʒjss.) a day, is uncertain in its action, but in combination with morphia often acts very well. Cocaine may also be used externally or given internally (a teaspoonful of a one-half-percent solution three times a day). The so-called revulsives (daily repeated cold-water enemata (Gussenbauer), cold or warm poultices, sinapisms, superficial cauterization, the electric brush), often act splendidly where we want to produce temporary amelioration of the pain; but unfortunately this is only transient. The same is true of electricity, which may be used according to the polar method (steady application of the

anode over the painful place, cathode at some indifferent place, weak increasing and decreasing currents being used), or according to the method of direction of the current (descending steady current). Ziehl (Berliner klin. Wochenschr., 1889, 12) recommends the application of electricity for as long as an hour at a time. Galvanism to the neck has also been advised. The constant current may be given a trial, combined with the action of chloroform, as Adamkiewicz has proposed in his paper on cataphoresis. I have several times used the "diffusion electrode," which he recommends, quite successfully (cf. lit.). Hoffmann is also satisfied with the results, but thinks that these are not to be attributed to the electricity (Neurol. Centralbl., 1888, 21). The faradic brush, the unpleasant action of which may be somewhat mitigated by putting moist blotting-paper on the skin, is often very satisfactory, and I can recommend the strong cutaneous faradization very highly even during the paroxysms. Operative interference (neurectomy) has recently more and more, and justly so, fallen into disrepute. The results are often entirely negative, and where some success has been obtained with it this did not prove lasting. For an account of the method of resection the reader is referred to the surgical journals; the nervus buccinatorius is resected according to the method of Zuckerkandl (Arch. f. klin. Chirurgie, 1888, 37, 2). In order to avoid relapses it is necessary to consider the advisability of resecting neighboring nerves (Obalinsky, Wiener klin. Wochenschr., 1889, 41). Repeatedly the Gasserian ganglion has been successfully extirpated (Rose, in London, Lancet, 1892, x, 22, and Krause, Deutsche med. Wochenschr., 1893, 15). The same is true of the resection of the trigeminus from the foramen ovale (Sulzer, Arch. f. klin. Chir., 1888, 37, 3). Baths, especially at the non-medicated hot springs, a stay at the seaside or in the mountains, cold-water treatment, and vapor baths may be advised, but we are unable to state definitely which of these modes of treatment are indicated in any particular case.

Ætiology.—About the ætiology we know little worthy of mention. That heredity and exposure to cold have something to do with the disease we must admit; but this is not peculiar to neuralgia of the fifth. However, affections of the pulp of the teeth, which are determined by an examination of the sensitiveness to temperature changes (Boennecken, Berliner klin. Wochenschr., 1893, 41), and anatomical changes (exostoses, nar-

rowing of bony canals due to syphilis, etc.), are here frequently of moment. Age, sex, and occupation do not seem to exert any particular influence; still, the disease is on the whole very rare in small children, and if present it is always inherited.

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2. *Anæsthesia of the Trigemini—Paralysis of the Trigemini.*

Paralysis of the sensory branches of the trigemini is on the whole less frequently met with than neuralgia of the face. Only exceptionally are all the divisions (the motor portion of the third included) affected equally; but most observations go to show that, as a rule, only individual branches suffer, and these not in their whole extent, but only within certain areas. The smaller the number of fibres in the distribution of which anæsthesia obtains, the more peripheral is the seat of the cause (Romberg), and we may assume an affection of one whole branch to exist "where the loss of sensation is found not only in certain areas of the surface, but also in the corresponding cavities of the face" (Romberg). Whether the branch is affected before or after leaving the skull we have no means of deciding.

A lesion of the first division also causes anæsthesia of the surface of the eyeball. Since, in consequence of this, influences from outside (foreign bodies, dust, traumatism) are not per-

ceived, not infrequently a keratitis, which begins in the lower segment of the cornea, is developed. This may run into an inflammation of the whole ball and bring about destruction of the eye (*ophthalmia paralytica*). That, to explain this condition we must not assume a lesion of special trophic nerves has been shown by experiments on animals (Senftleben). An affection of the second division deprives the nasal branches of their function, and the nose becomes not only insensible to external touch, but certain pungent smells—as, for instance, that of

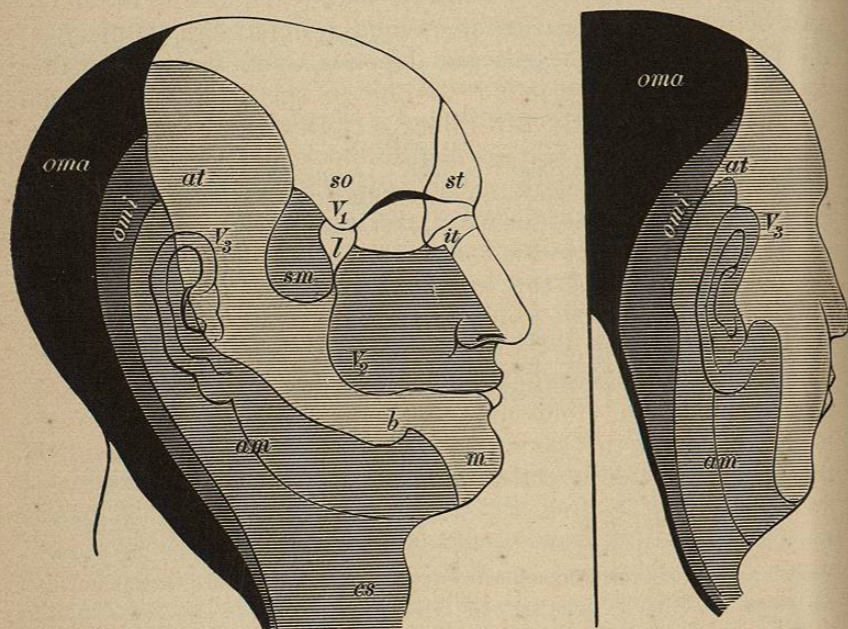


Fig. 12.—DISTRIBUTION OF THE SENSORY CUTANEOUS NERVES ON THE HEAD. V_1 , V_2 , V_3 , the three branches of the trigeminus. *at*, auriculo-temporal. *so*, supraorbital. *st*, supratrochlear. *it*, infratrochlear. *l*, lachrymal. *m*, mental. *b*, buccinator. *am*, auricularis magnus. *sm*, subcutaneous malæ. *oma* and *omi*, occipitalis major and minor. *cs*, superficial cervical.

snuff—are no longer recognized on the affected side. In lesions of the third division the corresponding half of the tongue, but only in its anterior two thirds, loses its sensation, and the patient has no longer any sense of taste in this area (*n. lingualis*); since, however, loss of taste in the anterior portion of the tongue has been observed in some cases where the function of the third division of the fifth was found to be perfect (Heusner), we can not exclude the supposition that the fibres of the

chorda tympani (or at least a considerable part of them) join the facial from the second division of the fifth. Certain it is that the fibres which pass to the chorda return again to (the second and third branch of) the trigeminus after having probably run with the facial as far as the geniculate ganglion. From Fig. 12 the distribution of anæsthesia over the skin of the face may be learned. Vaso-motor changes, subjective sensations of heat and cold, sensations of swelling, and disturbances in the movements of mastication and difficulty in opening the mouth (paresis of the external pterygoid and the anterior belly of the digastric), are sometimes met with (Müller).

The course of the disease depends upon the seat of the lesion. In peripheral affections the prospect for recovery is usually comparatively favorable; yet this is frequently only partial, and several of the qualities of sensation remain permanently lost, the sensibility in general is dulled, and tactile paræsthesias persist—in a word, recovery is imperfect.

The treatment chiefly consists of excitants, among which the most efficient is the application of the faradic and the galvanic brush to the skin. Transient improvement may be thus obtained after a short while in the peripheral affections. The electric brush is the best excitant for the skin, and is to be preferred to all liniments and the like, which are supposed to act in much the same way. Internal treatment, provided there be no definite underlying disease, is absolutely superfluous.

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3. *Trigeminal Cough.*

Finally, we may call attention to a reflex neurosis, which was first described by Schadowald, and then studied by Wille. This is a paroxysmal cough which, occurring in individuals whose respiratory organs are perfectly sound, is entirely due to an irritation of the trigeminal fibres distributed to the nose, pharynx, and the external auditory meatus. These two writers distinguish accordingly a nasal, a pharyngeal, and an auricular trigeminal cough, and declare the first (nasal) to be the most frequent variety. According to them also, this neurosis is by no means rare, and the possibility of its existence ought always to be thought of where we have to treat cases of an obstinate paroxysmal cough, which is liable to be produced by the action of pungent odors and by changes of temperature, and which is accompanied by hypersecretion of the nasal mucous membrane. The treatment consists in the use of the nasal douche, the application of weak induction currents directly to the nasal cavity, and the administration of potassium iodide. Further observations are still needed to decide whether we actually have to deal in these cases with a neurosis of the trigeminus, or whether the vagus has not something to do with the affection, or whether, finally, as Hack suggested, the erectile tissue of the nose is responsible for it.

Quite lately it has been claimed that peripheral irritation of the trigeminus (by inhalation of pungent vapors, new growths, etc.) may reflexly give rise to sensations of dizziness ("nasal vertigo," Joal). Until more confirmatory evidence is brought forward, it would be well to suspend judgment on this question.

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CHAPTER V.

DISEASES OF THE FACIAL NERVE.

THE facial nerve emerges at the base of the brain from the medulla oblongata by the side of the abducens and behind the trigeminus on the posterior margin of the middle peduncle of the cerebellum. The auditory nerve is situated close behind it, and between the two a separate bundle of fibres is placed—namely, a second root of the facial, the so-called nervus intermedius or portio intermedia Wrisbergii. With the auditory nerve the facial then passes forward and outward into the internal auditory meatus, at the bottom of which it enters through a small opening the Fallopian canal (cf. Fig. 15). In the hiatus of this canal it makes an almost rectangular turn (genu nervi facialis), passes backward and then downward, and leaves the skull through the stylo-mastoid foramen to divide inside of the parotid gland into the terminal branches, the temporo-facial and the cervico-facial, which form together the plexus anserinus major. At the so-called genu the nerve forms a ganglion-like swelling—the ganglion geniculi—from which the larger superficial petrosal nerve is given off (cf. diagram, Fig. 15). These are the fibres which communicate with the trigeminus, and have the function of gustatory fibres for the anterior two thirds of the tongue (cf. page 74).

The nucleus of the facial, a group of large multipolar ganglionic cells, lies four millimetres and a half beneath the floor of the fourth ventricle, in the region of the formatio reticularis, dorsal to the upper olive (cf. Fig. 13). From this illustration it is also apparent that the ascending root of the trigeminus has the emerging portion of the facial root to its mesial side, while the anterior root of the auditory lies external to it. The axis cylinder processes of the ganglionic cells of the nucleus are united in a larger fasciculus, forming the first part of the root (Ursprungsschenkel of Krause), which at the floor of the fourth ventricle becomes a compact bundle, the intermediate portion (VII, *a*). At the anterior end of the eminentia teres this is bent at right angles (genu cerebrale), and becomes the emerging portion (Austrittsschenkel) of the facial (VII), which