

FACIAL PARALYSIS.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL.

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THE three patients whom I present to you to-day illustrate three different forms of paralysis of the muscles of one-half of the face. If we study the course of the tract through which motor impulses travel from the cortex of the brain to the facial muscles, we will ascertain that the conducting fibres, springing from the facial centre at the lower extremity of the anterior central convolution, pass downward through the internal capsule, decussate at the upper border of the pons, and join the facial nucleus in the medulla. From this nucleus the facial nerve arises. It passes through the internal auditory canal with the auditory nerve, then through the aqueduct of Fallopius, and, emerging from the stylo-mastoid foramen just beneath the lobe of the ear, supplies most of the muscles of the face. The knowledge of the course of the nerve after it leaves the facial nucleus is important, as it enables us in many instances to locate the situation of the lesion with a considerable degree of accuracy. It is possible, in the great majority of instances, to differentiate clearly between facial paralysis due to lesions of the facial motor tract in the brain above the facial nucleus, and lesions affecting the nucleus itself or the facial nerve. It is also possible, if the lesion involves the facial nerve or its nucleus, to determine whether the nerve is affected after it leaves the skull or within the bony canal through which it passes, or where it lies on the base of the brain just after its superficial origin from the border of the pons.

CASE I.—The first case is a man, fifty years of age. He has suffered from two attacks of inflammatory rheumatism during the past eight years. On October 26, 1891, he awoke about six o'clock in



CASE II.—Facial paralysis due to a lesion of the facial nerve, showing inability of the patient to close the eye on the paralyzed side.



CASE I.—Facial paralysis from a cerebral lesion above the facial nucleus, showing ability of the patient to close both eyes.

the morning. He was then perfectly well, so far as he knew. He went to sleep again and slept perhaps an hour. This time when he woke up his face was paralyzed on the right side, and his speech was thick and indistinct, but there was no evidence of aphasia.

Comparing him with Case II., the woman who sits by his side, you will observe that the faces of both patients, while in repose, are perceptibly drawn to the left. Notice particularly that when I make a motion as if I intended striking him in the face he winks with both eyes, while a similar demonstration made before the woman's face is followed by winking in the left eye only. When he attempts to close the eyelids voluntarily you will observe that the lids of both eyes close completely and simultaneously; on the contrary, when the woman attempts to accomplish the same act the lids of the left eye close naturally, while those of the right eye do not close at all. With this single exception in the man's case, neither of them can voluntarily move the facial muscles on the right side. You will also note another point of difference. When I make a remark to him which he considers humorous he smiles distinctly with both sides of his face, thereby greatly diminishing the facial asymmetry. When the woman smiles only the left side of the face contracts, the right side remaining perfectly immobile, and thus the facial asymmetry is increased. Let me now call your attention to the difference in the electrical reactions of the muscles in the two cases. In the man's case, even after six months have elapsed since the advent of the paralysis, the muscles react readily to the faradic current and also normally to galvanism, while in the woman's case, though I am using as strong a current of faradism as she can bear, the muscles do not contract at all. You will observe, however, that they do respond to galvanism.

These three conditions in the man's case—the ability to close voluntarily the lids of both eyes simultaneously; the response of the paralyzed muscles to reflex action, such as laughter, when they cannot be made to move by will-power; and the ready reaction which results from faradic stimulation, even after the paralysis has lasted a long time—are characteristic features of facial paralysis due to a lesion in the facial motor tract above the facial nucleus, while in the woman's case the absence of these conditions shows conclusively that her paralysis is due to a lesion affecting the facial nerve.

I will now explain why the symptoms of facial paralysis due to an intracerebral lesion differ so materially from the paralysis associated with a lesion of a facial nerve. A cerebral lesion above the pons very seldom destroys all the motor fibres which supply the opposite side

of the body. Even in very severe cases of hemiplegia some of the muscles of the paralyzed arm and leg either escape altogether or else are very slightly affected. All the fibres going to join the facial nucleus are seldom destroyed by an intracerebral lesion, and it seems, from an anatomical arrangement of the fibres, that those which supply the upper portion of the face are the ones to escape injury. When the lesion is extensive, so that all the fibres of the cerebral facial motor tract are either injured or subjected to pressure by the hemorrhage, the resulting facial paralysis is complete for the time being, but in a few days, as the pressure is diminished by the absorption of the fluid portion of the clot, the paralysis of the orbicularis palpebrarum gradually disappears, and the individual will then regain the power to close the lids of both eyes, although the rest of the muscles on the affected side may be completely paralyzed.

When an individual receives a pleasurable sensation through the medium of his senses his facial muscles are apt to contract into what is termed a smile. This is an emotional involuntary movement. The impulses which govern it reach the facial nucleus through different channels, and may be transmitted even if the cerebral facial centre is cut off from the facial nucleus. But the integrity of the nucleus itself and of the facial nerve must remain unimpaired. Absolute freedom of these organs from disease is essential for the proper performance of any kind of muscular movement, either voluntary, emotional, or reflex. Hence, when facial paralysis is the result of injury of the facial nerve or its nucleus, a smile is represented only by the contraction of the facial muscles on the sound side, while in facial paralysis due to a lesion of the facial motor tract above the facial nucleus both sides of the face may smile, and yet the paralyzed muscles fail utterly to respond to the will.

The muscles contract properly to the electrical currents when the lesion is in the brain above the facial nucleus, because the facial muscles receive their nutrition from the cells in the facial nucleus, which, being uninjured, performs its nutritive functions properly, and hence the electrical reactions are normal. On the other hand, when the facial nerve is affected its power to conduct nutrition to the muscles is seriously interfered with. The muscles therefore degenerate, and, like all similarly degenerated muscles, they soon show the characteristic electrical reactions of degeneration.

Comparing these two cases of facial paralysis, therefore, we observe that Case I., in whom paralysis was caused by a lesion in the facial motor tract above the nucleus, can close the lids of both eyes volun-

tarily, and simultaneously smiles on both sides of his face when he sees or hears anything that amuses him; and that the paralyzed muscles respond normally to both faradism and galvanism. Case II., on the other hand, in whom the facial paralysis is caused by injury of the facial nerve, cannot close the eyelid on the paralyzed side; when she smiles the muscles on the sound side contract, while those on the opposite side are absolutely motionless. It is also observed that the muscles fail to respond to as strong a current of faradism as the patient can bear, although they will respond to galvanism. These three differential points will always enable you to distinguish facial paralysis due to injury of the facial nerve from the paralysis due to a lesion of the facial motor tract in the brain above the facial nucleus.

Let us now compare Case II. and Case III., both of whom are suffering from facial paralysis due to injury of the facial nerve, and let us see if we cannot locate the positions of the lesions in both cases.

Case II. is forty-two years of age. She has been a widow for fifteen years. She has had four children, all of whom died in infancy from contagious diseases. On January 1, 1891, her face suddenly became paralyzed on the right side, and sensibility on that side of the face was greatly diminished, but not entirely abolished. She observed for about a month previous to her paralysis that she had gradually been getting deaf in the right ear. After the paralysis the deafness increased rapidly, and in about two weeks hearing in the right ear was lost entirely. If you will examine the uvula you will observe it deviates decidedly to the left. I have already shown you, in comparing her with Case I., that the entire side of the face is paralyzed. She is totally unable to close the eyelid; she cannot smile with the paralyzed muscles, and the muscles show typical electrical reactions of degeneration.

Case III. presents exactly the same appearance as Case II. She cannot close the eyelid, cannot smile on the paralyzed side, and the muscles will not respond to the faradic current. She is about fifty years of age. Two months ago she got out of bed at two o'clock in the morning, and for about a quarter of an hour sat with her head out of an open window, watching something going on in the street. She then went to bed, and when she awoke again the right side of her face was completely paralyzed. There is no disturbance of hearing, no anaesthesia, the uvula hangs perfectly straight, and there is no loss of the sense of taste. In fact, there is no symptom whatever except the complete paralysis of the facial muscles on the right side of the face.

In analyzing the symptoms of Case II. so as to locate the lesion, we will begin from the periphery and work inward. The muscular

paralysis might be due to a lesion affecting any part of the facial nerve but not the facial nucleus. It is probable that the fibres which supply the orbicularis oris arise from the hypoglossal nucleus and join the facial nerve after its exit from the medulla. Hence a lesion of the facial nucleus would cause paralysis of all the facial muscles *except the mouth*, which is not the case in the present instance. Hence the facial nucleus must be intact. The paralysis of the right half of the uvula would indicate a lesion of the nerve either in the aqueduct of Fallopius, where the petrosal nerves which supply the palate are given off, or else back of this point. We are warranted in locating the lesion back of this point because loss of hearing has accompanied the paralysis. The auditory nerve accompanies the facial nerve through the auditory canal. Disease of the auditory canal would cause both facial paralysis and deafness. In this case there is no history of any such disease, and, besides, a lesion in the auditory canal would not cause facial anaesthesia, which is, of course, in this instance due to an affection of the fifth nerve. Farther back than the auditory canal on the base of the brain the auditory and facial nerves lie side by side, and but a short distance from them is the root of the fifth nerve. It is in this situation, and in this situation only, that a single lesion could produce complete facial paralysis, facial anaesthesia, deafness, and paralysis of one-half of the uvula. Meningitis and growths of various kinds are the usual lesions which cause this form of facial paralysis.

In Case III., on the other hand, there are no symptoms, as I have just pointed out, except the paralysis of the facial muscles. This is the most common form of facial paralysis we meet with. It is caused by an injury to the facial nerve, usually inflammation, which occurs just within the Fallopian canal, but not far enough back to implicate the petrosal nerves, otherwise there would be paralysis of the palate, as I have just shown. Exposure to cold is the usual cause of the paralysis. It is so in this case. The patient sat for some time with the side of the face exposed to a draught of cold air. Inflammation of the sheath of the nerve followed, the sheath became swollen, and, as the nerve at this point is situated within a canal with firm walls, pressure must necessarily have been exerted inward against the nerve, which was thereby compressed, and consequently incapacitated from transmitting motor impulses.

The prognosis of facial paralysis is influenced by the situation and nature of the lesion and by the severity of the injury and the consequent neural and muscular degeneration. Above the facial nucleus in the cerebral hemispheres the facial motor tract is liable to be damaged,

principally by hemorrhages and tumors. In either case, if the motor path is simply incapacitated by pressure from transmitting motor impulses, the resulting paralysis will disappear if the removal of the pressure can be accomplished. Thus the prognosis is more favorable when the paralysis is due to a syphilitic growth, which it is possible to absorb, or to a small hemorrhage, the fluid part of which soon becomes absorbed.

In ordinary neuritis of the facial nerve the prognosis is excellent. Sometimes the pressure from the inflamed sheath is so great that extensive degeneration of the nerve occurs, and consequent degeneration of the facial muscles follows. In such cases the disease may last for several months, and may in rare instances become permanent. The electrical reactions of the muscles are of great assistance in determining the prognosis when the paralysis is due to nerve-injury. If the muscles respond to faradism, the injury is slight, and will probably be recovered from in a few days. If faradism fails to cause muscular contraction, while galvanism is quite successful, the case is more severe, and will probably last from one to three months. If the muscles will not respond to either current, the prognosis is bad: the disease may last from four to eight months, and in some instances will be permanent.

The treatment likewise varies with the nature and seat of the lesion. Facial paralysis due to a hemorrhage within the hemispheres is not materially affected by treatment. So much of the paralysis as depends upon pressure from the hemorrhage will disappear as the fluid part of the clot becomes absorbed. It is believed by many that the iodide of potassium accelerates the resolution of the clot and hastens the absorption of its fluid part, but there is little or no evidence to substantiate this theory. If there is any likelihood that the lesion is syphilitic, the iodide of potassium and the bichloride of mercury are both indicated. Case II., in which we have diagnosed a lesion at the base of the brain, involving the facial, auditory, and trifacial nerves, is probably suffering from a syphilitic growth. There is no history of a primary lesion, but secondary symptoms are plentiful. She has been taking iodide of potassium in increasing doses, and bichloride of mercury, for the past ten days. Improvement has already begun. If you will observe closely you will see that when she attempts to close the right eye a slight but distinct muscular contraction follows. This was not apparent when she first came under observation.

Electricity applied to the muscles in all forms of facial paralysis is beneficial. Not that it exerts any curative effect upon the lesion, but simply on account of its nutritive influence on the paralyzed mus-

cles. When the nerve is injured, the nutrition of the muscles is interfered with, and they undergo atrophy.

Electricity in the form of faradism, if that current will contract the muscles, or galvanism, if it will not, unquestionably delays this atrophic change, so that when the nerve recovers from its injury the muscles will be in such a good state of preservation that complete recovery soon follows. On the other hand, if electricity is not used the muscles atrophy rapidly, and in severe cases may almost entirely disappear. In such cases it will be months before recovery takes place. The positive electrode should be placed just in front of the lobe of the ear, and the negative electrode applied successively to the paralyzed muscles, care being taken to interrupt the current so as to make the muscles contract with each interruption. Strong currents should not be used, on account of the likelihood of inducing severe vertigo from the action of the electricity upon the brain. As a rule, the current from six or eight cells will be sufficient. Application should be begun as soon after the advent of the paralysis as possible, and should be made certainly daily, and twice a day if possible, and from ten to fifteen minutes at each *séance*. A small blister should be applied behind the lobe of the ear, or the skin in the same location may be lightly cauterized. Counter-irritation is quite serviceable when applied directly over the seat of the inflammation. This may be accomplished by touching the skin behind the lobe of the ear lightly with a cautery, or else by applying a small blister to the same locality.

The paralyzed muscles are further weakened by being continually pulled and stretched by the contraction of the muscles on the sound side of the face. To overcome this I use a simple apparatus consisting of an S-shaped hook, one end of which fits in the angle of the mouth on the paralyzed side. To the other end of the hook an elastic band is attached which can also be fastened to the ear by means of a loop of cord. By regulating the length of the elastic the tension on the muscles is greatly diminished. A very good hook can be made by putting a piece of whalebone into hot water for a few minutes, then bending it to the desired shape, and tying it. When cold and dry it will retain its form. This apparatus should be worn all night, and also during the day when practicable. Medicinal treatment, except when syphilis is the cause, is ineffectual. We are obliged to wait for nature to remedy the injury. But we can render some assistance by applying counter-irritation over the seat of the lesion, keeping up the nutrition of the muscles by electricity, and relieving the strain on the paralyzed muscles by the apparatus just described.

Pediatrics.

THE SURGICAL TREATMENT OF PLEURISY AND EMPYEMA IN CHILDREN.

CLINICAL LECTURE DELIVERED AT THE MEETING OF THE BRITISH MEDICAL ASSOCIATION, BOURNEMOUTH.

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PLEURISY.

GENTLEMEN,—The first part of my subject may be passed over in a very few words; because in dealing with the surgical treatment of pleurisy in children it is only necessary to refer to the operation of aspiration, an operation so simple that it is even included in the practice of the most orthodox Fellows of the College of Physicians. And for this reason it happens that a surgeon has, with exceptional opportunities, but little familiarity with it. Still, he is not unfrequently asked to do it, and sometimes to express an opinion as to the advisability of its being done. To this I always answer that I have never seen any harm result from it, and that I consider it not only advisable but indicated:

1st. When the fluid—whether in large or small amount—shows no tendency to become absorbed, and especially if the temperature keeps above the normal; and

2d. When the fluid is in sufficient quantity to interfere with the action of the heart or the respiration. It must be remembered that the extent of the dulness and the displacement of the heart give a very imperfect indication of the amount of fluid in the chest, for, if the lung on the affected side be consolidated, a small amount of fluid may cause more displacement than a large quantity where the lung is healthy enough to be capable of considerable compression; but, fortunately, under these circumstances the withdrawal of a small amount of fluid gives as much relief as the evacuation of a large quantity would if the lung were much collapsed.