RESECTION OF SECOND AND THIRD DIVISIONS OF FIFTH NERVE AT THE FORAMINA ROTUNDUM AND OVALE.¹

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At a previous meeting of this Society, I reported three cases of resection of the third division of the fifth nerve at the foramen ovale. Since that time I have operated on two patients suffering from intense facial neuralgia, in both of whom the second as well as the third divisions being involved, I removed both nerves at their exit from the skull. I wish, in this paper, to call attention to the comparative ease with which both nerves may be reached through a single external incision, and also to speak of certain variations in the anatomy of the bony structures met with during the operation. Though these variations have been described by a few anatomists, I do not find them referred to by surgical writers; and without a knowledge of their existence, the operator might be greatly puzzled and hampered.

The method chosen for reaching the foramen ovale I have described elsewhere, and the incision through the origin of the temporal muscle and zygoma, given by Salger,² is the one that seems to me the best, after five operations on the living, and a large number of experiments on the cadaver.

The first step in the operation, namely, turning down the flap with temporal muscle, zygoma and pterygoids, is simple enough, though the hæmorrhage is always severe and only controlled by packing with sponges and compression with spatulæ. When the external pterygoid plate is reached, and the soft parts are pushed back with the finger or blunt instruments, the anatomical variation alluded to may be encountered, as happened in one of my cases. As a general rule, there is a considerable space — enough to admit the end of the index finger — between the posterior border of the external pterygoid plate and the spinous process. In looking up the anatomy of the operation on various dry skulls, I was struck by the great difference in this space in different individuals, and in a skull which I brought from Paris I found that there was actually a bony bridge from the plate to the spinous process. This bridge is found, according to Civinini, Grüber, Henle and others, in a certain number of skulls, (Grüber says one in fourteen), and is simply a bridge of bone instead of the more usual ligament (ligamentum pterygospinosum) which occupies this position. Hyrtl describes also a bony bridge forming the "porus crotaphiticobuccinatorius," through which pass the motor divisions of the inferior maxillary nerve. The variations in bony and ligamentous structure, and their relations to the nerve and its branches, are fully described by Von Brunn,³ and a minute description of them is unnecessary here. In a report on the "Progress of Anatomy," by Dr. Dwight, recently published in this JOURNAL,⁴ there is an account of these variations. It is sufficient for the surgeon to know that such ligaments always, and bony bridges sometimes, occur in this region, and that in one-third of the cases the main divisions of the nerve are divided by such structures.

¹ Remarks made at the meeting of the Boston Society for Medical Improvement, March 23, 1891.

² *Wien. med. Woch.*, 1887, xxxvii, 461.

³ *Anat. Anzeiger*, 1891, vi, 967.

⁴ Vol. xxiv, p. 555.

If, then, on reaching the external pterygoid plate the space between it and the spinous process is very small, or they are connected by a bony bridge, it is necessary to use either a chisel and cut through the obstruction, or to break it away with a blunt instrument until the finger passes easily to the foramen ovale, which is recognized by touch.

This bony bridge I have seen six times in about 125 skulls examined. Three of these were in dry skulls, two were in the cadaver, and one in the living patient. In one cadaver the bony bridge separated the divisions of the nerve trunk; (lingual, inside; inferior dental, etc., outside) and in the other, observed by Dr. Dwight, in a girl sixteen years of age, the nerve trunk was on the outside. In my patient, I was unable to decide definitely the relation, on account of the bleeding, but I think that the bridge separated the inferior dental and lingual branches.

Having a patient with a severe neuralgia in the second as well as third divisions of the nerve, I made several dissections on the cadaver with the idea of reaching also the foramen rotundum through the external opening previously described. I found that by separating the attachment of the external pterygoid muscle from the external plate until the pterygo-maxillary fissure was reached, the internal maxillary artery was exposed and easily tied, and then, in most cases, the nerve could be drawn out with a blunt hook of proper shape, seized with strong hæmostatic forceps, and easily divided with a curved tenotome at the foramen rotundum. The whole contents of the sphenomaxillary fossa, is easily separated by a fine blunt instrument, and by means of the hæmostatic forceps the branches of the nerve are twisted out; by this method a considerable portion of every branch of the nerve, also Meckel's ganglion and its connections, are removed.

In some cases a very marked projection at the anterior end of the pterygoid ridge (tuberculum spinosum — McAllister) prevents easy access to the sphenomaxillary fossa, and it is necessary to remove it with the chisel. This may be done without danger, as it represents only a thickening of the bone at this point, and not a deepening of the middle fossa of the skull.

After having performed the above operation, my attention was called to a very similar one, the nerves being reached through an incision under the zygoma. This method does not seem as anatomically correct as the one described, as there is greater danger of wounding the superior branches of the facial nerve, and the soft parts are divided at a point where their correct apposition after the operation is more difficult. The scar also is more prominent than in the temporal incision, of which all but a part of the anterior limb is covered by the hair. The temporal incision is not as direct perhaps, but it gives plenty of room for operating, and the nerve is as easily exposed as by the other operations.

The earlier methods of reaching the foramen ovale I have not described, as I see no reason why any one who has sufficient anatomical and surgical skill to do the operation, should divide the lower jaw at any point, when it can be reached without. The operation is a somewhat tedious one, as much of the hæmorrhage has to be stopped by pressure, and sometimes the bleeding is very profuse.

The paralysis and contraction of the muscles of mastication, described as following excision of the third

division, has caused little discomfort in the cases I have operated upon. The jaws should be opened widely every day after the first week, and wedges used by the patient, if necessary. The very slight stiffness is a small matter to the patient, when compared to his previous intense pain.

As regards the methods of reaching the foramen rotundum and Meckel's ganglion, by trephining the antrum, or resecting the upper jaw (osteoplastic), I can see no reason why they should be chosen in preference to the operation described, even though the neuralgia is limited to the second division. The removal of the nerve in the orbit certainly cannot reach the posterior dental branches, which so often seem to be the first ones affected by the disease.

An operation still more radical than resection of the nerve trunks at the base of the skull has been performed—resection of the Gasserian ganglion.⁵ In none of my cases has the supraorbital branch been involved; and as there is apparently danger of ulceration of the cornea and loss of the eye from removal of the ganglion, I have considered it best not to undertake it.

The following cases were seen by Dr. J. J. Putnam, who advised resection of both the second and third divisions, as both were involved. These cases, added to those previously reported, make six in which I have resected the third division at the foramen ovale.

CASE I. Patient of Dr. Sylvester, Natick; man; age sixty-seven; severe facial neuralgia for five years. When first seen it was very severe, the most painful points being on the temple (auricula-temporal) and near the nose on the cheek (infraorbital). He was absolutely unable to work for three years.

The temporal incision was made, and on reaching the external pterygoid plate, the bony bridge (pterygo-spinosum) was found, which was broken through, together with a portion of the pterygoid plate. The nerve was divided at the foramen ovale, and the distal end twisted out. After tying the internal maxillary artery, the "tuberculum spinosum" was chiselled off, and the trunk of the superior maxillary nerve raised with a blunt hook. The contents of the sphenomaxillary fossa were then freed from the bone, an opening being accidentally made into the posterior nares through which air bubbled as he breathed. The distal end of the nerve trunk was forcibly twisted out, as were any filaments remaining in the fossa.

The wound required no packing after the operation, and on the removal of the dressing, in a week, was found entirely healed. (Patient was shown at the meeting, four weeks after the operation. Now, three months after operation, there is no pain, and he is able to work.)

CASE II. Kindly referred to me for operation by Dr. Homans, at the Massachusetts General Hospital. Man; sixty-two; more or less pain for years, but very severe for a year. When first seen had most severe form of epileptiform neuralgia over the area supplied by the second and third divisions. This operation was much like the previous one, except that there was no "tuberculum spinosum" to be removed, the nasal cavity was not opened, and the foramen pterygo-spinosum was not present, though the pterygoid plate projected so far backward that its posterior edge had to be cut away. There was considerable hemorrhage, and iodoform gauze was packed in the

bottom of the wound. The gauze was removed in forty-eight hours. No suppuration. There was absolutely no pain from the time of operation until the patient's discharge from the hospital. I think that nothing more favorable can be said of so severe an operation than the statement of the patient, that he "would rather go through the operation any time than have the old pain for twenty-four hours."

CASE III.⁶ German, male, age sixty-four. Severe epileptiform neuralgia of second division; slight neuralgia of third division. Referred to me for operation by Dr. C. J. Blake. Operation as in last two cases. Hemorrhage severe; wound, packed with iodoform gauze. Recovery rapid, and relief from pain immediate and complete. In this case there was some pain and roaring in ear on side operated upon, which on examination by Dr. Blake was found to be due to hemorrhage into membrana tympani. This symptom was present in one other case, and, as in this, was transient.

(August 10th. I have examined two of the above cases within a few days; and in both there is no pain. Case I is able to work regularly, which he has not done before for years.)

OTALGIA.¹

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THE original use by earlier writers, (Itard and Bonafant, for instance) of the term *Otalgia*, as meaning pain in and about the ear, of either inflammatory or the less understood reflex origin, has, with the better definition of causes, gradually given place to more limited uses, until in its later definition and with the enlargement of our nomenclature, it means neuralgia of the ear itself, or "pain in the course and over the distribution of a nerve in the ear without fever."

In this sense neuralgia of the ear is, even with the broader definition of Roosa, an extremely rare disease, and is usually of general or immediate reflex origin, varies both as to time and degree in its manifestations, and is therefore frequently simulative, and can be differentiated from the pain due to a local inflammatory process often only by the most searching examination.

Of the neuralgias in and about the ear so completely defined by Dr. Green in his paper before the American Otological Society, 1874, the term *otalgia* would, most exclusively considered, include only neuralgia of the auricle, and external auditory canal, and of the middle ear, the correlative nerve supply of these parts being such as to afford ample opportunity for pain of purely reflex origin without reference to the possible causative trophic changes in the tissues of the ear itself, first adequately described by Dr. Green in the paper mentioned, and which should not be included here if we wish to keep to the more precise definition. This nerve supply includes, for the outer ear, nerves derived from the third cervical, the trigeminus and pneumogastric, and, for the middle ear, trigeminus, facial, glosso-pharyngeal, pneumogastric and great sympathetic, and in addition the tympanic plexus.

In the neuralgias both of the external and middle ear the pain may be divided into two classes, the persist-

¹ Read before the Boston Society for Medical Improvement, March 23, 1891.

² Operated upon after this paper was read.

⁵ Rose: *Lancet*, 1890, II, 914.