(u) **REMARKS** ✓
ON
**THE VARIOUS SURGICAL PROCEDURES
DEvised FOR THE RELIEF OR CURE
OF TRIGEMINAL NEURALGIA
(TIC DOULOUREUX).**

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ALL previous operations for trephining the jaw fall under the disadvantage of not complying with all the above operative considerations or of not removing the nerve before its entrance into the bony canal—in my opinion a *sine quâ non* for a successful result. The operation known as Paravicini's had the further disadvantage that the wound of necessity became septic. The operation which I advise and have performed since 1886 is carried out as follows:—

The skin having been first shaved and washed with soap and water, is covered for twenty-four hours with a dressing of lint soaked in 1 in 30 carbolic solution. Just before the operation it is finally sponged with warm lotion, and the external auditory meatus, after being thoroughly cleaned out, is rendered more antiseptic by the insufflation of powdered boracic acid, or is packed with antiseptic wool or soft gauze. The patient is anaesthetised, preferably with chloroform, so as to diminish facial congestion, although ether has frequently been given for me in this operation without much inconvenience. An incision is then made, (See Fig. 1.) beginning above the upper border of the root of the zygoma and carried through the skin and superficial layer of fat only, straight down the front of the tragus and following the contour of the jaw behind the angle forward just below the lower border of the body as far as the facial artery. The triangular flap thus marked out is then raised, the knife cutting the layer of fat and superficial fascia which lies immediately over the deep masseteric fascia. In this latter ramify the branches of the facial nerve. The flap is to be drawn forwards and upwards with suitable traction until the anterior border of the masseter is reached, and the edge of the parotid and the lower border of Stenson's duct are clearly defined. The degree to which the parotid gland covers the masseter muscle varies, of course, in different individuals, but this is of no consequence. What does matter is that sometimes collecting tubules of the lower lobules run up towards Stenson's duct just within the anterior border of the gland, covered only by a thin layer of the parotid fascia. Unless care be taken in defining the edge of the parotid or the fascia left uninjured in the next step of the operation, one or other of those tubules may be divided or torn, and subsequent annoyance may be caused for some days by a flow of saliva through the track of the drainage tube.

The next step is to divide the fascia, muscle, etc., between Stenson's duct and the highest branch of the facial nerve. The nerve branch and duct being obvious, the masseteric fascia is split horizontally between them over the whole breadth of the muscle. (See Fig. 1.) In doing this the branches of the transverse facial artery will probably be wounded; if they are tied at once they will give no further trouble. The fascia is then seized with dissecting forceps, and undermined all round with the back of a knife or some blunt instrument. It has been recognised for some time that if a nerve in its continuity be pulled by a small blunt hook, the point of traction being so narrow many nerve fibres may be seriously damaged, giving rise to subsequent paralysis. It seemed to me that this could be avoided by employing retractors which should have a convex outline towards the structures they were sepa-

rating, so that the nerve they are drawing aside should slip round them as on a pulley. A similar retractor was suggested by Mr. Morris for pushing aside fat, etc., in operations on the kidney. The concave side being nickelised acts as a reflector, carrying the light to the bottom of the wound. With such retractors, and with the aid of a blunt instrument, the hole in the masseteric fascia can be steadily widened until it is about 3 centimetres in diameter. The parotid gland should now be retracted towards the ear, so that the finger can freely detect the posterior border of the jaw. The masseter muscle is then to be divided, preferably with scissors, on the jaw for the posterior two-thirds of its extent. The rapid oozing from the branches of the masseteric artery can be stopped at once by the application of a small sponge with some very hot lotion, though the arrest of the bleeding is especially provided for by the pressure of the retractors. The periosteum of the jaw is then peeled off, together with the superjacent muscle, until the finger and the electric light (which is absolutely essential for the success of the operation and should be worn on the forehead) have made perfectly evident the sigmoid notch, the posterior border of the coronoid process and the neck of the jaw.

The small wound in the muscle should then be plugged with a piece of hot dry sponge for a moment while preparations are made for dividing the bone. Now, this division consists practically in extending the sigmoid notch down as low as the upper orifice of the dental foramen. The dental foramen is situated about opposite to the point where the masseteric ridge—which is really, of course, a continuation of the outer border of the neck of the jaw—reaches the middle of the vertical ramus. Although arbitrary measurements are dangerously untrustworthy, it may, perhaps, be better to mention that this point in the adult is usually from 12 to 15 millimetres (measured in the line of the ramus) from the bottom of the sigmoid notch. To prevent possible fracture of the jaw and to aid subsequent division of the same with bone forceps I think it best to cut out the U-shape required by first marking with the drill the presumptive position of the dental foramen, then carrying up on each side at the proper distance a row of holes, made with a drill, completely but only just penetrating the bone. (See Fig. 2.) These holes are best drilled with the central pin of Farabœuf's trephine, and then a small centimetre disc of the jaw should be taken out opposite the foramen. If this be done just at the opening of the foramen the periosteum on the inner side of the jaw appears, and on its division the inferior dental artery comes into view, while lying behind and posterior to it is the inferior dental nerve. If the nerve is not seen at once it is probably just under the posterior border of the trephine opening, and gentle search with the seeker will reveal it. A reliable silk ligature may, with advantage be looped round it at this stage. The rest of the bone marked out by the drill holes should next be removed *lege artis*. Curved bone forceps of patterns made for me by Mr. Hawksley, of Oxford Street, I find useful for this purpose.

The internal maxillary artery giving off the inferior dental branch is now seen, and if it is large and the walls degenerated so that it will not stand much traction it had better be divided between two fine ligatures, and the ends pushed out of the way. (See Fig. 2.) A quantity of loose yellow fat is now seen filling the bottom of the wound and if it interferes with the next step some large lobules of it may be quickly extracted with the dissecting forceps. The inferior dental nerve, secured by the ligature previously passed round it, should now be divided at its lowest part and raised, while the fat, etc., is pushed away from around it with a conveniently stiff and narrow retractor. In doing this it is traced upwards to the point where it is coming from beneath the external pterygoid muscle. This latter is also to be levered upwards with the retractors, and by this means the nerve can be followed out to within about a centimetre of the foramen ovale. It should then be cut as high as possible and the piece removed. During these manipulations the lingual nerve may have appeared in sight, but as a matter of fact it lies half an inch deeper than the inferior dental, in the line vertical to the ramus, at a point just above the dental foramen, consequently search must be made for fully this depth if it should not have been found before. A large

length of it is then removed in the same way as from the inferior dental. The wound is then sponged out with warm sublimate solution, all bleeding points, including the smallest, ligatured with fine catgut, the whole thoroughly dried and the smallest drainage tube laid from the bottom of the hole to just above the lower angle of the jaw and the skin edges very carefully approximated with horsehair stitches at intervals of a centimetre. A light dressing of soft gauze and alembroth wool is then fixed on with soft muslin bandages. The patient usually is fed with spoon diet and custard pudding, etc., for five or six days, and is then given pounded chicken and fish and later mince meat; provided the wound runs its proper course it is very remarkable to see how extremely little disturbance is caused to the eating.

A feature common to all neuralgic cases and of practical importance is the furred condition of the mouth owing to the impracticability of cleansing it during the period of pain. Immediately after the operation, as it gives immediate and complete relief, this can be at once carried out by judiciously wiping out the mouth with a slender stick around one end of which some cotton wool has been twisted and wetted with warm boracic lotion. The drainage tube should be removed in twenty-four hours and an occlusive dressing applied, which need not be taken off, unless uncomfortable, until the stitches are removed, seven or nine days after the operation. In one or two cases where the patients have been nervous and not given the jaw free play, which can be allowed after the first fortnight, they may, if this is not seen to, experience some stiffness, and in one case, when I only saw the patient three times, I had to give a little laughing gas, six weeks after the operation, and gently open the jaws to their full extent with a gag, which of course was easily done. After everything is perfectly healed, partly from a little accumulation of exudation in the wound in the tissues of the cheek, the cheek of the operated side appears fuller than the other, but this is no disadvantage, as was shown long ago by Mr. Adams, such exudation (if not inflammatory, that is, suppurative) doing good service in preventing any falling in from loss of substance, etc.

Believing strongly in the common origin of this evil in cold, I think it is a wise precaution to advise the patient to wear a slight protection over the seat of operation, in the shape of a silk covered guard if a male, and padded bonnet strings if a female. As these patients are usually reduced before operation to great straits by inability to feed themselves, loss of sleep, and the depression produced by the dreadful pain, they should always, if possible, be sent away afterwards to a warm seaside place, sheltered from the north and east such as Bournemouth etc.

The fact of cases having been seen in which the pain recurred after peripheral operation on the inferior division, suggested the adoption of a method which provides for the removal of this division at the foramen ovale itself. The first apparently to reduce this to a method was the elder Pan-

coast, of Philadelphia.³¹ He carried out such an operation as follows:—

A trap-door incision was made in front of the parotid and above Stenson's duct, down to the bone immediately over the coronoid process and ramus of the lower jaw, uniting those by a cross cut of equal depth on the ramus. The flap, which included the masseter, was dissected up, the temporal tendon cut from the coronoid process and pushed up under the zygoma, and the coronoid removed at its junction with the ramus. The space leading to the pterygo-maxillary fossa was now exposed, and the forefinger was passed deeply into it. The internal maxillary artery was separated and tied, the origin of the external pterygoid exposed and cut away from the wing of the sphenoid, and the nerve exposed as it emerged from the foramen ovale. Half an inch was cut out

of the main trunk and out of each branch, and the wound closed.

By the same operation the second division can also be got by means of an instrument carrying a ligature into the pterygomaxillary fossa which the nerve crosses.

Crédé³² made a flap with the angle upwards, sawed twice through the zygoma and drew it away with the skin and muscle (masseter), the lower jaw and temporal muscle were strongly retracted, the periosteum raised from the base of the skull and the nerve thus reached. This is a modification of Lücke and Lössen's method.

Krönlein³³ devised an operation, the object of which was to reach both the foramen ovale and the foramen rotundum. It consisted essentially of a modification of Pancoast's operation, together with a modification of that on the second division of the nerve with which Lücke's name is associated. To avoid Stenson's duct he made a skin flap with its base upward between the border of the orbit and the tragus. He then cut, not the masseter as Pancoast did, but he detached the temporal fascia from the zygoma, resected the latter, so that it could be drawn away, separated the coronoid process, and reflected it upward. The internal maxillary artery was then tied, the external pterygoid muscle separated, and the nerve exposed at the foramen ovale. The foramen rotundum was reached by Lücke's method, and the second division exposed in the same way.

Salzer³⁴ introduced a modification of Pancoast's which I have already referred to, and is undoubtedly the operation which recommends itself as the best means of reaching the foramen ovale. His directions are as follows:—Mark in front the lower and hinder border of the malar bone, and behind the under border of the zygomatic process of the temporal, about a finger's breadth in front of the tragus. Between these points make a curved incision convex upwards, which at its highest point reaches about a finger's breadth above the zygoma. In this cut are divided skin, temporal

Fig. 1.—Partly diagrammatic. Dissection of parotid region in a male subject to show the parts met with in the operation referred to in the text, for resection of portions of the inferior dental and lingual branches of the inferior division of the fifth nerve above the dental foramen. The thick black line shows the position of the skin incision, carried, as explained, only through the skin and fat. The flap of skin and fat is turned forwards and can be readily drawn aside so as to expose the anterior border of the masseter. The short line in thick dashes on the masseter indicates the incision to be made in the masseteric fascia. The branches of the facial nerve are seen lying in the masseteric fascia. The coarsely dotted line shows the outline of the jaw. Note especially the situation of the sigmoid notch.

³¹ Philadelphia Medical Times, 1872.

³² Verhandlung der deutschen Gesellsch. f. Chirurg. IX Congress, 1880.

³³ Zeitschr. f. Chirurg., 1884, xx, p. 84.

³⁴ Langenbeck's Archiv für klin. Chir., 1888, 473.

fascia, temporal muscle and the periosteum at both roots of the zygoma. Then the spot at which the zygomatic process of the temporal bone passes into the tuberculum mandibulare is freed and sawn through. To be able to turn down the soft parts attached to the zygoma it is necessary to detach the temporal muscle from the skull at its insertion. Then work along the base of the skull with a blunt instrument to avoid entering the joint or provoking bleeding. The nerve cannot be missed if the corner bounded above by the base of the skull and below by the articulation of the jaw be adhered to. Electric light is necessary, and all the different parts of the nerve can be seen. The mouth should be kept slightly opened so as to keep the coronoid out of the way, and the nerve is divided by pressing a tenotome along the artery and nerve to the foramen ovale.

An operation has been described, independently, by Mikulicz³⁵ and Obalinski,³⁶ with the view of exposing the third division, but as the method proposed by them involves the division of the jaw and does not permit of such easy access to the second division, it is not to be compared for utility to the valuable operation of Salzer.

In three cases, as described below, where I have observed recurrence of the neuralgia after removal of a considerable portion of the inferior dental nerve through the enlarged sigmoid notch, as described above, I have found that the Pancoast-Salzer operation with slight modification, afforded a very useful means of obliterating both the second and third divisions of the fifth nerve, not merely at the base, but actually within the skull itself. In each case I have made a convex flap, the incision being carried upwards from the root of the pinna across the middle of the temporal fossa, and then joining the ridge and following that down behind the external angular process and margin of the orbit to terminate just below the middle of the malar bone. This incision is carried down to the bone throughout, except at the fore part of the temporal fossa. The flap is then turned downwards, including skin and superficial fascia and fat only, as low as the centre of the zygoma. The deep fascia covering the temporal muscle is then best divided by an incision running parallel to the margin of the orbit and upper border of the zygoma, and at about 1 centimetre from these. The upper part of it is then turned up and the temporal muscle exposed. The next step is to divide the malar bone and the root of the zygoma so as to turn that process downwards with the masseter attached. This is best done by sawing vertically through the malar bone in a line with the posterior margin of the orbit with an Adams's saw, which can be pushed underneath the skin and periosteum if the latter be separated a little. The posterior extremity of the zygoma should also be sawn through immediately in front of the capsule of the joint. The

complete division of the bone is then best effected in each case with sharp forceps. The zygoma being now forced downwards, carrying with it Stenson's duct and the branches of the facial nerve uninjured, the coronoid process of the jaw appears with the temporal muscle attached. The upper portion of the coronoid process should be cut off with strong forceps, and may be conveniently removed, together with the lower portion of the temporal muscle, since this latter will degenerate after the removal of the branches of the inferior division. The oozing in this operation is usually very free, but is easily controlled by irrigation with very hot aseptic solutions and by firm sponge pressure.³⁷

The external pterygoid now exposed is detached from the sphenoid with an elevator and pushed down until the foramen ovale is completely laid bare, with the branch issuing from it. In two cases I have proceeded with a suitable long handled trephine³⁸ to remove the bottom of the middle fossa of the skull between the foramen ovale and the foramen rotundum, and have severed the branches of the fifth nerve within the skull and removed them freely outside. In a third case I did not open the skull, but contented myself with removing the nerve from the foramen, which was found to be remarkably enlarged. (See Case II.) After all bleeding has been stopped and the wound has been thoroughly disinfected, a horizontal drain is placed at the bottom and brought out close to the pinna, and the rest of the wound carefully united with horsehair sutures and cyanide dressings applied. In two cases the wounds have healed by first intention, but in the first case some necrosis occurred, which also happened to Pancoast and others. I was at first inclined to blame the very free manipulation which is necessary for this effect, but I am now inclined to believe that it was really due to the failure of the aseptic precautions, although in these cases they were very extensive. The operation is certainly a very useful one, and as it is not followed by any notable shock it does not appear to endanger life, and I recommend it to be tried as the next measure after the simple procedure of enlarging the sigmoid notch has been carried out according to the method described above.

(To be concluded.)

Fig. 2.—Further stage. The gland has been drawn upwards and backwards, the posterior half of the muscle has been cut through and similarly retracted and the jaw exposed. The sigmoid notch thus laid bare is deepened as described. The outline of the trephine hole and small drill holes are seen and the pterygoid fossa clearly displayed. The external pterygoid is drawn upwards by a suitable retractor (elevator) the internal maxillary artery, *a* and *b*, is represented as divided (this is not always necessary) the inferior dental branch lying as usual superficially to the dental nerve. The lingual nerve, *l*, lies deeper and further forward than the inferior dental nerve; *i*, *i*, *i*, retractors, special, see text; *r*, condylar ridge, guide for inferior dental nerve; *a*, placed on the external pterygoid muscle, is just above the central end of the cut internal maxillary artery; *b*, placed on the ramus of the jaw just at the base of the coronoid process, points to the peripheral end of the artery; *d*, inferior dental nerve; *l*, lingual nerve. The fat of the pterygoid fossa in which these nerves are imbedded is not shown, nor the fibrous periosteum of the inner surface of the jaw.

GENERAL PRACTITIONERS' ALLIANCE.—A meeting of the Council of this Society was held on November 17th, 1891; 22 duly registered general practitioners were elected members of the Alliance. The following gentlemen were elected District Secretaries:—Dr. R. H. Barkwell (Wandsworth), Dr. Edridge-Green (Willesden), Dr. R. W. Jones (Westminster), Dr. Walter Moore (Stourport), and Dr. W. W. Stocker (Brondesbury).

³⁵ *Centralbl. für Chir.*, No. 24, 1888.

³⁶ *Wiener med. Presse*, 1889.

³⁷ For the distribution of the vessels, etc., consult Mac Cormac's *Surgical Operations*, Part II, 1889.

³⁸ Made for me by Mr. Hawkesley.