initially by Sir Henry Butlin, and mentions another of Sir Anthony Bowlby's. I have myself seen a carcinoma of the breast recur in the pelvis as a mass, the histological structure of which was reported as a "spheroidal-celled carcinoma of mammary type." The breast had been removed by Sir Cuthbert Wallace for carcinoma thirty years before. Three cases of recurrence in the scar have been observed by me twenty-one, twenty-two, and twenty-three years after operation by other surgeons. A case of my own developed a recurrence in the scar seventeen years after a radical operation, and this followed a few weeks after an acute attack of pyelonephritis, for which I had been called to treat the patient. I have seen local recurrence follow an operation for haemorrhoids performed sixteen years after the initial amputation; two recurrences followed gall-bladder operations, and one seemed consequent upon a hernia operation performed under a local anaesthetic six years after the mastectomy.

In most cases late recurrence has progressed disastrously, but exceptions are met with. One patient, operated upon for a mammary cancer seventeen years previously, developed a recurrence at the clavicular end of the scar. This was "flared" by radium, quickly becoming adherent to the clavicle; glands in the posterior triangle of the neck rapidly made their appearance, and there was increasing oedema of the arm. A "fore-quarter amputation" was performed, and the posterior triangle of the neck was cleared out at the same time. The patient survived two years, dying of metastases in the spine.

Certain *geographical localities* seem to "breed" a carcinoma of the breast of less malignant type: Mid-Hertfordshire has, in my experience, produced many ten-year and even twenty-year clinical "cures"; the Biggleswade and Sandy area of Bedfordshire seems conspicuous for the malignancy of cancers of all sorts.

Sure and accurate knowledge of the dread scourge will one day place in our hands some more specific cure than we at present possess, and much of the heroic in cancer surgery will pass into oblivion. In that golden era gross mechanical destruction of disease and cruel mutilation shall be no more, but even now much encouragement is to be found in the results of the surgery of breast cancer. A chaplain at "Middlesex" told me that during his three years' service at the hospital he had never met any patient who wanted to die. The addition of three years of life may not be always a trifling gift; five years' respite constitutes no paltry achievement; ten years may be a source of abiding joy to patient and relatives; twenty years spells a triumph!

Some may remember how the late Sir James Barrie, in his Rectorial address on "Courage" to the red-gowns of St. Andrews, reminded his listeners that "God gave us memory so that we might have roses in December." The memory of those 158 patients who have each survived more than ten years, perhaps many more years than ten, after an operation for a mortal disease like cancer of the breast, will be for me a reminder that I, too, can have my "roses in December."

It affords me great pleasure to acknowledge the kindly help of many friends. Miss Griffith and Miss Coys of the follow-up department of Middlesex Hospital have furnished me with information about almost every single case of my own operated on in "Middlesex" since 1925; it is with pleasure that I express my sincere thanks to my registrar, Mr. A. S. Till, who pursues with tireless energy any research on which he is engaged. The courtesy and alacrity with which my questionnaires, sent to many friends, were answered and returned to me were perhaps not surprising, for British

surgeons are a "band of brothers." To the members of the medical profession whom I have assailed with letters I am under a great debt of obligation for the trouble they have taken to collect the information that I desired. To Miss Hall, my late secretary, I am grateful for aiding in the search for patients operated upon long ago. Miss Aspiotis had genius and pertinacity in obtaining news of patients operated upon even as long ago as thirty years. The topographical knowledge of my chauffeur, and many taxi-drivers, to say nothing of their enthusiasm, aided my efforts to secure the information I wanted. My own labours are also not undeserving of some eulogy when only seven cases have remained untraced.

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TREATMENT OF PAIN IN THE FACE BY INTRAMEDULLARY TRACTOTOMY

BY

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This paper is concerned with three cases of severe pain in the forehead which have been relieved by section, through the postero-lateral aspect of the medulla oblongata, of the pain fibres in the descending tract of the trigeminal nerve—a method recently suggested by Sjöqvist (1938) of Sweden.

The results of surgery in the relief of primary neuralgia of the face are outstandingly good, and, in fact, tic douloureux is one of the most gratifying ailments to treat in the whole realm of medicine and surgery. Important advances have been made since Horsley's description in 1891 of an unsuccessful attack on the sensory root of the trigeminal nerve several years before. It is to Hartley (1892) of America and Krause (1892) of Germany that chief credit must be given for the extradural approach through the middle fossa, which formed the basis of operative procedures destined to obtain so great a success. In the first instance both divided the trunks of the nerve distal to the ganglion, and it was not until a year later that Krause (1893) removed the ganglion itself. In 1901 Spiller and Frazier suggested division of the posterior root instead of removal of the ganglion, and it was this modification which so profoundly influenced all subsequent methods of treatment. Apart from conservation of the motor root, the great advantage of the method is that a fractional anatomical section is generally possible. Immediately behind the ganglion the nerve fibres run in groups corresponding fairly accurately with the three peripheral trunks, and can be isolated according to their relative positions, the mandibular and maxillary fibres occupying the lower and outer two-thirds of the root. Dandy (1929) claims that as the posterior root nears the pons varolii the fibres conducting the various modalities of sensation become rearranged into distinct physiological groups, so that by means of an intradural approach through the posterior fossa it is possible to divide only those fibres which are carrying pain impulses. It is doubtful whether this arrangement occurs in all cases, and there is much experimental evidence to disprove it. However, within the brain stem physiological grouping does take place, and in this position fractional physiological section is possible. Sjöqvist has devised a method by which he is able to divide the pain fibres in the descending limb of the trigeminal

tract by an incision through the postero-lateral aspect of the medulla oblongata, sparing the sensation of touch so that the face is not recognized by the patient as unpleasantly numb.

Case I

Intramedullary tractotomy for the relief of neuralgia in the ophthalmic division of the right trigeminal nerve.

History.—A woman aged 58 was admitted to the neuro-surgical service of the Manchester Royal Infirmary under the care of Mr. Geoffrey Jefferson. One day, nine months pre-

FIG. 1.—Showing the site of the incision of intramedullary tractotomy.

viously, when walking on the promenade at Blackpool, the wind "caught her face," and the next morning she experienced severe pain over the right eyebrow. The pain was essentially spasmodic in character; it came on in sharp knife-like stabs, starting in the eyebrow and shooting into the forehead. A spasm would be brought on by washing the face or by a cold draught, and in the past few weeks the pain had been almost intolerable.

On examination she was seen to be a small thin woman, though well preserved, and certainly not of the nervous or migrainous type. There was no loss of sensation in the face, and no abnormal neurological signs were found. It is rare for true tic douloureux to start in the ophthalmic division of the fifth nerve, but this was a genuine case.

Operation (performed by G. F. R., April 16, 1938).—Under avertin and gas-and-oxygen anaesthesia a wide cerebellar exposure was made through a transverse skin incision (Fig. 1). A generous amount of bone was removed, including the posterior margin of the foramen magnum, and the dura mater was opened through a Y-shaped incision. This exposed a large cisterna magna, filled with cerebrospinal fluid, and its release by puncture of the tough arachnoid membrane so lowered the tension in the posterior fossa that manipulations could be carried out with ease. The right cerebellar tonsil was retracted until the foramen of Magendie came into view; on lifting the cerebellar lobe still further the restiform body was exposed and at the side could be seen the roots of the vagus nerve, the curve of the vertebral artery, and the ascending root of the spinal accessory nerve. Two millimetres above the lowest vagal root and starting close to its origin from the medulla oblongata a transverse incision was made into the right tuberculum cinereum in its outer part for a

distance of 4 mm. and to a depth of 3.5 mm. During the manipulations within the dura mater the systolic blood pressure rose and the pulse increased in rate—changes no doubt due to traction or pressure on the medulla oblongata. The flaps of dura mater were sewn together to prevent blood trickling into the posterior fossa from the raw surface of the muscles. To complete this repair a small fascial graft was necessary because, as is usual, the dura mater had contracted after it had been opened. Finally the usual careful closure was made in layers.

When the patient left the operating theatre her general condition was excellent; the right corneal reflex was absent, whereas the left was actively present. Convalescence was not very smooth in this case, because of the development of a low-grade meningitis—not due to irritation of blood, as proved by lumbar puncture. This complication cleared up and the woman made a perfect recovery. In the first few days there was slight difficulty in swallowing, but this soon disappeared and she was able to eat solid food in the usual way. This deserves mention because of the very close and dangerous proximity of the vagal nucleus to the plane of operative section. Before the operation the woman was suffering from severe and frequent spasms of neuralgic pain, and since the operation she has been entirely free; in fact, there is something about the quality of the analgesia which tells her she is not going to have any more. Herpes developed on the right upper and lower lips towards the end of the first week—a most interesting observation, as herpes has always been thought to be due to injury of the Gasserian ganglion.

Fig. 2 illustrates the areas of sensory impairment which were present post-operatively. The dense anaesthesia at the back of the head is due to severance of the occipital nerves in the skin incision. Sensory changes in the right forehead and face are due to severance of fibres or cells in the nuclei of the trigeminal tract. This area is densely analgesic; thermal sense is impaired, a hot tube is felt as warm and a cold tube warmer still; light touch can be appreciated and localized perfectly, but it does not feel quite the same as on the opposite side. The corneal reflex on the right side has disappeared, but at no time has there been any sign of ulceration.

FIG. 2.—Areas of sensory impairment present post-operatively in Case I.

Area 1: Complete anaesthesia, owing to the severance of the occipital nerves in the skin incision. Area 2: Pain sense is absent; thermal sense is faulty; light touch can be appreciated and accurately localized.

FIG. 3.—Areas in which sensory changes occurred post-operatively in Case II.

Area 1: Complete anaesthesia. Area 2: Pain sense is depressed; the corneal reflex is absent; thermal sense is faulty; sense of light touch is normal.

FIG. 4.—Areas in which sensory changes occurred post-operatively in Case III. Area 1: Complete anaesthesia. Area 2: Pain sense is absent; thermal sense has lost discrimination; light touch can be appreciated and correctly localized. The sensory changes in the lower part of the face are much lighter than over the forehead, and this is particularly so over the lower lip.

[NOTE: In all three cases sensation is normal on the opposite side of the face.]

tion of the cornea or haziness of the conjunctiva. Both eyes can be made to water freely. The tongue is analgesic on the right side in its anterior two-thirds, taste is present on this side, sense of smell is good in both nostrils, and all the muscles of mastication are active. There are no changes referable to the sympathetic nervous system—no pupillary changes, no differences in colour or temperature in the skin on the two sides of the scalp or face. This woman was an excellent witness.

Case II

Severe and persistent migrainous headaches treated by intramedullary tractotomy.

History.—A man aged 50 was transferred by Dr. Don from the medical wards to Mr. Jefferson's neurosurgical service on May 5, 1938. For fourteen years he had suffered from periodic headaches confined to the right side of the forehead. They would come on slowly, develop to a climax, and then slowly disappear. Occasionally specks would float before his eyes and he would feel sick. In the past ten days the headache had been continuous. Medical measures having failed, he was anxious to undergo any surgical treatment if there were a reasonable chance of gaining relief.

On examination he was observed to be a tall well-built man, and was living an active life as an overseer in a munition factory. He was of the nervous type, but not a single abnormal neurological sign was discovered. Migraine unassociated with any underlying pathological change was the obvious diagnosis. Because of the persistency and severity of the pain and the failure of ergotamine tartrate to give relief it was decided that surgical intervention was necessary.

Operation (performed by G. F. R., May 10, 1938.—The entrance was tedious because of massive nuchal muscles and a thick occipital bone. A good exposure was obtained, and a transverse incision 4 mm. long was made into the right tuberculum cinereum in its outer half just above the lowest vagal root, to a depth of 3.3 mm. Towards the end of the operation the pulse became irregular for a few minutes and extrasystoles developed. When the patient left the operating theatre his general condition was excellent: the right corneal reflex was absent and the left one was brisk. Within two days a "red" eye developed, but this was due probably to the trauma of repeated testing for the corneal reflex rather than to paralytic interstitial keratitis, and it cleared up in forty-eight hours. During convalescence he had a little difficulty in swallowing: this was subjective rather than objective. There was a fine nystagmus on lateral fixation to both sides; no cerebellar signs were present in the arms or legs.

Fig. 3 illustrates the areas in which sensory changes occurred post-operatively. Area 1 is completely anaesthetic, due to severance of the occipital nerves in the skin incision. In the right side of the face and forehead the sensation of pin-prick is dulled, the analgesia fading in density from above downwards. Thermal sense is not so discriminative as in the corresponding areas on the left side. Light touch is present and can be localized perfectly.

In this case the tracts had been bruised rather than severed completely, because, as the days went on, the analgesia began to fade from below upwards. This is an important observation, since it shows that a fixed length or depth of section is not entirely adequate and that each case must be judged individually. This man had a bulky and very wide medulla oblongata, and so the medullary incision would have been better lengthened and deepened.

Case III

Intramedullary tractotomy for primary neuralgia affecting the ophthalmic division of the left trigeminal nerve.

History.—A man aged 56 was admitted to the neurosurgical service of the Manchester Royal Infirmary, under the care of Mr. Geoffrey Jefferson, complaining of pains in the left forehead. These started in November, 1935, and had appeared at intervals ever since, the last attack being very persistent. When he appeared at the out-patient department he was

suffering from severe pains—so severe, in fact, that he refused to go home, and insisted on being admitted to the hospital as an urgency. The pain started in the region of the supra-orbital notch and, in spasms, shot upwards into the forehead as if red-hot needles were being driven into the skin. Each spasm would last a second or so, and then the pain would disappear, to be repeated in about a minute. In the past four days the intervals of relief had been so short that he was almost demented.

On examination there was not a single abnormal neurological sign and, in particular, no sensory loss in the face. It is unusual for true primary major neuralgia to start in the ophthalmic division of the trigeminal nerve, but this was a typical example.

Operation (performed by G. F. R., May 21, 1938).—In this case the experience gained in the two previous operations permitted a more limited exposure of the posterior fossa, and a low mid-line entrance was made. At the level of the lower fibres of the vagal line, and starting at their superficial origin, a transverse incision 4 mm. long and 3.5 mm. deep was made into the left tuberculum cinereum. The incision had to be performed in two cuts because of a large vessel which ran vertically across the proposed line of section and could not be mobilized. At the end of the operation the patient was in excellent condition: the left corneal reflex was absent, whereas the right one was brisk. The next day his left arm was wildly ataxic, the left leg a little unsteady, and there was a fine rapid nystagmus on lateral fixation; but all these signs disappeared in three days' time. General convalescence was easy and smooth throughout. For a few days there was some difficulty in swallowing, which again was subjective rather than objective, and difficulty in micturition which did not necessitate catheterization.

Fig. 4 illustrates the sensory changes which occurred in the face post-operatively. The anaesthetic area at the back of the scalp is due to severance of the occipital nerves in the skin incision. Area 2 is analgesic, thermal sense is depressed, a hot test-tube being appreciated as a warm one, and a cold tube as a little less warm than the hot one. Light touch can be appreciated and correctly localized. The man volunteered the statement that the sensory changes were "heaviest" from above downwards. He has had no neuralgic pains since the operation, and is now a much happier-looking man.

Commentary

The immediate relief of severe forehead pains in three cases has been conspicuous, and though not enough time has yet passed to allow of a final evaluation of the method in the therapeutics of neuralgias the nature of the operation suggests that the good results will be lasting.

The advantages of the method are that the face is not completely denervated; analgesia is densest in the forehead, and the muscles of mastication are never paralysed—an important consideration, as bilateral neuralgia is by no means uncommon. Moreover, the great superficial petrosal nerve (nerve of tear-secretion) is far from possible injury, and so a dry eye is avoided. It is the loss of tear-secretion which is thought to be the main factor in the production of corneal "steaming" or ulceration, a troublesome complication occasionally following posterior root section.

The operation also makes an interesting neuro-anatomical experiment in elucidating the destination of the fibres in the posterior trigeminal root. Somatically, the face is represented upside down in the long spinal nucleus and the vascular lesions of the brain stem, and in particular the occlusions of the posterior cerebellar artery have often shown a dissociated sensory loss, pain sense being absent and touch intact. The Sjöqvist sections furnish, for the first time, experimental proof in the human that fibres conveying the various modalities of sensation are rearranged within the brain stem into physio-

logical groups, the pain fibres probably having the lowest and the touch fibres the highest representation in the somatic sensory nucleus of the trigeminal nerve.

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THE EMPLOYMENT OF DIABETICS

BY

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Diabetics still suffer great difficulties in their work and employment from the public misapprehension that they are necessarily invalids. However fit and healthy he or she may be under appropriate treatment, the patient with diabetes cannot enter any Governmental or similar service, is barred from all types of employment which are pensionable, and is liable to find himself discharged when his private employer knows of his disease. As a result, patients with diabetes must often hide their condition and miss necessary visits to our day clinics (we now have an evening clinic for them), as these might disclose the disease to their employers. Young diabetics entering industry are rarely accepted by an approved society, and can usually only get health insurance through the Post Office scheme, with its limited benefits. Many children, after winning scholarships for higher education, find that they cannot take them up because they suffer from diabetes. Altogether, many lose confidence from rebuffs in finding the type of work they wish to do and which they are most capable of doing well.

From experience with our hospital clinic we consider the above attitude quite unjustified, unfair, and a mere survival of pre-insulin days, when ill-health—that is, industrial inefficiency—and early death were the rule. Patients appeal to us and to the Diabetic Association, which concerns itself with such difficulties, to help them against this injustice and handicap. The Diabetic Association suggested that an investigation should be made of the employment efficiency or disability in our hospital patients so as to produce facts instead of vague impressions. The results of the inquiry follow.

Investigation in a Hundred Cases

No special selection of employed patients was made, but the first 100 employees attending the clinic were studied. As most of these patients attend at intervals of

about three months it took about six months to investigate 100 cases. Both sexes were included, but the majority (75 per cent.) were men. Their ages varied from 14 to 65, but 73 per cent. were under 40 years old and consequently cases of severe diabetes; the majority (83 per cent.) were having insulin treatment continuously. The average amount of insulin given was 35 units, and varied from 8 to 80 units daily. The duration of employment as diabetics varied from one to nineteen years, with an average of five years. All types of employment—some strenuous, some sedentary—were found, and included such occupations as gardening, engineering, carpentry, commercial travelling, shopkeeping, office work, work as telephonist, domestic service, etc.

It is realized that the data obtained are inaccurate, since patients chiefly depend on their memory. In every case, however, we have checked their story from attendance records and found it to be reasonably accurate. The tendency was to remember "diabetic illness" but to forget minor indispositions—influenza, colds, etc.—which, however, were usually noted in the case records. It was soon recognized that it was necessary, in observing the effects of diabetes *per se* on time lost in employment, to distinguish between diabetic illnesses directly due to the disease and fortuitous illnesses: febrile colds, appendicitis, etc.—that is, common illnesses not caused by diabetes. Again, it was thought right to distinguish between the time lost at the onset of diabetes, while treatment was being worked out, and after restoration of health by adequate treatment. We have not included visits to our clinic (on the average four half-days a year) as time lost! The figures have therefore been prepared in the following way:

Loss of Working Time in 100 Diabetic Cases

	Cases
For Diabetic Illness:	
I. No loss of time, even at onset	39
II. Time lost at onset only	38
	<u>77</u>
III. Time lost after first stabilization	23
	<u>100</u>

Analysis of Group III:

	Cases
Restabilization necessary in cases with good health on diet for 1-3 years but which broke down and needed insulin	8
*Sepsis (carbuncles, ulcers of foot, etc.)	5
Diabetic coma	2
Hypoglycaemia and after-effects	4
*Neuritis	2
Cataract (after 11 years' work as diabetic)	1
*Hyperthyroidism	1
	<u>23</u>

* It is doubtful if some of these conditions should be classed as diabetic illnesses.

For non-diabetic Reasons, time was lost by 55

Their illnesses included bronchitis, influenza, appendicitis, accidents, and, of course, colds, bilious attacks, etc.

It was hoped at first to get accurate figures of the days or weeks lost for the above reasons, but this was found impossible. We are sure, however, that our patients were not longer incapacitated from work by influenza, accidents, and so on, than non-diabetic individuals.

The school attendances of children have not been included in this survey, but the matter is being investigated. The result ought to be interesting; the figures will be more accurate, since they can be checked, and will allow of comparison between groups similar in all respects except their diabetic diathesis.