lateral curvature disappeared, and all weariness about the back and loins came to an end.

Since that time I have on a good many occasions prescribed analogous movements in consequence of pains about the abdomen and back, and always with considerable advantage, though never perhaps with so striking a result as in the case just related.

I daresay I may be told that there is nothing new in my suggestion. It is only our old friend, movement cure, in a different dress, and I grant that there is some truth in the contention, but the point on which I am specially insisting is that our viscera, our blood vessels, our spinal cord, and our bones need healthy muscles to keep them in their proper position and condition, and especially is this the case with intra-abdominal viscera. If this truth were better recognised than it is we should not be ordering as many belts and supports as we do, but we should rely on the means of support which Nature has given us, and strengthen them if they need it by healthy exercise, and not by steel bands.

Once more, gentlemen, let me thank you for placing me in this chair, and for listening with so much attention to this, I am afraid, somewhat too lengthy address.

ON THE MEDICAL TREATMENT OF TIC DOULOUREUX IN CONNECTION WITH THE QUESTION AS TO OPERATION.

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THE treatment of tic douloureux is a subject which cannot be dealt with from a limited supply of facts, and for which collective study and experience, such as those at the disposal of the Association, are specially needed. The growing tendency to resort to operation, since it implies a prevailing impression that, in spite of recent advances in the therapeutics of other diseases, ordinary treatment is ineffectual in this affection, renders it desirable to inquire how far this impression is traditional, and to determine the capabilities and the limits of medical treatment. Had we sufficient evidence that the trouble was due to mechanical pressure amenable only to mechanical relief, or due to the overgrowth of fibrous tissue removable only by the knife, no question would arise as to the desirability of early surgical interference. Whilst, however, in the pathological reports there is a lack of unanimity which leaves the question as to any lesions practically speaking open, the prevailing uniformity of the clinical symptoms in all cases supports the view that of the various lesions which have been described none is necessarily the essential one; and from the fact that some cases are obviously not connected with permanent structural changes, we may infer that others, although they may be much more severe, probably share with the first either a common origin or some common factor.

Surgery has thrown light upon some important points, and has furnished us with two great data: (1) The pain is bound up with the peripheral sensory function¹ at least as much as with the central function, a temporary interruption in the peripheral conduction by division or resection of nerves causing only temporary cessation of the pain until a full return of the sensory function of the part, whilst permanent interruption of one branch of the nerve does not protect against its subsequent extension, likewise peripheral, along another branch, whether vicariously or by overflow. This ex-

¹ The exquisite local tenderness, coupled with the exquisite local pain, warns us against identifying the affection with a decay of peripheral fibrils, and differentiates its etiology from that of the lightning pains of tabes, in which a depressed peripheral sensation coincides with pains traceable to a more centrally situated anatomical cause. Much, however, remains which is mysterious: (1) The lightning character both of the spontaneous and of the peripherally excited pain; (2) its paroxysmal visitations; (3) its long remissions—all suggest that it is due to fibrillar irritations, and not to any continuous pressure by fibrous tissue, or by bone, or from congestion. The circumstances defined under 2 and 3, and the fact that worry predisposes to, and emotion is capable of exciting the pain may justify our assuming the existence of local changes due to hyperæmia, to anæmia, or to malnutrition, lasting through the periods of lability, but not, as in the case of lesions due to bony pressure, outlasting them.

tension or transference of the pain might be explained by implication of any one of the three factors common to the whole nerve—the vasomotor nerves, the nervi nervorum, or the Gasserian ganglion—but which of these is implicated we are not sure. (2) Surgery has also shown that the Gasserian ganglion is a bridge, the cutting of which permanently arrests the pain (this would not result were the cause of pain mainly central); and that, whenever an assumption of the great risks involved is justified, we have in this operation, and perhaps in this operation only, an ultimate and effective resort.

An important object is to limit, if possible, the frequency of a necessity for the risks in question, and to determine how far a less severe treatment may avail to change the intolerable degrees of pain into those which are tolerable, or even, by a continuous and prophylactic method, to keep the pain under permanent control. The following cases may indicate some hope in that direction; and the comments to be made upon them, *ex parte medicæ*, invite the fullest criticism.

THE CONSTITUTIONAL AND THE GOUTY FACTOR.

The foregoing considerations (see also footnote) and varied clinical observations suggest that in all cases there is a functional or constitutional factor, and that in some of them this is paramount. The strongest argument in point is the existence of a group of cases where a gouty connection is manifest; this, indeed, seems to be the only kind of etiology which has hitherto been strictly identified by the results of medical treatment.

From this point of view we may classify cases as: 1. Those obviously gouty. 2. Those in which the gouty association is rendered probable by the family as well as the personal history. 3. Those in which the family history is unknown, but the previous history includes visceral affections analogous to those which we recognise as gouty, and in which the personal aspect also speaks of gout. These three groups probably make up a large proportion of cases. 4. Into the remaining group, obviously provisional, are relegated the cases where there is no evidence of any connection with gout, either in the family or in the personal history, and all cases of unknown etiology. Cases attributed to syphilis or to the pressure of bony or other tumours would form a special group. They are not under consideration in this paper.

The frequency of a gouty association has probably been underestimated, because it is often not an immediate one. It seems to be the exception for sufferers from this neuralgia to be attacked by articular gout, and it might be said of them, among others, that it is their misfortune that they never experienced gout in their joints. The same immunity is sometimes witnessed in the cutaneous manifestations of goutiness, which may alternate in the hereditary cycle with neuralgia. Instances are familiar in which the skin affection occurred in the children, and the neuralgic affection in the grandchildren, of gouty parents. Of this kind is a case communicated to me by Dr. Morton:

CASE I.—The patient, a lady, suffered for many years from tic douloureux in the tongue, without ever obtaining relief from treatment. She ultimately died of phthisis, after a life of much confinement owing to her pain. At the necropsy, performed by Dr. Lionel Beale, no abnormal appearances were detected in nerves or ganglia. Her father had gout badly; one of her sisters had rheumatic gout. Of her nine children, two had slight eczema, and one has gouty glycosuria.

The facts in the following case, which is typical of this group, are still more striking. The notes, kindly contributed by Mr. Warrington Haward, will be read with interest *in extenso*:

CASE II.—A gentleman, aged 58, first seen in 1869, had suffered for about twenty years with intense trigeminal neuralgia, which came on first during extreme grief at the loss of his wife. The first attack was preceded by severe nephritic pain. The neuralgia began quite suddenly in the temporal branch of the right fifth nerve. The attacks gradually increased in frequency and severity, and have been worse for the last five years, remaining about the same for that period, both in frequency and severity. When attacked the face becomes contorted; the patient often shrieks with pain. Pressure sometimes eases the pain. He presses his hand and face against the wall. Nearly all the branches of the right nerve are affected. Emotion or draughts of cold air he thinks bring on the attack. He looks a healthy man, with white hair and ruddy complexion. When free from attacks he is very cheerful and intelligent good. *Has taken many drugs and seen many physicians.* (The italics are mine.) Sir William Jenner ordered bromide of potassium, which he thought did good for a time and then lost its effect. He has also used both soothing and stimulating applications locally without any good. He had taken for months 35 gr. of quinine and 2½ drachms of chlorodyne every day. Was very shaky and rather emotional. Very temperate, but took wine and

beer in moderation. He was sent to me for operation on the nerve. No syphilis. An uncle became insane in middle life. The family history is otherwise good. His father had gout in the great-toe severely. This patient has passed a great number of uric acid calculi, of which he brought me specimens. Urine very acid. He has, however, never had the gout. I treated him for gout, stopped wine and beer, except a little claret and water, and reduced the meat. He left off all local applications, which only made the surface more sensitive. The patient began to improve almost at once, and the improvement was steadily maintained, the attacks becoming less frequent and severe. In four months he was quite well, and had no pain for two years, being able to go on circuit. After two years he had occasional attacks of pain in the right jaw. He then took iodide of potassium as well as alkalies and colchicum, with relief to the pain, which, however, occurred at long intervals in the jaw and in the lower gum, but nothing comparable to its former severity. I lost sight of him for some years, and then heard that he had had severe attacks of pain in the ophthalmic branches of the nerve, after a birthday party and drinking port wine—I think he had for some time been less careful of diet. This was relieved by the same remedies, but he also took cannabis indica. In the latter years of his life he had occasional attacks of pain, but not of the former severity, and he died about twelve years after I saw him, with, I believe, cerebral softening of rapid type. A son of the patient was also seen by me. He was suffering from a very troublesome form of eczema, but was free from articular gout.

Both these cases were unrelieved so long as the gouty connection escaped recognition. The fact that it is the easily overlooked gouty tendency, the attenuation of gout or goutiness rather than declared gout, which commonly is the basis of the affection, suggests that in other instances also the alleged failures of treatment may have been instances of its imperfect application. This is the more likely since we have not in every case as a guide the advantage of a complete family history or of a reliable personal history. A confirmation of our suspicion of an underlying goutiness can then be obtained only from the analogy between the symptoms observed and those accepted as evidence of goutiness in well authenticated cases.

The following features, frequently noticed in sufferers, may be regarded as pointing to those constitutional influences which, though not necessarily leading to gout, underlie the gouty state:

1. The healthy and often ruddy complexion such as we associate with sthenic gout.
2. The presence of Heberden's nodules or of tophi in the ears.
3. A previous history of gravel or of stone.
4. A long history, often beginning in childhood, of gastric, intestinal, and hepatic disturbances of a nervous type.
5. The abiding strength of the pulse, which strikes us as no less remarkable than the resistance of the patient to the effects of long-continued pain and insomnia.
6. The adverse influence of alcohol and of certain forms of diet.
7. The presence of uric acid sand in the urine, was noted in several of the cases related.
8. It is also significant that in two of the male cases and in three of the female cases habitual bilious attacks were experienced in childhood and for many years afterwards.

The nature of this distant influence of gout is unexplained; it may tell in two ways: First, by the inherited delicacy and irritability of the nervous system, analogous to the irritable skin found in other sufferers; and in the second place, by perverting the juices. The view that uric acid is deposited and acts as a local irritant on the nerves may or not be correct. The results of treatment do not supply clear evidence on this point. Alkalinising the urine is apt, as in Case vi, to aggravate the liability to pain; whilst remedies which may not be regarded as solvents for uric acid relieve it. Nevertheless, it might be possible to argue on the lines suggested by Dr. Haig, that these remedies act beneficially by clearing into the blood any excess of uric acid existing in the tissues (in this case in the nerve tissues), and by promoting its excretion.

The influence of atmosphere, locality, climate, and soil should not be overlooked as probably important indications in the treatment of certain cases, as it is in other ailments of the goutily disposed, and particularly in gouty asthmatic persons. Long intervals often elapse between periods of suffering. A return of the ailment in spring and in autumn might be explained independently of gout as the effect of change in the weather acting upon susceptible nerves. It is, however, noteworthy that mere cold is not specially dreaded, though keen draughts of cold air directed to the tender surface may excite paroxysms.

THE PRINCIPLES OF TREATMENT.

The medicines which have been employed with some success in the present cases do not claim to be specifics nor to be suitable to all. Greater importance belongs to the method which is based on the assumption of a constitutional factor and on the clinical contrast between tic and the ordinary neuralgiæ. A merely symptomatic and sedative treatment, such as may benefit ordinary neuralgia, is powerless, and only too likely to perpetuate the ailment. Whilst ordinary neuralgia, although seldom overcome by sedatives alone, is benefited by alcohol, by iron, by strong tonics, and by a generous diet, these are precisely the agents which often aggravate tic douloureux, as though in this neuralgia the nerve reacted to some irritant quality of the juices, such, for instance, as we may assume to exist in the gouty state, rather than to their deficiency in nutritive value. The constitutional element in treatment, namely, diet and hygiene, is, for this reason, an indispensable adjunct to medication. In the treatment of the cases narrated, special regard was directed to the following indications: (1) The sedative; (2) the restorative; (3) the alternative; and (4) the tonic.

1. Sleep being the first essential, and the basis of the entire treatment, it is necessary that the narcotic prescribed should be sufficiently strong to procure prolonged slumber. Chloral and morphine combined will usually prove effectual.

2. The restorative measures include mental and bodily rest and suitable alimentation. Rest in bed is indicated in all severe cases till remedies have taken effect; and the success of treatment may largely depend upon this means of economising nerve energy. Alimentation is the second essential, but needs to be adapted to the irritable state which prevails at this stage. The tenderness of the mouth and its often unhealthy state, and the feeble and faulty digestion, call for a careful selection and for a gradual progression in diet; and the question here arises as to the use of nitrogenous food and of alcohol. The object of the treatment is to raise the nutrition without overloading the blood with nitrogenous waste. Thus, a modified vegetarianism, including a liberal supply of the vegetable foods and a moderation of the nitrogenous, is generally indicated. Vegetarianism itself deserves a full trial in the worst cases before resorting to operation, and it is said to have been attended with most favourable results, though Dr. Gowers refers to the opposite experience in a case where the neuralgia began coincidentally with the adoption of the vegetarian plan. Vegetable food was liberally, but not exclusively, supplied in the present cases; in Case iv, however, the patient has been for the last two years a strict vegetarian, with the exception of eggs. Alcohol is to be avoided. Sufferers are well aware that the relief it affords is purely temporary; and it is regarded by the writer as decidedly harmful in promoting a liability to the attacks. Whilst this prevails it should be absolutely forbidden; and, subsequently, total abstinence is the safer course; and should be the rule in the gouty cases. Nevertheless, in enfeebled and underfed subjects, stout, or even port wine, may be allowed as a temporary help to nutrition.

Dyspepsia, due to gastro-hepatic catarrh, may have to be dealt with as a preliminary; and, in a mild case of this kind, the neuralgia may rapidly subside under treatment directed to the stomach (see Case iv). The state of the teeth and of the gums also calls for every attention, though, as regards the teeth, more than the needful has often been done before the patient comes under treatment. It is a well-known characteristic of the sufferers that they ruthlessly sacrifice their sound teeth as well as those decayed in the vain expectation of relief. But the mucous membrane may be less at fault than the chemistry of digestion and of its products; and more searching remedies, which may be broadly termed alternative, will be needed.

3. The alternative treatment may, in genuinely gouty cases, be specially directed to the gout, with careful avoidance, however, of any depressing agents. In the generality of cases a modified treatment, favouring absorption as well as glandular activity (particularly that of the liver), will meet the gouty as well as the general indication. The salicylates, the benzoates, sulphur, chloride of ammonium, and taraxacum are available, but none of them probably equal in efficacy the salts of iodine and of mercury, and particularly their combination in the proportion of 20 to 30 minims of the solu-

tion of the perchloride of mercury, and of 6 to 10 grains or more of the iodide of potassium. The iodide may be tried alone, and should then be given in sufficient doses. Its action seems to be promoted by the addition of tincture of iodine in doses of 15 to 30 minims. The full measure of relief, however, was not obtained in the two cases where the drugs were administered in instalments until mercury was added to the iodides. Where the iodides alone had failed, this combination brought about a cessation of the pain. As a useful adjunct, guaiacum, a drug so highly recommended in gouty affections, was employed, and, when flavoured with syrup of orange, formed a mixture which was more unsightly than unpalatable; but in private practice it is better administered separately. No anodyne was in any of the cases administered conjointly, the night draught having become unnecessary after the first two or three nights.

Reduction of vascular tension is a well-known property of the drugs in question; but it is difficult to apportion the share taken in the result by this influence, and by the favourable action on glandular and general metabolism and on absorption respectively. The action of nitro-glycerine, which has also been prescribed with benefit, is less doubtful, and it is not as that of aconite open to the objection that it produces undesirable depression.

4. The tonic measures, as already indicated, are less dependent on drugs—though the vegetable tonics may be used with advantage—than on hygiene, and, above all, on muscular exercise, which has the advantage of diverting energy from the oversensitive nervous mechanisms whilst raising the general nutrition. Muscular work should be at first passive, and only gradually increased. Ordinary massage may be applied at an early date after the needful long sleep has been obtained, and should be gradually replaced by the "resistance movements," and in suitable cases by Swedish gymnastics. Salt baths may be combined with this treatment, which, by diverting the circulation to the skin and muscles, would tend to relieve the nervous system. Climatic treatment may also be resorted to.

The treatment which has been sketched is complicated in its details, but simple in its general principles. The action of drugs needs to be favoured by every hygienic advantage, and, above all, by a removal from home influences, which act as exciting causes. Probably no health resorts can confer advantages comparable with those gained by the poor from a stay in hospital, which fulfils almost all the hygienic indications.

ILLUSTRATIVE CASES.

Some of the features suggesting a gouty tendency are presented by the following cases, which are probably fair examples of the average case coming for treatment without any obvious etiology:

CASE III.—E. B., aged 65, spare, with bright complexion, was sent up from the medical out-patients on January 3rd, 1896, to the surgical ward as a case for operation, suffering from intense pain in the edentulous upper jaw, shooting up into the left nostril and eyeball, which began two years ago, after influenza and bronchitis. Previous good health, except rheumatic fever at 40. No tophi, but well-marked Heberden's nodules on both forefingers. The nodules have become larger and more painful since the neuralgia has set in; in the intervals between attacks they are less tender. In childhood and since has been subject to bilious attacks recurring at intervals of four to six weeks. To these she is still somewhat subject. In other respects has always been healthy. She had previously had three attacks of pain in the neck, shoulders, head, and left arm; the last one, after the influenza, more severe than the others, led up to tic douloureux. Her mother died of phthisis, aged 50, her father after operation for stone; but no definite history of gout. For the last six months the pain has been apt to keep her awake, and she has lost much flesh and strength, and she attributes to this the tremor. After a draught of morphine and bromide she became delirious in the night, and was thought to be suffering from delirium tremens; but she subsequently repudiated the idea, and there seemed no ground to suspect alcoholic excess, though she has been in the habit of taking stout with her meals. Mr. Bennett having desired me to see the case, full doses of the bromides were ordered every four hours and the delirium subsided; but the pain returned, and she continued, although sleeping well at night, to suffer much during the day. On January 14th she was transferred as a medical patient, and placed on full doses of biniodide and guaiacum, and on a milk diet, with eggs and baked apples. January 15th. Has had one fit of pain. Was ordered morphine draught, if necessary, at night, but this was not taken more than once or twice. The patient quickly improved, and on the 23rd the mercury was omitted from the draught, and the next day the draught itself was omitted. On the 26th it is noted that the pain was occasionally severe at night. January 30th. Medicine repeated, the patient being much better, but thinking the pain comes on if the medicine is stopped. February 6th. Went home greatly improved in strength, and remained quite free from pain whilst following the treatment as an out-patient; but after a month was not seen

again till readmission in September, 1896, with the same symptoms as previously though less severe. She was submitted to the same treatment—by rest in bed, bland diet, the biniodide with free iodine, and massage and resistance movements. No narcotics were required after the first day. The pain quickly lessened in frequency and acuteness, and for the last two weeks and a half was entirely absent. She gained 7 lbs. in weight.

Special interest attaches to the following case owing to the definite way in which the recurrence of the attacks followed in the wake of ordinary dyspepsia with loaded tongue, and of the resulting debility, and owing to the readiness with which the liability to pain was relieved by simple medical measures. The case is also interesting as an instance in which a vegetarian diet seems to have been beneficial in lessening the tendency to recurrence.

CASE IV.—A. H., aged 65, generally healthy, temperate; formerly taking beer and stout, since aged 50 a teetotaler, but of late again taking one glass of beer daily. She presents Heberden's nodules, and had occasional twinges in the great toes during the last few years. Subject to bilious attacks from an early age. Gravel first noticed aged 21, when she had right inguinal pain, and frequently since then. Tic douloureux since 1890 or 1891, after a blow causing closure of the left eye, with pain lasting three or four weeks. She was treated as an in-patient in July, 1891. The then diagnosis—"hysterical neuralgia"—has not been confirmed by subsequent symptoms and appearances, and is negatived by the fact that she has had to resign a desirable post, and has had five or six sound teeth extracted. The neuralgia began in the left infraorbital region, accompanied with redness, smarting, and lachrymation, but no facial distortion at first, though some is now present. In 1892 the pain extended to the nose and along the lower eyelid, seeming to shoot from a tooth, which was extracted. There are two varieties of pain—one rapid and momentary and very frequent, compared to a hot needle; the other, which began in 1893 and caused her to resign work, long and severe, lasting ten seconds, causing her to put her hand up to her face, and sometimes interrupting her sleep; eased, she thinks, by cold water. She is aware that the pain is aggravated by quinine and iron, and that port wine brings it on almost immediately, "sending her almost mad." When first admitted under the writer in August, 1894, she had a swollen and ecchymosed orbit from an injection of morphine. The pain was readily subdued by cocaine and under the influence of a mild alkaline stomachic mixture. All alcohol was strictly forbidden, she was recommended a mainly vegetarian diet, and to this she has adhered ever since with decided improvement and relative freedom from paroxysms of pain. The pain returns severely at periods when the bowels become constipated, the digestion disturbed, the appetite suppressed, and the tongue thickly coated with creamy fur. This was her recent condition, when readmitted in August, 1896. After two good nights obtained with morphine and chloral, and appropriate purgation, the pain was considerably relieved, and she ultimately got free from it without any more searching medicine than the compound guaiacum powder. A little iodide was prescribed for some muscular rheumatism when she was discharged. She has adhered since 1894 to vegetable diet, which, however, includes two eggs a day, but she takes no stimulants. No gravel has been seen for a long time. She was again seen as an out-patient in October, when the biniodide was prescribed.

In the case to be narrated, nothing points definitely in the direction of goutiness except a history of gout in the father and in one brother. The ailment was of long standing, and had undermined the patient's health, yet it yielded readily to treatment. She was less tolerant than others of the iodine mixture, which seemed to set up some irritation of the mucous membrane; this was specially marked during a severe relapse after the shock of two operations on the teeth. Nitro-glycerine was then administered, with the best results.

CASE V.—E. P., widow, aged 62, admitted into the surgical ward with a view to operation, and transferred by Mr. Bennett for preliminary medical treatment: a pale, flabby, lachrymose person, with everted lip and horizontal projection of the lower front teeth, and a foul tongue and gums. The neuralgia began five years ago, without known cause, over the left upper canine, extending to the left temple and outer supraorbital region, but at an earlier date she remembers sharp shocks of pain in the right forearm. The spasm causes tight closure of the eyes, the raising of the hand to the cheek, and well-marked interference with respiration. The tongue is very tender, and food causes much pain. Under the hygienic, dietetic, and alterative measures prescribed, her general condition improved greatly. The pain, however, in spite of the sleep which was secured by morphine and chloral for a few nights, was not much lessened during the day, and no great alleviation was admitted by the patient until the administration of iodide of potassium and tincture of iodine. Complete cessation of the pain did not however occur until mercury had been added to the iodine and guaiacum mixture. The diet was made light and nourishing; no alcohol was allowed, excepting port wine, for a few days after the pain had been relieved; this made her much worse again, and was discontinued. Further improvement occurred in general health at the Wimbledon Convalescent Hospital, whence she returned with a cheerful, full-faced, and florid aspect. The improvement does not appear to have been of long duration. She gradually lost ground after returning home. When readmitted in September, 1896, her condition and aspect were by no means as wretched as at first; but the pain was frequent and severe, the digestion disturbed, and sleep also very imperfect. Compound guaiacum powder did not effect much improvement. Iodide of potassium (15 gr.) and tincture of iodine (15 minims), prescribed with guaiacum mixture, somewhat lessened the pain, but the subsequent addition of a drachm of solution of perchloride of mercury rapidly improved the patient's condition and feelings. After a delay, due to a catarrhal attack, the progress in energy, cheerfulness, and freedom from pain was uninterrupted, and after a while

the nights were undisturbed, and there was during the day no outward evidence of pain, the aching and discomfort still complained of being probably connected with the abnormal state of the mouth. Before this was rectified by the extraction of the projecting teeth, Donovan's solution, in doses of 15 minims three times a day, had been substituted for the previous mixture, and Nauheim baths and resistance movements prescribed as tonics. A severe recrudescence of the pain, which for some time had been in abeyance, set in on the second day, after the removal under an anæsthetic of the unsightly teeth. The biniodide mixture was ordered again instead of Donovan's solution, and port wine, which had been given tentatively for the last three weeks, was stopped. The attacks of pain, which once or twice extended to the left shoulder and side of the chest, gradually diminished in frequency and severity in the course of a few days with the help of chloral and morphine at night. Under the influence of the narcotic it was noticed that the patient would wake with pain, and immediately after its cessation fall asleep again. The pain having continued for several days, although with lessening severity, trinitrine solution (2 minims increased to 7 minims for a dose) was prescribed and the iodine mixture discontinued. She was the better for the change, and soon had little pain in the day and slept through the night without a narcotic.

The following case is noteworthy in connection with its severity, its inveteracy, and with its resistance to various forms of treatment prior to admission into the hospital, and with the relief and ultimate cessation of the symptoms whilst under observation; but noteworthy also in connection with the subsequent return of the pain, under the influence of the former surroundings, fatigue, and worries, the remedies and the diet which had proved beneficial then losing all effect. The passive attitude of the patient in regard to his trouble and to any fresh effort towards getting rid of it, and his loss of faith in any cure, are characteristic of the group. Cases such as this are probably those in which ablation of the Gasserian ganglion may be justified, unless the patient is prepared or able to sacrifice his employment, and to place himself under the most favourable conditions for giving every chance to constitutional treatment.

CASE VI.—J. M., aged 61, a small farmer, fairly well nourished; the right cheek and eyelid reddened by constant pressure of the handkerchief. Sent up for operation as a severe intractable case of three years' duration, in which the highest authorities had been consulted in vain, the patient losing all faith in treatment. Family history incomplete. The father died of cerebral softening, and a sister of paralysis; one brother from phthisis, and another from cancer. No statement as to gout. Good personal history. Always sober and laborious, but apt to worry. Dislikes beer; takes one pint of cider daily, with a little whisky in it; occasionally a glass of port wine. Diet abundant and varied. No articular attack remembered. Doubtful tophi in the ears. Between the ages of 12 and 15 had bilious vomiting every week, with frontal headache. The pain, the cause of which cannot be traced, and for which the right upper and lower molars (two of which were sound) had been previously removed is referred to the back of the right eye, to the front of the right side of the face, and to the right side of the nose. It is excruciating, coming on every five minutes, and lasting about a minute, so that hardly any sleep is obtained. The veins in the head stand out, and perspiration is set up. The eye waters. No paralysis of any kind. No tenderness of skin or scalp. Pressure relieves the pain somewhat. During an attack of pneumonia he remembers having remained quite free, the pain returning as soon as he convalesced and before leaving his bed, after resuming solid diet. Likewise, during three days when he suffered from retention, and kept his bed there was no pain. He considers himself in good health, has a good appetite, and does not vomit his food. Tongue much furred. Urine clear, acid, no albumen (specific gravity 1020); subsequently a slight colourless sediment was found, and, on one occasion, a haze of albumen. Uric acid sand was also repeatedly noticed, and oxalates also occurred. Only slight relief was obtained from narcotics and from cocaine internally. The effect of bicarbonate of potash was to rapidly alkalise the urine and to aggravate the pain, which was made still worse by the addition of port wine to the diet. Improvement began when these were discontinued, and after sleep had been procured by a liberal supply of morphine, and after a mixture containing sodium salicylate, ammonium chloride, and potassium benzoate had been ordered, together with a tumblerful of hot water night and morning. Five days after the change, only one paroxysm in the hour was noted. On the sixth day a few twinges in the morning, but no pain in the afternoon; and the tongue was clean. Subsequent notes mention good nights; attacks fewer, shorter, and less severe, occurring chiefly between 5 and 8 A.M.; pulse much softer; bowels less constipated; appetite improving; 2 lbs. gained in a week; no serious attacks. On October 29th, after slightly more pain, 2 gr. of quinine were ordered four times a day; and on October 30th 10 gr. of each of the hypophosphites of iron, calcium, and sodium to be taken in syrup after meals. The improvement was henceforth progressive and sustained, and, although attacks were still entered on the list which the patient was made to keep, they were much less severe, and gradually disappeared. The diet had been kept throughout light, and little meat allowed. He was discharged November 29th practically free from pain, and admittedly better than he had been for a long time. During the winter occasional attacks recurred, but at the end of March, 1895, they became more severe, and ultimately, in April, almost continuous, in spite of salicylate and other drugs, and of careful dieting. He seems to have suffered more or less severely since then, with intervals of freedom. A report from his medical adviser in September, 1896, mentions a recent interval of four weeks, after which the pain had returned. In spite of all, his general health is reported to have remained fairly good.

The following is a case of recurrence and extension of the pain after repeated surgical operations on the nerves (though not on the Gasserian ganglion), which gave only temporary

relief. Distinct alleviation was obtained from medical treatment so long as it was continued, and for some time after its cessation. The endeavour to ascertain the patient's subsequent history and present condition has unfortunately not been successful:

CASE VII.—H. S., aged 68, navy, an old Crimean, powerful and portly, blind on the left side owing to an old injury, was referred to me by my colleague, Mr. Bennett,* who had operated three times upon him. The patient's father had died old, and his mother at 93. He had syphilis in early life without important sequelæ; fever at Gibraltar, aged 33; left pleurisy, aged 50; between 30 and 40 much gravel, and at one time severe pain in passing water; for 20 years, up to the age of 55, bilious attacks two or three times every month. He weighed 15 stone between the ages of 40 and 50. Has still a florid complexion, dark brown hair (slightly grey for the last five or six years). Heberden's nodules on the fingers. At the age of 40 he suffered from pain in the right toe, causing him to limp severely, but not to give up work. The history of his neuralgia is this: 6½ years ago he had a severe fall without perceptible injuries, and six weeks later developed the first symptoms. Meanwhile, an influenza cold settled in the throat and produced a "drumming" in the right ear. Soon after his recovery, whilst sitting at dinner in a field, an intense pain shot like a bullet from the right upper canine into the temporal region; has never had so severe a pain before or since. A few days later a different pain was felt along the right upper jaw, not relieved by the removal of a tooth. No pain for two months; when it returned for one or two weeks, further extractions were declined by the dentist. Admitted into the medical ward four years ago, and treated with various anodynes without benefit; readmitted by Mr. Bennett and again treated by medicines ineffectually, remaining altogether in the hospital for eleven months. During that time he was allowed beer and brandy. Three years ago he had six teeth taken out, all of which were sound, without more than a few days' relief. The pain was intense; much twitching of mouth and of right side of face; the eyelids firmly closed, and the head finally drawn down to the right shoulder. The frequency was sometimes twenty in the hour, and interfered seriously with sleep, in spite of drugs. Sometimes no sleep night or day for two or three weeks; yet, strangely, he never felt exhausted or much tired from sleeplessness. Meanwhile he managed to take food fairly; as he said, "six meals and six doses of medicine in twenty-four hours," and usually had brandy and beer. Avulsion of the entire superior maxillary nerve was performed by Mr. Bennett. The result was a cessation from pain for ten months, after which the pain returned, this time in the region of the mental foramen, the pain having been previously from the region of the tragus along the lower edge of the zygoma and malar process. Now the pain began to "curl up behind the ear." The inferior dental nerve was removed by trephining the lower jaw, the length avulsed being about 1 inch. After this, relief followed for six months and he returned to work; but in August, 1893, there was a return of the pain, in spite of which he struggled on till Christmas, when he was admitted. The blind eye was removed in the spring of 1894. The auriculo-temporal nerve was removed at two operations, undertaken at a month's interval, the pain returning meanwhile. It was after the last operation, which the patient said had not relieved the pain, that he was referred to the physician. The pain now complained of occurred by night and by day. Sometimes the old pain would return, running into the triangle of the neck to the shoulder, and, on one occasion, down to the wrist, and the pain would bend him over to the right; it would also extend to the right half of the fronto-parietal region. During the paroxysm he would put up his hand to his forehead, in the supra-orbital region; the eyeball also ached. The pain was generally aggravated by stooping; he slept with his head high in consequence. The treatment was carried out on the lines described, as regards medicine and diet, with distinct relief. Under the biniodide, with large doses (30 to 50 minims) of tincture of iodine, the pain lost much of its frequency and severity, whilst the general health also improved. The diet was kept as much as possible of a vegetarian type, and no alcohol was allowed. The patient was seen occasionally after his discharge, and was at times liable to a slight return of the pain. Recent inquiries have failed to trace his present address.

CONCLUDING REMARKS.

Under the treatment described all the cases improved, and lost the pain for a time, although it had existed for prolonged periods. Yet these were cases sent to the surgeon for the express purpose of operation because medical treatment had failed or was regarded as useless; and they might, on that showing, have been operated forthwith as intractable cases. In all of them the evil day has been postponed; in some perhaps indefinitely. How far operation may be postponed or ultimately avoided in individual cases is one of the questions for solution. The answer to this depends upon the capabilities of medical treatment when tested on a much larger scale than the present one. A radical cure, one which would compare with the cure of a neoplasm by the removal of the growth, is not to be expected; if the affection is largely functional a renewal of its occasioning causes must revive it; but the temporary relief afforded is in itself evidence that the ailment is not necessarily a progressive one, and that it may be amenable to treatment, even when of old date. If the symptoms can be checked once, may they not be checked again, and as often as there may occur any sign of a relapse? This question is partly answered by some of the cases, but should be put to a wider test. Lastly, it is still a question

* For some important particulars I am indebted to Mr. Bennett's lecture on Tic Douloureux, *Clinical Journal*, 1894.

whether the series given has been a specially favoured one, and whether cases may occur of a still more severe type, upon which no impression can be made by medical treatment. Upon all these points, as well as upon the question as to the method and details of the treatment, this paper aims at eliciting valuable information which may be available, though not yet recorded. It may also be of some use in pointing out that it is desirable, in every case proposed for operation, to inquire closely, not only whether medical treatment has been applied, but in what form.

REPORT OF SOME CASES OF STOPPAGE OF RESPIRATION DURING CHLOROFORM ANÆSTHESIA TREATED BY TRACHEOTOMY.

WITH THE REPORT OF ONE FATAL CASE OF CHLOROFORM ANÆSTHESIA.

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CASES OF ARRESTED RESPIRATION: RECOVERY.

THE frequent occurrence of recorded cases of death during chloroform anæsthesia has led me to submit these short notes of the following cases, which occurred in the Victoria Infirmary, Glasgow. They may be of interest as indicating a method of treatment on which greater stress might be laid by those who are responsible for the instruction of students of surgery. In the cases here recorded there is no need of discussing whether the respiration or the heart failed first, as in all it was noted that the heart continued to beat during the stage of apnoea.

None of the patients had undergone the usual preparation for chloroform, with the exception of Case i.

CASE I.—J. H., aged 44, was admitted in September, 1895, with necrosis of the femur. The heart and lungs were normal. Chloroform was administered by Mr. W. E. Macharg, M.B., C.M., House Surgeon. Violent struggling occurred during the first stage. This subsided as anæsthesia progressed. The pupils were well contracted, and anæsthesia otherwise seemed complete. Without warning sudden stoppage of the respiration took place shortly after the operation was begun. Artificial respiration, which was at once started, did not cause either air to leave or enter the chest. Tracheotomy was immediately performed by Dr. Parry, Visiting Surgeon, and then—but not before—did artificial respiration have the desired effect of initiating normal breathing. The administration of chloroform was resumed, and anæsthesia continued without a hitch till the end of the operation.

CASE II.—N. T., aged 32, was admitted in November, 1895, with mangled fingers—the result of an accident. The heart and lungs were normal. Chloroform was administered by Dr. Primrose, House Physician. Violent struggling took place, accompanied by voluntary apnoea. The struggling and straining subsided shortly, but the breathing remained laboured and obstructed, though the patient was well under the anæsthetic. One finger had been removed, and while another was being amputated respiration suddenly ceased. This took place about ten minutes after the inhalation of chloroform had begun. Three or four heaving movements of the chest and abdomen, simulating the ordinary rhythmical movements of respiration, were noticed, but no air either entered or left the chest. The jaw was raised well up, the tongue pulled out, and the epiglottis hooked forward with the point of the finger, but still breathing could not be made out. Artificial respiration was then begun, but proved useless, as in Case i. The patient meantime had become profoundly cyanosed. The pupils did not dilate. I hastily performed tracheotomy, and was greatly relieved to hear air whistle into the lungs through the opening in the trachea, which was kept patent, at first by the blade of the knife placed transversely. Chloroform was continued through the tube till the conclusion of the operation without further trouble.

CASE III.—R. T., aged 17, was admitted in November, 1895, with crushed fingers. The heart and lungs were normal. Chloroform was administered by Mr. A. R. Anderson, M.B.,

C.M., House Surgeon. Violent struggling occurred during the initial stage, soon followed by quiet and regular respiration with complete anæsthesia and well-contracted pupils. Twenty minutes later, towards the end of the operation, some heaving movements of the chest and abdomen were observed, and were considered to indicate the onset of sickness. Nothing, however, was vomited, and at the same time it was noted that the respiration was not quite so satisfactory. The throat was cleared, and respiration again became free and regular for some little time. Then the same violent, jerky movements of the chest and abdomen were again observed. These may have been due to sickness, but probably they were movements of inspiration. The tongue was drawn out, and the head allowed to hang over the end of the operating table. Artificial respiration was started. Breathing apparently was resumed, but only momentarily. It then ceased completely, and—as in the former cases—artificial respiration proved useless. Tracheotomy was immediately performed by Dr. Parry. This was at once followed by a long inspiration, and by the continuance of natural respiration till the end of the operation. On returning consciousness the patient vomited a few lumps of semidigested apple, and if the spasmodic movements referred to were due to retching, then a piece of apple blocking the trachea might have given rise to the symptoms. There was, however, no cough either then or later on.

THE CAUSES OF ARREST OF RESPIRATION.

In all the foregoing cases the heart sounds were normal. None of the patients were anæmic or debilitated, and indeed in Cases ii and iii they were quite the reverse. They were all males. Duncan, Flockhart and Co.'s pure chloroform was employed in all cases. Struggling during the first stage was a marked feature in all, and was accompanied by voluntary apnoea. The failure of respiration in all took place within the first twenty minutes of anæsthetising. It was noted in all that the thoracic and abdominal muscles continued to act after respiration had ceased, thus demonstrating the well-known fact that movement *per se* of chest or abdomen, or both, is no reliable or positive indication of true respiration. In none of the cases could the failure of respiration be due to a central cause, as the appearance of the patient and the course of the symptoms were undoubtedly due to peripheral obstruction, probably laryngeal, as traction on the tongue and epiglottis had no beneficial effect whatever. The dangerous condition is due to the straining, and begins before anæsthesia is complete.

The late Sir G. H. B. MacLeod used always to teach "that to push the administration of chloroform during this phase of its action was a very dangerous procedure."

This obstruction to breathing may become complete after the lapse of a shorter or longer time, but long before the respiratory centre could possibly be depressed. The obstruction may be due to one or more of the following causes:

1. Tenacious secretion in the larynx or trachea.
2. Spasm of the chords.
3. Oedema of the larynx.
4. Vomited matter.
5. A combination of two or more of the above conditions.

1. *Secretion*.—It is the rule, rather than the exception, for the chloroformist to be greatly annoyed by the increased secretion, but this *per se* would not cause such obstinate obstruction, as in the cases referred to, pressure on the chest, as a preliminary act in artificial respiration, did not cause air to be expired.

2. *Spasm*.—This might be due to (1) a reflex cause at a stage when the patient is insufficiently anæsthetised, a condition which did not exist in the above cases; or (2) to a spasm at first voluntarily maintained, but soon passing into a species of involuntary cramp. This is a possible explanation.

3. *Oedema of the Larynx*.—As is well known, oedema of this organ is readily induced, and often suddenly becomes extreme, thereby producing complete laryngeal stenosis. Is it not possible that the prolonged straining may give rise to this condition, a condition which might be called traumatic oedema? This oedema would explain the persistency of the obstruction, which persistency was present notably in Case ii, and was almost demonstrated by the fact that when the tracheotomy tube was withdrawn during the operation,