

part of the sac; these bands surrounded and constricted the intestine.

Pelletan* endeavoured to return the tumour of six days' duration. The greatest portion returned with a noise, which could be heard by all present, but the patient died during the day. *Post-mortem examination*: General inflammation of the peritonæum, with old adhesions. A portion of omentum remained outside the ring, forming a fatty tumour. Above the ring was the portion of ileum which had protruded, of a red colour, and adherent to the hernial sac above the ring. The sac was filled with bloody serum.

In another case related by Pelletan,† the hernia accompanied by testicle internal to the ring, was reduced by taxis. The symptoms however continued, and the patient died fifteen days after. *Post-mortem examination*: Effusion in abdominal cavity. The portion of gut had pushed the peritonæum before it, and contracted adhesions between it and the testicle, and was constricted between the latter and the edge of the ring.

I would also refer to my own case at the Charing-cross Hospital, already related as a proof of the necessity of careful examination of the internal ring in the operation for strangulated hernia.

Bush‡ gives the account of a case of inguinal hernia, which was several times reduced by the taxis, and as frequently protruded without abatement of symptoms. The patient died on the third day. A membranous band crossed over the intestine in the abdomen, binding it down, and causing strangulation.

The gut, also, from the constriction to which it has been subjected, may become so contracted as not to allow the passage of the contents of the alimentary canal, although relieved from all external pressure. Ritsch§ mentions an instance in which the gut was returned by operation into the abdomen, but the symptoms continued, and the patient died. The intestine was so much contracted at the two points of constriction, that the canal was entirely obliterated. Mertrud and Contavoz|| relate similar facts.

But by far the most frequent cause of failure of the taxis, is the return of the hernia sac, and all the return, *en masse*, of eighty-four cases, the particulars of which I have collected, wherein the hernial tumour had apparently been reduced, but without relief to the symptoms, forty-four are examples of "*réduction en masse*."

The foregoing, whilst they prove in what manner the taxis may be unsuccessful, are certainly strong arguments against the adoption of Petit's operation, the same causes of failure would exert their influence in either proceeding, whether of taxis or operation, whilst in the usual method they would be ascertained at the time of operation. It should be borne in mind, that these complications are not met with in merely isolated instances; they are far too numerous to be disregarded in the selection of the mode of operating, and I would submit that having the choice of operations, with these examples before us, we are not justified in adopting Petit's operation.

Harley-street, August, 1849.

THEORY ON THE PRODUCTION OF HEMICRANIA.

By DR. AUZIAS TURENNE.

(Translated by F. BATEMAN, of University College Hospital, and Member of the Faculty of Paris.)

HEMICRANIA¶ is a pain in the head resulting from the compression of the trifacial nerve, and more particularly of its ophthalmic branch, caused by the accumulation of blood in the sinuses of the base of the cranium, and especially in the cavernous sinuses. This precise definition excludes, as being distinct from hemicrania, various pains which are often confounded with it, at the same time that it admits of others which are not limited to one side of the head. Contrary to the etymology and usual interpretation of the word, true hemicranial pains—that is, pains resulting from one and the same cause, (compression,) and presenting the same characters—occupy at one time a circumscribed portion of the head, and at other times occupy, more or less, both sides of the head. Pains of this description are sometimes observed to be alternately general and local during the same attack.

The above definition of hemicrania is exact, if the theory

of which it is the expression is admissible; and I think no authenticated fact will be found irreconcilable with it.

In a short essay, I can only present the *resumé* of my researches in the form of propositions, which I shall divide into two groups:

- I. Facts on which my theory is founded.
- II. Objections which have been made to it.

I. *Facts in Proof of the above Theory.*

1. Of the three divisions of the trifacial nerve, its ophthalmic branch and its ramifications are the principal seat of hemicrania. Now this branch and its ramifications are situated in the external wall of the cavernous sinus, with which they have vascular connexion, being separated from the blood contained in the sinus by a very thin layer.

2. The superior and inferior maxillary branches of the trifacial are sometimes the seat of hemicranial pains, especially when a movement of the head backwards tends to displace those which have their seat in the parts supplied by the ophthalmic division. This movement directs the blood of the cavernous sinus into a venous plexus, to which, from its situation, I have given the name of "supra-petro-sphenoidal," and also towards the anterior extremities of the superior and inferior petrosal sinuses. Now the anterior extremities of the above-named sinuses and the supra-petro-sphenoidal plexus are in relation with the Gasserian ganglion. The pressure of the venous blood on the motor portion of the trifacial is sometimes sufficient to produce spasmodic movements of the lower jaw, and especially its involuntary closure against the upper.

3. Nausea and vomiting often accompany hemicrania; they are caused by the compression of the eighth pair at the foramen lacerum posterius, or along the neck; for in the latter region the common carotid or the internal carotid artery, the pneumogastric nerve, and the internal jugular vein, are in the same aponeurotic sheath, and the vein is susceptible of considerable dilatation. The compression of the pneumogastric nerve must result from this dilatation; and it is especially by a movement of the head backwards, during hemicrania, that nausea and vomiting are produced, although this movement is calculated to diminish the acuteness of the pain.

4. During hemicrania the frontal vein is distended; the eyes, or that of the affected side only, are red, swelled, painful, and suffused with tears; vision is sometimes disordered. This results from the distention of the ophthalmic vein, which empties itself with difficulty into the anterior extremity of the cavernous sinus,* and from the compression, at the trunk of the nerve, of those fibres of the ophthalmic which are destined to be distributed to the eye, the conjunctiva, the lachrymal gland, and the eyelids.

5. In hemicrania each pulsation of the internal carotid artery corresponds with a shooting pain. This results from the dilatation of the artery, which thus diminishes the cavity destined for the venous blood in the cavernous sinus.

6. Epistaxis is often critical in hemicrania. Now the veins of the nasal fossæ, and more particularly the sphenopalatine veins, communicate freely with the cavernous sinuses.

7. Hemicrania sometimes ceases at the establishment of the catamenia, and reappears at the change of life; for we can readily understand that the flux of blood towards the pelvis, by diminishing the quantity which the vena cava conducts into the right auricle of the heart, leaves more room for the blood which enters the same auricle in following the course of the internal jugular veins and of the vena innominata. We can also understand that when this determination towards the pelvis ceases, the congestion and the varicæ of the sinuses (if I may be allowed the expression) can and must reappear. It is by an analogous mechanism that the good effects of enemas and emetics are explained. These means moderate the activity of the blood which circulates from below upwards in the inferior cava, at the same time that they diminish its quantity; they also improve the state of the alimentary canal, thus placing it in a condition favourable for the cure of hemicrania.

8. Patients during their attacks are subject to two actions, provoked partly by the pneumogastric nerve, gaping and stretchings of the body.

Now, physiology shows, first, that gaping is under the influence of the motor portion of the trifacial nerve; and that stretchings of the body which accompany gaping are under the influence of the motor portion of the spinal nerves, which, as we shall explain farther on, are in relation, at their passage through the intervertebral notches, with veins having

* Op. cit., p. 349. † Op. cit., p. 394. ‡ Medical Gazette, vol. x.

§ Acad. de Chirurg., vol. xi, p. 271. || Idem.

¶ The proper translation of the word "migraine" is hemicrania, but in consequence of the extended sense in which Dr. Auzias uses that word, I have sometimes translated it by "hemicrania," and at others, by the more generic term of "headach."—F. B.

* "Veins of the exterior of the head have been known to burst in violent cephalalgia."—(Bichat, Anatomie Générale, p. 176.)

large communications with the venous sinuses of the base of the cranium; second, that these actions have both, for result, the introduction into the thorax of a larger quantity of air and of venous blood. Can we fail to recognise, in this, the intervention of a salutary instinct, the mechanism of which operates under our eyes?

To the data furnished by physiologists I shall add some remarks. At the interior of the cranium the cavernous sinus and the plexus which I have called supra-petro-sphenoidal communicate freely with each other, and from this communication results a large reservoir of venous blood. Outside the cranium the pterygoid, masseteric, and alveolar plexuses communicate also freely with each other, and constitute a second reservoir of venous blood. These two reservoirs communicate with each other by veins which traverse the sphenoidal fissure, the foramen rotundum, the foramen ovale, the foramen spinosum, the carotid canal, and other foramina. When the pterygoid muscles, by their contraction, put the lower jaw in motion, a vacuum is made in the inferior reservoir, which is instantly filled by blood from the superior reservoir, and consequently from the cavernous sinus.

9. The acuteness of hemicrania diminishes during inspiration, and increases during expiration, or whilst the breath is held; or, in other words, it diminishes whilst the venous blood arrives towards the heart, and increases in opposite circumstances.

10. I am aware with what caution we ought to accept the accounts of our patients, but they become valuable when they are in accordance with the observations of medical men. Many patients complain of their head being split as with a wedge. It is the parts of the head occupied by sutures, and more particularly the sagittal suture, that they designate as the seat of these splittings. Authors quote cases, and I myself have seen two, in which a separation of the parietal bones could be felt through the scalp and occipito-frontalis muscle. Other practitioners have discovered, at the post-mortem examination of persons who had suffered hemicrania during life, the separation of the sagittal and of the petro-occipital suture.* Did these separations indicate that the sutures had never been formed on account of the distention of the sinuses, or were they the result of the absorption of the articular margin of the bones? I am inclined to admit the latter explanation; whichever may be the correct one, the phenomena themselves are positive and conclusive, and my theory, founded on the distention of the sinuses, is the only one that can agree with them.

11. Without entering in a detailed manner into the consideration of the different positions of the head which relieve hemicrania, I would add that they are those which empty the cavernous sinuses, whilst the contrary positions increase it. Let one bend his head forwards, and the pain will be acute; let the head be directed backwards, and kept in that position for some minutes, and the pain will disappear, or, at all events, diminish. It will be more effectually treated, if, at the same time that the head is carried backwards, it is inclined towards the affected side, because by this means the middle lobe of the cerebrum ceases to press on the cavernous sinus of that side. This sinus, as, indeed, all the others, is compressible; I have been able to satisfy myself of this on the dead subject, by causing the blood to move by very slight pressure. By inclining the head backwards, together with the whole body, as, for instance, when reclining in an arm-chair, a relief less prompt and less complete is obtained than when the head is carried backwards alone, which, by the admission of all surgeons, endangers the introduction of air into the open veins during operations on the neck; this result is more particularly to be feared when this movement of extension of the head is combined with one of rotation. I made the following experiment on the dead subject: having removed from the back part of the neck all the muscles which cover the bones, thus exposing the mastoid and posterior condyloid foramina, I then carried the head backwards, together with the whole body, but scarcely a drop of blood escaped from the above-named foramina. I afterwards directed the head backwards alone, when the blood flowed freely from these foramina, and the flow of blood was much more abundant when I combined the movement of extension of the head with a slight movement of rotation. Whatever explanation may be given to these phenomena, it is fully proved, that by paying attention to the position, direction, and inclination of the sinuses, to their communications with each other, and with the veins outside the cranium, we can arrive at a precise knowledge of the

positions and movements calculated in many instances to prevent an attack of hemicrania, in all to render it less intense, and sometimes to dispel it altogether. I have never failed in obtaining the above results when I have requested the patients to place themselves in certain positions, in which they could remain during an attack without experiencing acute pain. I have often found it advantageous for the patients to walk about, and to execute sudden movements, thus producing an emptying of the sinuses. I content myself with mentioning these means; further considerations would lead me from my present subject into the domain of therapeutics.

12. Pains similar to those of hemicrania have been caused by an engorgement resulting from contusions, or from the presence of small tumours in the neighbourhood of the ramifications of the ophthalmic nerve. A simple pressure with the finger on one of the cranial ramifications of the trifacial nerve, the use of a tight headress, especially during hot weather, occasion pain similar to that of hemicrania, but evanescent as the causes which produce it. Who is not aware, that in coryza the simple congestion of the pituitary membrane, whose relations with the trifacial nerve are incontestable, is sufficient to cause a species of headach?

An attack of this kind is more obstinate than that of ordinary headach, because the cause cannot be immediately removed; but as this cause is transient, or rather accidental, this description of headach, which is never very severe, does not often recur. I have twice given myself hemicrania by compression of the two internal jugular veins against the spinal column; another time I produced the same result by pressing one of these veins between the fingers. These artificial headachs do not long resist the gymnastic treatment mentioned above. Headach has often no other cause than a tight cravat. These facts are easily explained by my theory of the engorgement of the sinuses.

14. Great mental exertion, intense study, especially if during digestion, deep emotions, respiration of air loaded with carbonic acid gas, &c., provoke the appearance of headach, all these circumstances being causes of accumulation in the head of venous blood.

15. Old people are generally exempt from headach, because with them the sinuses of the base of the cranium, and particularly the cavernous, the inferior petrosal, the circular, the basilar, are enormously developed, and therefore the blood is never obstructed. Besides, the walls of these sinuses in old people are hardened, and sometimes ossified, and the trifacial nerve and its ophthalmic branch, endowed with less sensibility at this age, are more efficaciously protected.

16. Hemicrania has a preference for the left side of the head; this side is more likely to be deficient in outlets for the venous blood, in consequence of the lateral and inferior petrosal sinuses, and the internal jugular vein of the right side, being often more developed than those of the opposite side; the posterior condyloid and the mastoid foramina are also often deficient on the left side, or, if existing, are smaller than on the right; it also frequently happens, that all the blood which circulates in the superior longitudinal sinus empties itself into the right lateral sinus, and thus gives an impulse to its circulation; besides, the right internal jugular vein is continued in almost a straight line by the vena innominata and the superior cava, a circumstance which facilitates venous circulation, and which does not exist on the left side. This predilection of headach for the left side is not universal, as in some persons it has been observed to affect principally the right; but we are aware that the anatomical differences above mentioned may not exist, or even be transposed, so that the left side possesses the greatest advantages for the venous circulation.

17. There is in hemicrania a striking contrast between the intensity of the pain and the importance of the prognosis. This contrast is easily explained by my theory; a gentle compression, and consequently one attended with no danger, suffices to awaken the sensibility of nerves which are highly sensible.*

II. Objections which have been made to the above theory.

1. The motor oculi and abducens nerves are in the external wall of the cavernous sinus with the ophthalmic nerve. Why in every headach does not their compression excite involuntary movements in the muscles which they supply?—Answer:—

* M. Blandin, an anatomist whose scientific probity is contested by no one, has observed that the pretended Pacchionian glands abound in the sinuses of those who have suffered headach. Are these granulations to be considered as cause or effect, or is their occurrence merely accidental? If the first hypothesis is admitted—that is, if they are considered as the cause of headach, they must necessarily protrude into the interior of the sinuses, and impede the circulation.

* During extreme pains, sutures sometimes separate, as was observed in the skull of Pascal after his death; instances of this will also be found in Hippocrates, Galen, and other authors.—(Palfin Anatomie Chirurgicale.)

Involuntary movements have sometimes been observed, but rarely, because the most gentle pressure on a sensory nerve is sufficient to excite pain, whilst, on the other hand, a motor nerve will suffer considerable pressure without giving rise to the spasmodic contraction of the muscles which receive their ramifications from it. The compression of the ulnar or median nerve causes pain, but not spasms, unless voluntary action is suspended. We know that sensibility is involuntary, and that motion is voluntary.

2. Headaches have been observed to result from decayed teeth, and to cease after their extraction.—Answer: Pain is an element of irritation, which in this case is often a cause of congestion. Pain, especially of this kind, causes wakefulness, which in its turn becomes a cause of congestion towards the head. I would observe that pain resulting from carious teeth resembles hemicranial pains without being of the same nature. The diagnosis of hemicrania, according to my definition, offers occasionally some difficulty.

3. Often, during hemicrania, we find tinnitus aurium, and either great susceptibility or dulness of hearing.—Answer: These symptoms are explained by the relations of the Gasserian ganglion with the supra-petro-sphenoidal flexus, by those of the auditive and facial nerves with the inferior petrosal sinus, and especially by the relations of the glosso-pharyngeal nerve, which sends ramifications to the Eustachian tube, and which is also in connexion with the internal jugular vein. I would also add, 1. That the mastoid portion of the temporal bone is abundantly provided with foramina, some of which communicate with the mastoid cells, whilst others less numerous communicate with the lateral sinus. 2. That between the upper surface of the petrous portion and the squamous portion there exist foramina, giving passage to veins which empty themselves also into the lateral sinus. 3. That the aquæductus vestibuli and aquæductus cochleæ are traversed by two veins which empty themselves into the internal jugular vein, or into the lateral sinus very near the commencement of that vein. The circulation of the tympanum is thus intimately connected with that of the lateral sinuses, and internal jugular vein. The relations of the facial nerve with the inferior petrosal sinus explain also the involuntary contractions of the muscles of the face, of which some authors speak.

4. Pains are sometimes experienced during headach in the course of the nervus occipitalis major, and even along the neck and arm, as far as the elbow.—Answer: Large veins traverse the intervertebral notches in the cervical region conjointly with the cervical nerves, and these veins have communications with the sinuses of the base of the cranium. Why should not the relations of these veins with the sensory portions of the vertebral nerves account for phenomena identical with those resulting from the relations of the sinuses with the sensory portions of the cranial nerves? Besides, the communications of nerves with each other ought to be taken into consideration in the explanation of the propagation of pain.

5.—Since the whole trunk of the trifacial, or at least its ophthalmic branch suffers pressure, how is it that the pain is not propagated in the direction of all the ramifications of the compressed nerve.—Answer: It may happen that pressure, although existing at the trunk of the nerve, is only made on those filaments of the nerve which go to supply the painful parts; but without admitting this, facts quite as inexplicable abound in the archives of science, touching other diseases. For instance, the entire pleura is inflamed, and pain is felt in one point only. The spine is deeply, and to a great extent, affected, and nevertheless pain is localized on a portion of a limb.

6. Headach is often a symptom of difficult digestion.—Answer: I think this is true in the majority of cases; but must we not admit that unwholesome food introduced into the stomach, or wholesome food introduced into a diseased stomach, determines an abnormal stimulus, the result of which is an incomplete action of the organ, and the production of an imperfect chyle? Now this chyle is converted into blood, but into vitiated blood, which produces a languid circulation, and it is by the participation of the sinuses of the base of the cranium in this state of the circulation, that headach is produced. If, then, persons subject to disorder of the stomach are not all subject to headach, it is because each person has his morbid predispositions, and that which in one person causes headach, in another produces some other affection. I am far from denying the relations of headach with disorders of the stomach; nor do I deny its relation with the nervous susceptibility of individuals. I am aware that sometimes headach declares itself immediately after the ingestion of food into the stomach; but I question whether headach and gastric disorder

are not in many instances under the influence of the same cause, and consequently not produced one by the other.

7. Infusions of coffee and other stimulants have been used with very good effect in preventing and dispelling attacks of headach.—Answer: These stimulants give to the stomach, and more particularly to the organs of circulation, the activity which they wanted. An arterial congestion would have been increased by their use, *ergo*, a venous congestion is diminished.

The relations of the vertebral, and more especially of the carotid arteries, with the great venous reservoirs of the head and neck, show how much their circulation, accelerated by stimulants, must react on the venous circulation.

8. Food taken in moderate quantities, and well masticated, has dispelled attacks of headach.—Answer: This explanation is the same as that given to the preceding objection; besides, as I have already observed, the movements of the lower jaw produce a vacuum in the pterygoid venous plexus, which is instantly filled by blood from the cavernous sinus.

9. Narcotics have, it is said, cured headach.—Answer: I am more disposed to think they have relieved pain by striking the nerves with stupor. They have acted on the effect, without favourably modifying the cause, unless they have been able to displace the existing congestion. Besides, I have never stated that every engorgement of the sinuses was accompanied or followed by headach, but that headach is under the dependence of the engorgement of the sinuses. I do not by this deny the existence in nerves of a certain predisposition which may be modified by the action of medicines. I will add, that narcotics more often cause headach than they cure it.

10. Certain headaches pass from one side of the head to the other, or from the anterior to the posterior part of the head, &c.—Answer: Many other kinds of pain are subject to these migrations, without our being able to explain the reason. Here, on the contrary, the communications of the sinuses from before backwards, and from side to side, admit of no doubt about the explanation to be given to the greater part of the erratic headaches. These headaches are not generally very obstinate, because the easy displacement of the blood in the sinuses, whatever may be its cause, regularizes the intra-cranial venous circulation.

11. The day after a headach, the person feels in better general health, and is free from the affection for some time.—Answer: This is not always the case; besides, it can be explained by the salutary repose to which the organs have been condemned.

Conclusions.

1. Hemicrania implies moderate compression of a sensory nerve, and particularly of the trifacial.

2. The causes of this compression are some venous reservoirs gorged with blood, and particularly the cavernous sinuses.*

3. The treatment ought to consist, 1st, in preventing the compression, which constitutes the prophylaxis of headach. It borrows its means of action from hygiene. 2nd. In palliating its effects by movements and positions of the head, &c., this constitutes the palliative treatment, and its means of action are borrowed from gymnastics. 3rd. In removing these effects, this is obtained by the co-operation of gymnastics and of stimulating, depleting, and other medicinal substances.

4. The cause of the accumulation of blood in the venous reservoirs of the base of the cranium ought by no means to be neglected.

Reviews.

The Scalpel; a Journal of Health adapted to Popular and Professional Reading, and the Exposure of Quackery. Edited by EDWARD H. DIXON, M.D. Published by the Editor. New York: Ring; Marriner & Lockwood; Dewitt & Davenport.

WE have before us two numbers of this periodical, which has been established within the present year. We rejoice to perceive that the editor is a fearless castigator of abuses; treading in our footsteps. In fact, both in name and nature, we may look upon this Journal as a descendant of our own production. Had there been no LANCET in Europe, there would have been no *Scalpel* in America. Our semi-namesake operates boldly, and no doubt with good effect. In his very first

* In certain cases there probably exists a true congestion of the trunks of the trifacial nerve.