An Address

ON THE

TREATMENT OF FRACTURES OF THE BASE OF THE SKULL.

DELIVERED BEFORE THE BORDER COUNTIES BRANCH OF THE
BRITISH MEDICAL ASSOCIATION.

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FRACTURES of the base of the skull have a death-rate nearly treble that of the vault alone; while the death-rate of fractures of the vault amounts to 20 to 25 per cent., that of the base is no less than 60 per cent. This difference is due to several causes. The functions of the basal parts of the brain are more important and more necessary to life than those of the hemispheres. Close to the base are situated the nerve centres for respiration and the cardiac centres. Injury to these is attended by great immediate risk. The base of the skull is pierced by many foramina through which pass blood vessels, and these when injured are often the sources of fatal haemorrhage. It is true that in contact with the vault lie numerous venous channels (the sinuses) and a few small arteries, and that these do get injured by fractures of bone, but the blood flows in these, specially in the sinuses, with very little force. It is seldom that danger results either from actual loss of blood or from pressure on the brain by effused blood so long as the injury is confined to the vault. Another element which has to be considered is that while only a moderate proportion of injuries to the upper part of the skull are compound, almost all fractures of the base are so. This last is the preponderating cause of the heavy mortality of this latter injury. The skull in many parts of the base is thin and thinly covered. When the bony case is broken a communication is established between the pia arachnoid cavity and either the upper part of the nasal cavities or the pharynx or the external meatus of the ear. A common fracture is through the sphenoidal cells, the contents of which may or may not be in a healthy condition. A fracture which damages the petrous portion of the temporal bone opens into the external meatus, and creates a channel through which soaks the cerebro-spinal fluid. This flows into the meatus, which may contain dust and cerumen of unclean kinds. The fluid can itself be a breeding medium for organisms. A basic fracture may involve any of the three cups which form the seat on which the brain rests, but the middle fossa is the one most commonly implicated, and even when fractures originate elsewhere they very commonly extend so as to involve it.

Probably injuries which open the subarachnoid space into the nose or pharynx involve less danger of sepsis than those which communicate with the external meatus. The external openings of the nasal cavities and of the mouth are a long way from the site of any fracture of the base, and the channels act as filters for the air. So that, unless the fracture is the result of direct violence, there is a better chance of internal sepsis being avoided than when there is a communication between an unclean ear and the interior of the skull. A very usual story with a fracture of the base is immediate insensibility after the accident, generally amounting to deep coma. After a time, which varies much, this gradually passes off, and the patient seems to be doing well till the third, fourth, or fifth day. Then he complains of severe headache, and light distresses him. He is seen to be flushed and restless; presently he vomits. His pulse is either abnormally slow or unduly fast. Jactitations, delirium, and convulsions follow, and then as a last stage paralysis of sphincters and advancing general muscular paralysis. Profound coma ends the scene. This is so common a story as to form a type of sequences. The original lesion has not been a necessarily fatal one by direct damage, but septic meningitis has occurred, and has produced the symptoms and the final result. My purpose in reading this paper is to ask you to consider on the occurrence of a basic fracture what can be done to prevent it running this course. I believe that we are too much

in the habit of acting on the idea that we can do nothing in such cases. We are apt to accept the belief that a certain (small) proportion will get well, and another (large) proportion will die, and that nothing we can do will alter the event in either. After making, however, a reasonable allowance for the increased danger resulting from the position, there ought not to be the very marked difference in death-rate which exists between compound fractures of the vault and of the base. If we could treat the latter as we do the former, there seems every reason to believe that there would be only a small difference in results. The vault fracture is washed till it is clean, detached bone or badly-damaged tissue is removed. The scalp is shaved and cleansed. Cerebro-spinal fluid is received in a copious clean dressing renewed sufficiently often, and as a consequence such injuries even when extensive do very well. The effect of taking too grave a view of the seriousness of a lesion is that no effort is apt to be made to do everything possible to help recovery. The two cases which I now report show some suggestive features.

CASE I.

In August of 1902 a man aged 47 was thrown from his bicycle, and was picked up completely unconscious. He was seen soon after by my friend, Dr. Helm, with whom I saw him early the following day. There had been considerable bleeding from the right ear, followed by a copious flow of clear fluid. He was still deeply unconscious. We had his head shaved, the right outer ear well washed out, packed with boric acid, and a large absorbent dressing applied to the right side of the head. With the assistance of his employer a good nurse was engaged to attend to him, and she was instructed to change the dressing and fill the concha with boric acid as soon as discharge appeared externally. He was fortunate in his nurse (Walsh), who attended to him most assiduously. For some days the discharge was very copious, and the dressing was renewed every two or three hours. As time went on the intervals between dressings grew longer, and in the third week the serous discharge ceased entirely. At the end of five weeks there was a slight return of consciousness; he could be stimulated to move a little. In another week he had some understanding of what was said to him. Gradual improvement in cerebral power occurred, but for a long time it was far from being equal to what it had been before the accident. He is now in good health.

CASE II.

Three years and a half ago a lady was returning from a morning ride. She was followed by her groom at 50 to 100 yards behind her. She came to a sharp turn in the road to the left, and was out of sight of the groom for a short time. When he turned the corner she was lying on the ground insensible, the horse standing near her. The road was hard and dry with a very smooth surface. The probability is that in turning the corner the horse lost its footing, came down, and threw her. There was a mark on its near shoulder. She was seen almost immediately by Dr. Symonds, and in the course of about four hours by myself. She was profoundly unconscious with stertorous breathing; a blood-stained discharge was coming from the right ear, and there was a large swelling due to injury just above the left brow and temple. There was no subconjunctival ecchymosis.

I was not able to eliminate with certainty the existence of a depressed fracture of the frontal bone. The edge of a haematoma often feels very like the margin of a depression of bone, but with rare exceptions it is possible to make out by palpation which is present. In this case the swelling was large. The bone could not be felt below the soft centre, and the edges gave an impression of greater hardness than usual. I was consequently in doubt as to whether this frontal injury was merely to the scalp or also to bone. Owing to the distance from Carlisle some delay occurred in making arrangements for operation, and nearly twelve hours elapsed from the receipt of injury before we were ready to begin. The patient's condition remained unaltered.

A horseshoe-shaped flap was raised at the seat of injury. The skull there was found intact. I trephined it with a medium-sized instrument. The dura mater was incised by crucial cuts. The fluid which escaped was not stained with blood. The four flaps of the dura mater were drawn together by catgut stitches. A small drainage tube was inserted through one limb of the incisions in the dura. The flap of scalp was replaced and sutured. The meatus of the right ear was cleansed and packed with boric acid. It was noticed that there was slight return of sensibility immediately after the operation. Stimuli caused movements, which they had not done before it. Improvement was continuous from this time forward. The drain was left in for four days, and then removed. Three days after the injury she was able to talk and express her wishes. The unconscious stage was succeeded by one of extreme irritability and altered disposition. This, again, in about three weeks had subsided to a normal state, except that headache was easily excited. Subconjunctival ecchymosis appeared during the night following the injury, and discoloration behind the mastoid from effused blood showed itself three days afterwards. There was no further escape of cerebro-spinal fluid from the right ear after the trephining. At first there was free discharge by the drainage tube,

[2504]

but day by day this diminished. When the tube was withdrawn it continued for a few days, and then entirely ceased. The wound was quite healed in about ten days. Recovery was ultimately perfect.

In boric acid we possess an antiseptic admirably fitted for keeping the external ear and meatus in an aseptic state. It is used dry, but has the property of ready solubility. When in contact with a fluid discharge it first becomes converted into a paste and then undergoes complete solution. It cannot form a retaining plug. It is easily used, and can be managed by an untrained attendant. There is no means of making an effective application or employing any useful treatment to the nasal or pharyngeal cavities. External cleanliness and pure air we can secure. We can see that decayed teeth are removed from the mouth and that proper attention is given to cleansing it. I think, however, that in the treatment of fractures opening into these cavities and into the external meatus trephining may prove to have a useful place. The continual oozing of cerebro-spinal fluid is an important factor in the evolution of septic meningitis; not only does it establish a water way to the interior of the skull, but it produces a sodden state of the tissues very favourable to sepsis. A trephine opening and drainage of the subarachnoid cavity prevents the fluid being under tension and allows it to escape by an arranged safe route. From investigations made in connexion with spinal drainage it apparently does not much matter what part of the cavity is opened; tension is equally relieved by a spinal as by a cephalic drain, but in head injuries there is a practical advantage in placing it at the seat of injury, in that it allows an investigation of the skull and brain at that point which is likely to have suffered from the direct violence. Of lumbar puncture or drainage I have no experience in these injuries. It may be that in the future these will prove useful, but the directness of the trephine opening is to me a recommendation. The opening for drainage is large and not liable to the blocking which may easily close a small tube.

A Lecture

ON

ASTHMA.

DELIVERED IN THE NORTH-EAST LONDON POST-GRADUATE COLLEGE.

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THERE are many varieties of dyspnoea and orthopnoea in so far as they own different causes, or present different pathological features, but apart from these, there is a distinctive idiopathic affection which is termed "asthma." It is sometimes called spasmodic or convulsive asthma, and sometimes bronchial asthma, but if we use the simpler terms "asthma" or "essential asthma" we are committed to no theory as to its pathology or its precise location. Now this disease, as we understand it to-day, has been carefully studied for at least 300 years, since that distinguished Englishman, Thomas Willis, definitely detected its individuality. It is minutely described in many treatises, and were it not that up to the present time its pathology has been the subject of incessant debate, and its treatment correspondingly difficult, there could perhaps be little justification in selecting it as a topic upon which to address you. But I hope to bring forward certain facts which may be of assistance in forming an opinion respecting the nature of this remarkable affection, and, following on that, to offer a few suggestions as to the most propitious method of dealing with it.

HISTORICAL NOTE.

Asthma was confused by the ancients with various affections of the chest. In the seventeenth century Willis recognized its specific features, and propounded the view that it was a convulsive affection of the lungs. Following him came Floyer—himself the subject

of asthma—who in 1698 defined it as due to "contractions of the bronchial muscles and the vesicles of the lungs." He also observed that "the nerves make the same sort of ligature on the arteries, as we observe by the intermitting pulse and the cold hands and feet." The theory of nervous spasm seemed to be established, and was supported by the great authority of Cullen, who flourished from 1770 to 1800. In 1807, however, Dr. Robert Bree, who was also, like Floyer, a martyr to the disease, wrote a treatise in which he combated the prevailing view of a purely nervous spasm. By cogent and ingenious arguments he contended that asthma was a strenuous effort on the part of the lungs to rid themselves of irritating matter. This irritant he believed in most cases to consist in a serous effusion which exuded into the air vesicles. He pointed out the analogies of muscular contractions in other situations to accomplish similar ends. This serous exudation he believed to be chiefly absorbed as the fit proceeded, but a certain portion was expectorated. In some cases, however, those of distinctively "dry" asthma, the irritant was "aerial acrimony" or "subtle matter." There were also certain other subsidiary species of asthma which need not concern us now. Asthma might also be caused by transference to the lungs of certain skin eruptions, by "retrocedent gout," or "viscid mucus secreted by the bronchial glands." Let it be noted that Bree admitted the element of bronchial spasm, which, however, was the outcome of no inscrutable neurosis, but served a definite and salutary purpose.

After Bree came the preponderating influence of Laënnec, who espoused the doctrine of an essential neurosis, and the distinctive views of Bree were gradually lost sight of. Since the time of Laënnec we are confronted with the spectacle of two opposing camps—the disputants concerning themselves not so much with the cause of asthma, as that is unknown, but with the anatomical conditions in the bronchi which occasion the dyspnoea, and these conditions have been narrowed down to spasm on the one hand *versus* hyperaemia or turgescence on the other.

RECENT ANATOMY AND PHYSIOLOGY.

With regard to the bronchial muscles, Aufrecht, by a special method of staining, has discovered the existence of a fine longitudinal layer, closely interwoven with the circular fibres. Herein we are furnished with a new conception of the expulsive mechanism of the bronchi, and it is evident that in the case of asthma, so soon as the imprisoning forces relax, the vermicular contractions of these longitudinal muscles would serve to expel both air and secretion. Then, with respect to their innervation, careful experiments by Dixon and Brodie have demonstrated that the sole supply is from the vagus, which contains both broncho-constrictor and broncho-dilator fibres. The bronchioles are readily constricted by various drugs (for example, muscarine, pilocarpine, barium chloride) acting either on the nerve-endings or on the muscle. This constriction is not accompanied by any congestion or secretion. In like manner, other agents (for example, morphine, atropine, hyoscyamine) cause bronchiolar dilatation. There appears to be no central tonus. The same investigators made another series of experiments with reference to the pulmonary vessels, in which it was proved that they are devoid of vaso-motor nerves. They are entirely passive, accommodating themselves readily to the needs and fluctuations of the circulation generally. Thus, when adrenalin is given via the veins, there is constriction of all the arterioles throughout the body, but the pulmonary vessels become flushed with blood, owing to the backward pressure. Indeed, it was found that when the lung itself is perfused with adrenalin solution, its vessels actually dilate. In poisoning by adrenalin, pulmonary oedema is a marked feature. Such a safety-valve action on the part of these vessels is a remarkable provision of Nature. It is to be remembered, however, that in so far as the bronchi are concerned we are dealing, though not solely, with the small bronchial system of vessels, and these are subject to the ordinary constricting effects of adrenalin. Anatomists state that the bronchial mucosa is supplied by both the pulmonary and the bronchial arteries, and in the case of the bronchioles, the principal supply is not from the bronchial but from the pulmonary artery. This becomes