native districts to such cities as Glasgow, do not obtain as complete protection from vaccination as the latter in the same circumstances, I am disposed to doubt, if not altogether to deny.

Before concluding these remarks, it may be useful to give a statement of the relative number of deaths from small-pox in every thousand deaths from all causes, prepared by the Epidemiological Society of London, and published in their Report, from official authentic sources :—

I.—IN PLACES WHERE VACCINATION IS VOLUNTARY.

London,	16	Glasgow,	36
Birmingham,	16·6	Dublin,	25·66
Leeds,	17·5	Galway,	35
England and Wales,	21·9	Limerick,	41
Paisley,	18	Connaught,	60
Edinburgh,	19·4	All Ireland,	49
Perth,	25		

II.—IN COUNTRIES WHERE IT IS MORE OR LESS COMPULSORY.

Westphalia,	6	Bohemia,	2
Saxony,	8·33	Lombardy	2
Rhenish Provinces,	3·75	Venice,	2·2
Pomerania,	5·25	Sweden,	2·7
Lower Austria,	6	Bavaria,	4

From this statement it appears that the protection of vaccination is more perfect in England than in Scotland, and in Scotland than in Ireland; that the mortality is higher in Glasgow than in any other part of Scotland; and that, with the exception of Dublin and Galway, it is somewhat less than in Limerick, Connaught, and all Ireland. But when we compare the condition of Great Britain and Ireland, where vaccination is voluntary, to that of those European countries where it is more or less compulsory, we find that, while, in the latter, deaths from small-pox are almost altogether abolished, in the former—the country to which the world owes the discovery of vaccination—its effects are least felt. Now, however, that the attention of the Government seems to be roused to the importance of the subject, it is to be hoped that the time will soon arrive when every one of the inhabitants of this country, whether dwelling in the most remote of the Scottish islands, or in the wildest parts of Connaught, will obtain efficient protection from this loathsome and fatal disease.

V. *Clinical Lectures on Surgery. Injuries of the Head, with Cases.* By ROBERT HUNTER, M.D., Surgeon, Royal Infirmary, &c., &c.

GENTLEMEN,—When, in former clinical prelections, I directed your attention to those cases of injuries of the head that from time to time presented themselves for consideration, I took the

liberty of urging upon you the necessity of studying carefully the anatomical relations of all the parts interested, as well as their physiological conditions; as without a knowledge of these subjects the symptoms which arise cannot be fully comprehended, nor the diseases themselves satisfactorily treated or cured. As the cases to which I refer were successively brought under your observation as *individual* subjects of study, it may not be useless now to view the subject in the general rather than in the particular; to take a glance, as it were, over this important field of surgery, paying at the same time due regard to the clinical character of the lecture, which should be as remarkable for the examples adduced, as for the rules or precepts inculcated. The subject, however, is one of very great importance, and cannot be too carefully considered by you all. The complex and peculiar structures involved in all injuries of the head, and the high functional importance of the brain, invest such injuries with more than common interest, and with difficulties and dangers peculiarly their own.

The liability of all such injuries to affect the brain is the essential peculiarity of such disorders. In all injuries of the head, therefore, the question of prime importance refers to the brain. Is the brain injured? and even if not directly affected, the question often arises, is the brain likely to become affected in the progress of the disease? The injuries of the head, then, that affect the *brain* are the principal injuries of this class, and demand from you a special consideration. But they are not the only injuries of this class. Those confined to the scalp and to the skull are, from the frequency of their occurrence, as well as the indirect relationship they hold to the brain, of great practical import, and cannot be overlooked. A few preliminary observations on this part of our subject will, therefore, be required.

Injuries of the Scalp.—Of late, few pure scalp injuries have been admitted into our wards. A simple and small scalp-wound is hardly sufficient to induce a patient to submit to the confinement of the hospital. The great mass of such cases as appear here, are either complicated with other more serious affections of the head, or with some injury of the trunk or extremities, and the wound of the scalp in such cases is often only of secondary consideration. And although it must be conceded that such injuries generally are less serious or dangerous than those which appertain to the deeper textures of the head, yet the relationship which the scalp bears to the brain imparts to such injuries an importance, which would not otherwise belong to them. For you must remember, that although the skull forms a wall of separation between the scalp and the encephalic mass, it is not an inorganic and impervious wall, but a living texture, permeated by vessels which inosculate with those on its outer and inner surfaces, and thus establish a vascular connection between the scalp and membranes of the brain; thus explaining, in some measure, the rationalé of the action of

blisters in internal diseases of the head, and accounting for the easy transference of a morbid state from the outer to the inner parts, and *vice versa*, as an erysipelas passing inwards, and the formation of a puffy tumour, or unhealthy state of the scalp from a morbid condition of the dura mater. We have not seen of late any such transference of morbid action in the scalp injuries that have come before us; but as this transference is by no means uncommon, you ought to be prepared for it, both in the way of prevention and cure. The cases that have lately passed under our review, whether of incised, contused, lacerated, or punctured wounds, have been of the most common description, generally requiring only the ordinary antiphlogistic treatment, and proceeding quickly to a successful issue. It is quite unnecessary to pursue this subject through all its minutiæ, either of doctrine or practice. There are certain general principles of treatment, however, which you would do well to bear constantly in mind, and which I may briefly indicate, as they lie at the foundation of all good practice, viz.:—

1st. To avoid, as far as possible, every cause of irritation to the wounded scalp, as by improper handling or dressings. No stitches should be employed.

2nd. To be extremely chary of removing any portion of the scalp, even in its most lacerated or contused states. As the scalp forms the natural and best covering for the bone, every chance of reunion should be afforded it.

3rd. To carry out the antiphlogistic treatment, locally, constitutionally, or both, according to circumstances. The extreme vascularity of the scalp, and the relationship it bears to the brain, demand this mode of treatment.

The following case explains more particularly the general characteristics and treatment of the most frequent kind of scalp injury that we meet with:—

Case I. *Lacerated Wound of the Scalp from Railway Accident.*—James Cathcart, æt. 46, railway officer; admitted 6th March, 1854. About three hours ago, when patient was standing in a railway carriage, and the train suddenly put in motion, he fell between the carriages; his head first striking the ground, and the carriage behind, which was empty, passing, he says, over his neck. He was slightly stunned by the accident, but immediately recovered. Had no vomiting, and now complains of pain, or rather stiffness, in the muscles of the back of his neck. His head and face appear as if they had been rolled in mud, and his hair is matted with blood.

Over the middle of right parietal bone there is a semicircular wound, which measures nearly four inches. The edges of the wound are lacerated and infiltrated with blood, and a flap of scalp is torn up from the subjacent bone for more than three inches. The bone thus uncovered is not denuded of periosteum, and there is no fracture.

At the external canthus of left eye there is a wound which implicates both eyelids, and extends upwards for an inch over the frontal bone, but does not penetrate to the bone. Over the site of the carotid arteries on each side of the neck, a soft fluctuating tumour exists. The one on the right side extends from the angle of the jaw to within two inches of the clavicle; the other on the left side occupying the angle of the jaw, and stretching down as far as the cricoid cartilage. Both swellings are equally soft and fluctuating, the handling of which gives no pain, and the skin covering them presents hardly any discoloration. Pulse 80, firm and strong.

The treatment in this case consisted—

1st. In shaving the head, which conduced both to cleanliness and to the more effective application of the necessary dressings.

2nd. In cleansing thoroughly the wounds, and in bringing their surfaces and edges in close apposition by means effective, but as little irritating as possible. In the scalp were used, as you saw, adhesive plaster, compresses, and bandages; and in the face, from the great mobility of the eyelids, two fine stitches were employed, and the parts supported still farther by strips of plaster.

3rd. Leeches were applied behind the ears, and the cupping glasses to nape of neck, to obviate inflammation; and to assist in attaining the same end, purgatives, low diet, and rest were prescribed with the best results. The patient, notwithstanding the erysipelas which arose in the face, requiring the removal of the stitches and the application of fomentations, rapidly improved; the swellings or effusions in the neck, which gave no pain, gradually became absorbed without local applications; and on the 20th April the patient left the hospital cured.

Injuries of the Skull.—From the mechanical protection and support the skull affords the brain, and the close relationship the osseous encasement bears to the cerebral organ, all injuries of the skull are fraught with deep interest to the surgeon. It is chiefly, if not exclusively, from this relationship, however, that the interest is excited. The injury inflicted upon the skull tells chiefly upon other parts, and produces those effects or symptoms requiring the interference of the surgeon. In fracture of the bones of the limbs, the surgeon interferes to replace and keep the fractured pieces in apposition. The rest of the process is left to nature, and the cure is effected. But in the ordinary fractures of the skull there is no displacement of bone. The surgeon requires, therefore, not to interfere on that account, but simply to ward off injurious consequences from surrounding parts or organs.

When the external table only of the skull is fractured, the effects are hardly to be recognized. The system does not suffer. It is otherwise, however, with fracture of both tables; because, in cases where the deeper fracture exists, greater violence has been inflicted. Blood is also usually effused, which may separate to a greater or less

degree the dura mater from the bone, and thus produce deleterious pressure upon the brain; or the force that breaks the bone may shake or lacerate the brain, and produce a train of consequences of the most serious description. It is not so much the fracture itself, as its adjuncts, concomitants, or results, that we have to fear. The mere injury of the bone is comparatively trivial, the effects or results often of the greatest moment. It is the business of the surgeon, then, in all such cases, to prevent or lessen the influence of these results, by bridling the circulation by low diet, rest, active purgation, and it may be by the topical or general detraction of blood; taking care, at the same, not to convert, by a reckless use of the knife, a simple into a compound fracture; or, should the scalp have been laid open by the original injury, to obviate the entrance of the atmospheric air by those appliances which tend to procure union of the divided scalp by the adhesive process. But the whole subject of injuries of the skull is naturally and closely united with that of injuries of the brain; for the state of the cerebral organ influences, in no small degree, our treatment of the cranial affection. Yet the following case may be adduced here, as illustrative of injury of the skull, unconnected with cerebral disturbance, and less likely, from its nature, than other injuries of the same class, to produce that effect.

Case II. *Fracture of the External Table of the Skull.*—Neil Craigie, æt. 56, a labourer, admitted 17th Nov., 1853. While engaged in loading a ship, patient fell into the hold, his head and right shoulder coming in contact with some pig-iron. He was stunned by the fall, but says he did not lose his sensibility, nor did he vomit. On admission, pulse 68, pupils natural, and patient altogether calm and collected. On the back part of the head, about half an inch behind the lambdoidal suture, there is a transverse wound of the scalp about an inch and a half in extent. At the bottom of this wound, and corresponding with it, both in length and direction, a fracture of the bone is found, into, and along which, the nail of the finger can be carried. The edges of the fracture are remarkably smooth and rounded, as if the bone had been cut, and the edges turned in. No blood oozes from the fracture, and the probe, when thrust in, enters the cancelli of the bone. There is a fracture, also, of the clavicle, at a point nearly midway between the two extremities of the bone.

Without entering into all the particulars of the treatment of this case, suffice it to say, that it consisted, at first, in shaving the head, strapping the wound, and bandaging the upper limb in the usual way for the fractured clavicle. As the wound in the scalp suppurated, water dressings were substituted for the plaster, and the bowels throughout kept free by doses of calomel and jalap, black draught, and sometimes castor oil. On the 28th, as the patient complained of pain in the head, ʒviii. of blood were detracted from neck by the cupping glasses. On the 7th of

December, reported doing well, and wound of head nearly cicatrized; 17th of same month, dismissed cured.

A fracture of the outer table only of the skull is rare, and attended with some difficulty of diagnosis. In this instance, the difficulty was not great from the free exposure of the bone injured, and the comparative ease with which the fracture could be explored. In forming a diagnosis, we must be guided by a variety of considerations, as, 1st, the general thickness of the skull at the site of the fracture; where no diploe exists, as in the squamous portion of the temporal bone, no such fracture could occur; and, 2ndly, the degree and condition of the hæmorrhage from the fracture. If there is much bleeding, and more especially if the hæmorrhage partakes of the respiratory movements, we may conclude that both tables are fractured; the elevation and depression of the dura mater influencing the outward flow of blood. In our case, the wound being comparatively dry, the gaping nature of the fracture, and the probe reaching no further than the cancelli, as well as the extreme mildness of the symptoms, enabled us to determine the true condition of the bone.

The following case is also illustrative of the fact, that the bones of the head, more especially of the face, may be severely injured without the brain suffering in the slightest degree. This fortunate result usually occurs in young subjects, or before the bones of the skull are consolidated, and capable of transmitting with effect vibrations to the brain. The case, in other respects, is interesting and uncommon.

Case III. *Contusion of Face, with Fracture and Displacement of Bones of the Palate.*—R. Landrigh, æt. 24, a seaman, admitted Dec. 12, 1853. While engaged in lowering a barrel of flour into the hold of a vessel, the barrel, which patient carried on his neck or shoulder, proving too heavy for him, forced his head down, causing his face to come in contact with another barrel, and thus to receive a severe contusion. On admission, a few hours after the accident, his face was found much swelled and disfigured, and blood had flown copiously from his nostrils and mouth. His eyes are nearly sealed up from the swelling of the eyelids, which are also of a deep black hue. His nose is flattened, and the alæ separated, especially on the right side from the nasal bones, but held *in situ* by clotted blood encrusted. The cartilaginous septum of the nose is also much injured, but the precise nature or extent of the injury cannot yet be made out, in consequence of the swelling. He cannot breathe through the nostrils when mouth is shut. His cheeks are much swelled, and his face appears broader than natural. He speaks with difficulty, and cannot open his mouth without great pain. Says there is something wrong with his mouth. Upon exploring the oral cavity with the finger, a solution of continuity in the bone is felt along the whole length of the mesial line of the palate. The rent thus made extends backwards from

between the middle incisors (which are much separated) to the velum, which is lacerated, but the finger does not pass through it. Pulse 76. No headache. Is quite sensible, and says he has had neither giddiness, faintness, nor insensibility since the accident.

To have lint dipped in cold water applied constantly to the face, six leeches to the mucous surface of the upper lip, and bowels kept active by smart purgatives. Low diet; no solid food.

Without entering particularly into the subsequent treatment of this case, suffice it to say, that after the swelling was somewhat reduced by the above treatment, pressure on the outer surfaces of the molar teeth enabled us to bring the palatine plates of the opposite sides into contact; and we found them easily kept in apposition, by tying the middle incisors together with dentists' wire. On the 10th of January, the patient left the hospital cured.

INJURIES OF THE BRAIN.—The study of injuries of the brain, resulting from external violence, embraces three important points of inquiry.

1st. The pathological states superinduced by the violence inflicted.

2d. The physiological phenomena or symptoms which arise from these pathological states.

3d. The treatment.

Practically, we are, for the most part, guided in our inquiries by the phenomena, and hence usually group all head affections of this kind into two grand classes, with their multifarious causes and diversified effects.

1st. Those which display certain symptoms supposed to depend upon a *shaking* of the cerebral mass—*concussion of the brain.*

2d. Those which display certain symptoms which arise, or are supposed to arise, from a *squeezing* of the brain into a smaller compass than natural—*compression of the brain.*

These two great classes of morbid cerebral affections should be studied by you as they appear—1st, in their simplest and purest forms; and 2d, in their more complex states; and that I may assist you in this study, I shall first place the symptoms of concussion and those of compression in succession before you, for the purpose of comparison and contrast, and then bring the cases which have been under your notice in the wards of the hospital, as practically illustrative and explanatory.

Concussion.—This, from its very nature, is necessarily of more frequent occurrence than compression; but as its effects in the minor degrees are more evanescent than those of compression, we have fewer opportunities of observing cases of pure concussion in hospital practice. Still, we occasionally meet wth cases in every stage of the affection.

In the first or mildest degree, the patient, from the blow inflicted, staggers, probably falls without losing his sensibility, and in a short time may recover his wonted powers.

In the second degree, the loss of consciousness is complete. The patient may appear to be in a calm and placid sleep. The sensibility is blunted, but not extinguished. The surface of the body is pale and cold, as in syncope. The powers of the system are low; the pulse quick and weak; the pupils contracted, seldom dilated, and there may be relaxation of the sphincter muscles, with the concomitant results.

In the third or most intense degree, the patient may die instantaneously, or in a few seconds, and death may take place with or without convulsive movements, or involuntary evacuations.

In *compression*, there is more of coma than of syncope; of oppression than prostration. The compressing causes, though acting directly upon the brain only, overpower the whole cerebro-spinal system, with the necessary effects upon the mental faculties and the motive and sensitive powers. Hence, as prominent symptoms, we uniformly find unconsciousness of existence, insensibility to outward impressions, and paralysis of the muscles of voluntary motion. From the paralytic state of these muscles, certain symptoms most characteristic of this affection arise, as laborious and stertorous breathing, dilated pupils, retention of urine, involuntary alvine evacuations. The ganglionic system of nerves being little affected, the heart continues to act with force, and the surface of the body is warm, not unfrequently perspiring.

In their *pure* states, concussion and compression of the brain can be easily distinguished; but it is necessary to mention that we rarely find compression of the brain in its pure form. Compression from external violence can hardly exist without some concussion; and, consequently, in the majority of cases, the symptoms at first are generally mixed or blended with those of concussion, which may disappear, sooner or later, and leave those of compression alone apparent.

You would do well, also, to bear in mind that the symptoms of the one class may *succeed* the other. The symptoms of concussion may first appear, and, by-and-by, dissolve, or shade, as it were, into those of compression. But to confine ourselves to *Concussion of the Brain.*

I have not been able to place *a case* of concussion in its *purest* form before you, but the following cases may be taken as samples of what we find in daily practice, and may tend to illustrate some important points in the symptoms, as well as treatment of concussion. The first case was seen only by some of you, and were treated by my respected predecessor and friend, Dr. Lawrie. I take it as recorded in the journal of the Infirmary.

Case IV. *Concussion of Brain.*—Peter Connelly, æt. 42 years. August 19, 1853. On Monday, the 15th, he fell down a stair and received a severe blow on the right side of the head. He remained quite insensible for a considerable time (two or three

days), and on recovering the power of his limbs, which was not till yesterday, he still remained either unwilling or unable to speak.

On admission, he appears in a stupid, half-sleepy state. When roused, answers to his name, but to all other questions makes irrelevant answers, or none at all. Considerable swelling on right side of head; countenance slightly flushed. Left pupil fixed and dilated; right pupil strongly contracted; both seem quite insensible to light. Passes urine and stools in bed. Is able to stand and walk when slightly supported. Is unwilling to take food or medicine; pulse 81, full; tongue coated; bowels open. Hab. ol. ricini, ℥i. h.s.

22*d.*—Pulse a little more rapid to-day; head very hot. Detrah. sang. op. c.c. ad. ℥viii. nuchæ. Habt. Hydrg. c. creta, gr. iv. ter indies. Ice to head.

23*d.*—Will not allow the ice to remain on head; is a little more sensible. Cont. pulv.

17*th September.*—Unequal contraction of pupils still continues. Is more sensible, but still slightly incoherent. Powders have been omitted for some time.

25*th.*—Still a little incoherent; otherwise doing well.

13*th October.*—Dismissed improved.

The most prominent features of this case, then, are great insensibility, but capability of being roused; weakness of limbs; contraction of one pupil and dilatation of the other; evacuation of contents of bowels and bladder in bed; slow progressive improvement; and, as you will often find, the patient leaves the hospital "improved" or "improving," but seldom "cured."

Case V. *Concussion of the Brain, complicated with Compression, terminating in Idiocy.*—Edward Docherty, æt. 43; admitted March 7, 1854. About three hours previous to admission, patient had fallen into the hold of a ship, and thence brought to the hospital in a state of insensibility. From the incoherent way he now mutters to himself, and the restlessness he displays, he has the appearance of an intoxicated person, but has no smell of drink. Rolls about in bed, and if care were not taken of him, would fall out. Lies for the most part quiet, and in a state of apparent insensibility, unaffected by ordinary sounds; but when spoken to in a very loud voice, as by shouting into his ear, he gives indications that he hears and understands. He does not move his left upper limb, and the left half of the body is obviously weaker than natural, but not paralysed. Irides sluggish, and pupils slightly dilated. Pulse 56, feeble; skin cool; respiration calm. Over the external angular process of frontal bone, there is a swelling about the size of a pigeon's egg. The integument is here lacerated, but the wound is little deeper than the skin, and there is no fracture or depression of bone. A turpentine enema ordered, and head to be shaved.

8*th.*—No movement of bowels from enema; pulse 72, of in-

creased strength; breathing generally calm, but occasionally, and for a short period, as for one or two respirations, slightly stertorous; responds to his name when loudly spoken to, but sinks immediately into his former torpid state. To be cupped on nape of neck to ℥xii., and to have a turpentine enema in the evening.

9th.—Displayed increased sensibility after cupping last night. To-day is nearly as difficult to rouse as he was yesterday. Pulse 84, compressible; bowels not moved. ℞ Hydrg. chloridi, gr. vi. pulv. jalapæ, gr. xvi.; fiat. pulv. statim sumendus. To be cupped behind ears to ℥viii., and a bladder of ice-cold water to the head.

10th.—Medicine has not operated. Otherwise, same as last report. ℞ Ol. crotonis tiglii m.ij.; aq. cinamonii, ℥i., statim sumend. et repet. sexta quaque hora ad tres vices si opus fuerit.

11th.—After three doses of the medicine, copious evacuations from bowels, and all passed in bed. Patient more sensible, and can move his left arm without assistance. When asked if head is painful, says "yes." To have a blister applied to back of neck.

12th.—Continues to pass his alvine discharges in bed, but whether with or without consciousness cannot be determined. No thirst; eats with avidity. To have two grains of calomel every six hours till gums are affected.

15th.—Has an idiotic expression of countenance; buries his head frequently in the bed-clothes, as if afraid of those around his bed; pulse 94; gums slightly affected; talks incoherently; has torn his shirt three times off his back since last night, and cannot be kept in bed without restraint. To have his head again shaved, and a blister applied over the whole head. Omit powders.

18th.—Is more rational and calm, but still talks incoherently; has more regard to personal cleanliness; appetite good.

25th.—Can be made to sit up in bed; has, both in the expression of countenance and general demeanour, the appearance of an idiot; cannot be made to leave his bed, or take any interest in what is passing around him. Applicetur empl. vesicator. ampl. iterum summo capiti; et sumat pulv. aloes compos., gr. xxx. o.n.

30th.—Calm, but otherwise no change.

April 22d.—General health and strength improved; incoherent; removed to poor's-house.

The most prominent features of this case, then, are—the insensibility, yet impressibility, the restlessness, the calm respiration, with occasional slight stertor, the weakness of part of muscular system almost amounting to paralysis, the sluggish state of the irides, the idiocy, with the usual inattention to personal cleanliness—all indicating concussion as forming the *substratum* of the affection; and the slight symptoms of compression which appear interwoven, as it were, with those of concussion, arising probably from some little effusion of blood or serum, or it may be from some

deeply-congested part only of the brain. The disease is essentially concussion, and the treatment has proceeded upon this idea. As the first stage was wearing off when the patient was brought into the hospital, little at first required to be done. In this stage the "expectant" treatment is generally the best. The patient is placed between Scylla and Charybdis—that is, of collapse and reaction; and we must guard, therefore, against either state. The patient was ordered a turpentine injection, which is always safe; for while it gently stimulates the dormant powers through the ganglionic system, it tends at the same time to promote the secretions of the alimentary tube and relieve the brain. But the first stage of concussion soon passes away, and we must be prepared for more active treatment. The feeble pulse of 56, in our case, changing into a stronger pulse of 72, indicated that reaction was setting in, and that more vigorous measures required to be adopted. These were put into requisition as the symptoms seemed to demand, and generally with more or less marked benefit. The treatment of the *second*, or principal *stage*, of concussion may, indeed, be said to be purely antiphlogistic. Bleeding, blistering, purging, cold to head, and mercurializing, constituting our chief means of cure. Pott, a high authority in this department of surgery, blooded copiously at an early period of the disease, and was eminently successful. We bleed now more sparingly, and prefer the topical to the systemic method of detracting blood. But I cannot say I am convinced of the superiority of the modern method. I should like to see the practice of Pott more frequently followed. But under the best treatment, we must not expect to be always successful. The injury inflicted by concussion is often irremediable. And even when death is not the result, it may leave traces behind it on the intellectual faculties and nervous functions which may never be obliterated. In our patient, the mental imbecility was strikingly marked, yet from the progressive, though slow, improvement which took place, while the patient was under our observation, we are encouraged to hope for an ultimate favourable result.

The treatment of this imbecility of mind and debility of body, which not unfrequently supervene in severe cases of concussion, must be conducted upon principles which tend to promote the general health of the patient, by proper attention to hygienic as well as therapeutic means. You must soothe the nervous system by both moral and medical appliances—impart new power by gentle tonics and alteratives, and modify or change the condition of the nervous system, by the frequent, or, it may be, long-continued action of blisters or issues in the neighbourhood of the brain.

Compression of the Brain.—Although compression of the brain may arise from four classes of causes, viz.—fractures, with depression of the cranium; extravasations of blood; effusions of serum

or pus; and foreign bodies that have penetrated the skull—it must be remembered that the symptoms of compression are not modified by the peculiarity of the cause, but remain essentially the same, in whatever way they may arise. This is to be accounted for by such causes acting *mechanically* only on the brain, and thus producing necessarily similar if not identical effects. The *rationale* of these effects or symptoms is worthy of your particular study, and, happily, is attended with no great difficulty. Pressure upon the brain has been long known to tell upon the intellectual faculties, as well as the motive and sensitive powers; and the degree of pressure is also well known to modify these effects by weakening, or, it may be, suspending or totally extinguishing these mental and corporeal attributes. By its paralyzing influence, pressure produces both general and local effects—*first*, on the whole nervous system, inducing coma, unconsciousness of existence, loss of sensibility and of voluntary motion; and *second*, on the function of certain nerves, and consequently on the functions of parts supplied by these nerves, as on the nerves of the *iris*, with *dilatation of the pupils;* on the nerves of the velum palati, with relaxation of the velum, and the consequent *stertorous breathing;* on the nerves of the bladder and sphincter ani, with the paralysis of these parts, and consequent retention of urine and involuntary alvine evacuations.

The mode in which death takes place in compression of the brain, is worthy also of some share of your attention. It is an interesting physiological problem, the solution of which may lead to some practical results, but which I must leave in a great measure to your own investigations. A single observation from me will at present suffice. The subject has been experimentally investigated by Legallois, Wilson Philip, Chossart, without any immediate relation to surgery, from which it appears that, when the brain is compressed, death takes place by asphyxia, or, in other words, by the failure of the *respiratory* process; whereas, in *concussion*, the fatal result is dependent upon *syncope*, or inaction of the heart. This may be viewed as an established fact, and it is in harmony with the general paralytic nature of compression; the lungs, through the pneumogastric nerves, being linked more closely to the brain, as well as muscular system, and placed thus more immediately under the influence of a compressing cause, than the heart. The organs of respiration, therefore, primarily suffer. Blood accumulates in the capillaries of the lungs and right side of the heart, and from the muscles of respiration being also deeply affected, the respiratory movements become arrested, with coincident death. In concussion, however, death takes place by a species of syncope, in which the heart is primarily affected—the action of the heart first failing, and the respiratory actions becoming only secondarily influenced.

Our *prognosis* in cases of compression should be extremely

guarded, because, while in all cases there is danger, we cannot tell in any given case the whole extent of the injury inflicted. The bone may be not only depressed, but piercing the dura mater and penetrating the brain. Some artery of the dura mater may be torn, and blood effused under the skull; the sinuses of the dura mater may be opened, and blood poured out, or a counter-fracture may exist, without any external indication, but still with the most serious consequences; or a vessel of the brain itself may have given way, and death result as if from an apoplectic seizure.

But even when the whole extent of the mischief is patent, we cannot with certainty prognosticate the result, because inflammation may arise from a slight or trivial cause, both during the progress of the disease, and after the cure is apparently effected, and destroy the patient.

These facts are sufficient to indicate the dangerous nature of all cases in which compression of the brain exists; but some cases, undoubtedly, are less dangerous than others; and although, in the majority of instances, death is the result, as some cases also recover, our prognosis must therefore be influenced by special circumstances, as well as by the general considerations to which we have referred. It is well known, for example, that compressing causes, directly affecting the basis of the brain, are always more dangerous than those that tell immediately upon the superior surface of the organ. Their vicinity to the great sinuses, origin of the nerves and medulla oblongata, satisfactorily account for this. It is also worthy of remark, that the danger is not in proportion to the extent of cerebral surface compressed, but in proportion to the intensity of the morbid symptoms. A very small punctured depression of skull is always more to be dreaded than a large flat depressed portion; but in both cases, so long as the symptoms are mild, we are encouraged to hope, and our prognosis will be so far favourable. But even when the injury appears slight, if the symptoms are intensely morbid—if the coma is profound, and the breathing stertorous and puffing, our prognosis should be of the most unfavourable kind. No case with these strongly-marked symptoms has been lately before us; but others of much interest have been for some time under your notice. Among these, the first I shall mention is one of compound fracture of the skull, with depression, admitted on the 19th October, and for a time treated by my friend and predecessor, Dr. Lawrie.

Case VI. *Compound Fracture of Skull, with Depression of Bone.*—Robert Thomson, æt. 20; admitted October 19. During the course of the morning, patient was getting a horse shoed at a blacksmith's shop, and while leaning down to examine something about the horse's hind foot, the animal struck out, and the turned edge of the shoe hit him a little above the outer angle of the orbit.

On admission, patient is in a semicomatose state; answers to his name after much hesitation; is exceedingly restless; pulse about 96; pupils slightly dilated, but contractile. Immediately above the superciliary ridge on the right side, at the outer angle of orbit, is seen a small lacerated wound, of about two inches in extent in one direction, and an inch and a half in another. On passing the finger into the wound, a small ridge of projecting bone is felt, and a fragment a little larger than the point of the finger is depressed in the centre. Patient makes very little complaint.

A consultation was held, and the members were divided in opinion as to whether operative interference would be advisable. Non-interference, however, was agreed to, and the patient's head ordered to be shaved.

V. S. ad. ʒx. et ap. c. c. nuchæ; ℞ Ung. hydrg. ʒi., to rub abdomen. Apply ice to head. ℞ Tart. antimoni, gr. i. ss.; calomel. gr. xxiv.; Pulv. opii, gr. vi.; Conserv. rosar. q. s. Divide in pilulas xii.; Sumat. i. q. q. quarta hora.

30*th.*—Slept well last night; thirst less; pulse 100, soft; tongue moist at margins; gums slightly affected; no headache. Omit med. omnia.

Nov. 1*st.*—Wound discharging a healthy pus; edges of tongue moist; no headache. To have some beef-tea.

10*th.*—Since last report, has slept well; has had little or no headache; wound nearly closed; appetite improving. ℞ Pil aloes comp. gr. vi., om. nocte.

21*st.*—For the last two days, right side of head and face have been considerably swollen, and to-day obsure fluctuation is felt behind the ear and under the temporal muscle. Patient complains of little pain, and says he sleeps well. To have the side of head frequently fomented. Continue pills.

22*d.*—The fluctuation in the temples and behind the ear being very distinct, the abscess was opened behind the ear, and ʒvi. of laudable pus evacuated. Appetite good, sleeps well, and complains of nothing.

27*th.*—Since last report pus has been daily pressed out both from original wound and the counter-opening behind ear. Health otherwise improving.

Dec. 1*st.*—At the angle of lower jaw a swelling of the size of a marble exists. The swelling is soft and fluctuating, and when opened to-day gave exit to four or five ounces of pus. General health good.

10*th.*—For last week has been often out of bed, and walking about ward. A little pus is still discharged from all the three openings, but has been daily decreasing. Appetite good; bowels regular. Dismissed by desire.

The chief peculiarities in this case consist in the punctured character of the depressed portion of bone, in the semicomatose

state, accompanied with restlessness, and in the slightly dilated, but not fixed state of the pupils—all indicating a moderate degree only of compression of the brain, with some slight degree of concussion. By the active and judicious treatment followed in the earliest stage of the treatment, the semicomatose state and the other morbid symptoms soon disappeared; and when the patient was placed under my care, little treatment was required, but to ward off some few untoward consequences, as you saw, and carry the patient onward to the cure. Of these consequences, the abscesses that formed under the temporal and masseter muscles were the most important, but were fortunately amenable to ordinary treatment.

Case VII. *Fracture of Cranium—Ablation of a Portion of Skull—Injury of Dura Mater—Hernia Cerebri—Death.*—Peter Nisbet, æt. 13, admitted 2d November. A few hours before admission, patient fell from a height of nineteen feet, his head first striking the ground. When brought into the hospital he was perfectly sensible; pupils dilated, but influenced by light; vision much impaired; had vomiting; no headache; pulse 68. There is a transverse wound of three inches over the occipital bone, with a corresponding flap of scalp torn up along with a piece of skull about two inches by one inch and a half—thus exposing to the same extent the dura mater. The piece of skull appears as if sliced off from the dura mater, and is found adhering to the inner surface of the large flap of scalp thrown back. The dura mater is dry upon its external surface, and at the posterior edge of the opening of the skull the membrane is scored or notched, as if by a cutting instrument, the incision not passing completely through at any point.

At the visit to-day, the head having been previously shaved, the detached piece of skull was dissected off from interior of scalp, and flap laid down, and its edges kept in contact by slips of plaster, supported by a compress and four-tailed bandage. Head to be kept elevated and cool, and bowels moved by a smart purge of calomel and jalap.

Nov. 3*d.*—Slept well last night; sees well with right eye, but very imperfectly with left; tongue moist; pulse 96; external wound of head slightly painful. Apply water dressings to wound, and repeat calomel and jalap.

4*th.*—Partial adhesion of lips of wound; head cool; sees altogether better; is inclined for food, and asks for porridge and milk. To be allowed a small quantity in the form of a drink; repeat the medicine.

6*th.*—About an inch of edges of external wound united. Patient complains of pain in the crown of the head, at a considerable distance from wound; pulse 110, slightly jerking; thirst. Apply eight leeches behind the ears, and repeat medicine.

7*th.*—Leeches did well; pain of head nearly gone; tongue moist;

pulse 96; bowels open; pus from wound thick, but studded here and there with particles of blood. ℞ Pulv. aloes comp. gr. xx., o. d. s.

10*th.*—Progressing favourably; pulse 90. Continue medicine.

15*th.*—Pulse 72; slept well; tongue clean; no pain in head.

18*th.*—Complains of pain in forehead; pulse 56, labouring; thirst; has vomited frequently since yesterday; granulations of wound pale and flabby. (Yesterday morning, had eaten freely of orange peel and other sweetmeats, brought in by friends, and given to patient without knowledge of nurse.) Appl. Hirudines viii. nuchæ; hab. calomel. gr. ii. quarta q.q. hora.

19*th.*—No better; pulse 56; vomits everything he takes. Omit the powders; to have effervescing draughts.

20*th.*—A tumour, size of a marble, is seen at the posterior end of the opening in the skull, from which it appears to protrude, covered by the scalp. The tumour is obviously influenced by the movements of respiration, but pressure upon it occasions little or no uneasiness; patient listless and depressed. To have three leeches applied behind each ear, and a compress soaked in lime-water placed over the swelling. Soap enema.

22*d.*—Edges of wound have separated, as if pressed up by the increasing growth of the tumour. Patient more torpid, complaining of pain in forehead; thumbs turned in. Pressure to be maintained upon swelling, and ice to the temples and forehead.

24*th.*—Edges of wound have separated considerably, and are thick and flabby. The tumour, about the size of a pigeon's egg, has now a fungous appearance, and not adherent to the inner surface of the scalp. Patient can hardly be roused; both hands firmly clenched, and muscles of both upper limbs occasionally affected with spasmodic movements. A soft poultice to be applied to wound, and bowels moved by turpentine enemata.

25*th.*—Fungous protrusion increased nearly double the size since yesterday. Shaved it off close by the skull; laid the scalp over opening, and supported the whole by a compress and bandage. Patient seemed to feel no pain; torpor very great. Bowels to be opened by enemata.

26*th.*—A large piece of fungus-like protrusion shaved off close to cranium, and compresses dipped in lime-water applied. Bowels to be moved by enemata every eight hours.

28*th.*—Protrusion shaved off as before, and parts to be covered with lint soaked in lime-water, and supported with a gutta percha compress. During the last two days, patient lost between three and four ounces of blood from fungus, attributed, by the nurse, to patient tossing and rubbing his head against the pillow.

29*th.*—Died this morning.

Post-mortem inspection not allowed.

The peculiar features of this case, then, are—the removal by violence of a piece of the skull—the incised-like wound of the dura

mater, and probable contusion of the brain—the extreme mildness of the symptoms for the first seventeen days—the ushering in of untoward symptoms, and from an apparent trivial cause—the formation of a hernia cerebri, with symptoms of compression, and speedy death; each of which peculiarity might afford scope for special observation. But, confining ourselves to general practical matters, and reviewing our management of the case, I think it would have been better had we carried out the antiphlogistic treatment in a more decided manner. Even at the early stages, when the symptoms were mild and the case apparently doing well, it is exceedingly probable that mischief was lurking within, as we find, on the fifth day, the patient complaining of pain in the crown of the head, and the pulse jerking and as high as 110. The leeches that were then applied did, no doubt, much good; the pulse fell, the pain of head subsided, and all went on apparently smoothly till the seventeenth day. Yet, while the patient was daily telling us that he was "well," or even "quite well," there was a lumpishness which indicated that all was not right—that some morbid action was slowly working its way in the dura mater or brain, and that a higher exercise of the antiphlogistic treatment might have counteracted that action. I regret that I did not bleed the patient from the arm on or before the fifth day, when the leeches were applied, for it is especially at the early stages of such injuries that full depletion can be best borne, and can be productive of the greatest benefit. From the sudden change which took place in the symptoms, local and constitutional, on the seventeenth day, I had little hope of recovery. Yet, if anything could have saved the patient, blood-letting, I believe, was the remedy; and had I a similar case to treat, and with an equally young and sound constitution, I would not hesitate to bleed freely, even at this late stage of the malady, calling also into requisition the other well-known modifying and assisting antiphlogistic adjuncts. When the ulcerative process attacks the dura mater, and that membrane gives way, and the brain, changed in colour and consistency, bulges through the opening in the skull, all the symptoms indicate increased action of the intra-cranial vessels, and by diminishing that action by antiphlogistic means, we are more likely to arrest that morbid state of the dura mater and brain than by merely using artificial pressure, or the more serious and doubtful practice of shaving off portions of the cerebral substance. So long as inflammation rages within, such practice is calculated to add to the evil; and if the inflammation is kept down, extremely little of the practice alluded to will be required. In the treatment of these cases, therefore, the subduction of inflammation ought to be our prime object.

In the following case, the value of copious blood-letting, and other antiphlogistic adjuvants, in compound fracture of the skull, is well illustrated:—

Case VIII. *Compound Fracture of Skull, with Depression of Orbitary Plate of Frontal Bone.*—James Frew, æt. 33, carter; admitted 2d June, 1854. When driving a horse along the canal bank, the animal struck patient on the head with hind foot, thereby knocking him down, and rendering him insensible for about ten minutes.

On admission, there is a wound over left eye, extending from inner canthus to the middle of the eyebrow. On introducing finger into the wound, the orbital plate of frontal bone is felt slightly depressed, or knocked in, from the orbitary arch, and a small piece of bone lies loose at the bottom of the wound. Patient, who smells of alcohol, is perfectly sensible. Pupil of right eye natural. From tumefaction of left upper eyelid, that eye cannot be exposed; pulse 80. Is said to have lost ℥v. of blood previous to admission.

At visit to-day, a bit of bone, about a quarter of an inch in length, apparently from the edge of the orbit, was removed from bottom of the wound with the finger. Lint dipped in cold water to be applied to wound; head to be shaved; venesection to ℥xii.; and black draught at bed-time.

3d June.—Medicine operated once. Patient complains of pain in wound; is perfectly sensible. Repeat black draught; cold water to wound.

4th June, 10 A.M.—Bowels not moved; face flushed; pulse 90, firm; skin hot; complains of severe frontal headache. Says he had a shivering during the night, which he attributes to a draught from an open window. Repeat black draught.

1 *o'clock* P.M.—Was heard to fall out of bed, and so heavily as to alarm the whole ward; immediately picked up, and found in a state of total insensibility; pupil of right eye, the only one that could be subjected to examination, dilated and fixed; pulse 82, hard. To be immediately bled to ℥xx.; ℥i. of ung. hydrg. to be rubbed into the groins every six hours; ice-cold water to be applied to the head; and 2 grs. of calomel with gr.ss. of antimony in form of pill, to be given every three hours till gums are affected; bleeding to be repeated in the evening, if symptoms require it.

10 *o'clock* P.M.—Has become within last hour more restless, tossing about in bed, and attempting to get up. Pupil of right eye contracted to the size of a pin's head, and little influenced by light; pulse 80, compressible. Was bled to ℥x.; to have ℥iii. of black draught early in the morning.

5th June.—Slept some hours last night; is sensible. Pulse 76, soft, feeble; pupil of right eye not contracted, and influenced by light. Bowels responded freely to medicine.

6th June.—Slept well last night; no pain in head; is quite sensible; says he feels comfortable. Had three stools this morning.

7th June.—Had a good night; skin cool; gums slightly

affected; tumefaction of affected eyelids less; pulse 60, soft and compressible. Omit pills and ointment; to have ʒiii. of black draught, morning and evening.

8*th June.*—Able to sit up in bed; says he is very hungry, and asks for broth to dinner. To have some broth, but chiefly milk, and farinaceous food.

10*th June.*—Passed a very good night; head free of pain; wound healing kindly; swelling of eyelid nearly gone; pulse 50, soft and natural; appetite good. To have a more generous diet.

12*th June.*—Walks occasionally about ward; convalescent.

All the peculiarities of this case may be summed up in a few words. The lacerated wound of the upper eyelid immediately under the eyebrow—the fracture and depression of the orbital plate of frontal bone, with splinter from edge of orbit—the slight and transient stunning—the total absence of all symptoms of compression for the first forty-eight hours—the sudden invasion of such symptoms, and in an intense degree, and the marked and speedy effects of active antiphlogistic treatment in the restoration of the patient to health. Within two days and a half, patient lost nearly fifty ounces of blood, and it was only after the last bleeding of ten ounces that the symptoms began to yield, the patient to sleep, and sensibility to return. Without that bleeding, I believe the patient would have died. Had the symptoms of compression appeared in this case immediately, instead of some fifty hours, after the accident, a more serious operative interference would have been necessary, as these symptoms would then have indicated the sudden application of a dangerous compressing cause, requiring to be removed. But as the symptoms of compression arose, not at first, but after a considerable lapse of time, or when the inflammatory action, consequent on all such injuries, had reached a certain height, and by the swelling around and below the depressed and injured bone had produced alarming symptoms, any operative interference with the depressed bone was then contra-indicated, and the removal of the inflammation became our first and obvious duty. This was accomplished, as you saw, by the free and sustained use of antiphlogistics, especially by the lancet; for I have no hesitation in saying that, by the free use of the lancet, this patient was saved.

Case IX. *Fracture of the Skull with Depression of Bone—Operation of Trepan—Cure.*—Although the following case was under the care of a surgeon in the country for a period of three weeks previous to admission, it has been now so long under your immediate observation, and is altogether so interesting and important, that I shall not hesitate to bring the outlines of its history from its commencement briefly under your notice.

Eliza Paterson, æt. 31 years; admitted 17th Dec. 1853.—The patient was found, when Dr. Paxton of Kilmarnock was summoned to visit her, lying in a state of total insensibility, breathing sterto-

rously, and wounded in various parts of the body, more especially on the head. Three of these wounds were accompanied with fracture, and of these, two were complicated, with depression of the skull. Pulse reported at 96, of tolerable strength, and heat of surface natural.

From the extreme urgency of the symptoms, it was resolved to raise the depressed bones; and after freely exposing the skull by the requisite incisions at the site of the injury, a triangular portion of bone, partly of the frontal and partly of the parietal, measuring two and a half inches in length, and an inch and a half in breadth at the widest part, was found extensively fractured and much depressed. This was picked out in fragments, leaving thus a corresponding portion of dura mater denuded of bone. From the opening thus made in the skull, a fracture was found extending backwards on the parietal bone about two and a half inches, and ending in a small depression from a stellated fracture at that part. A portion of the bone was here trepanned, and the depressed bone raised. No immediate effects were produced by the operation, and a most unfavourable prognosis was consequently formed. The patient was reported to be in a most hopeless state. On the third day after the operation, the symptoms became more favourable. The breathing was now more calm. Sensibility and consciousness in part returned. The wound discharged a healthier pus, and hopes were again entertained of her recovery. These favourable symptoms continued, and on the 10th of January, twenty-four days after the accident, the patient was removed to the Royal Infirmary, and placed under my care.

On admission, we found a wound five inches in length, extending, on the left side of the coronal region of head, from an inch anterior to coronal suture, back nearly to the occipital bone. The wound has a very irregular appearance, both from its varying in breadth at different parts of its extent, but more especially from its varying in depth from the absence of pieces of the cranium. At the anterior part of the wound, an irregularly square piece of skull, about two inches in breadth, is awanting, and dura mater exposed; and near the posterior extremity of the wound, there is another portion of the cranium, about an inch square, awanting. A fracture extending from the one opening to the other. Along the whole track of the wound, the integuments have retracted on both sides, and left at the middle part of the wound the bare skull, which is partially covered with granulations; and at the anterior and posterior parts of the wound, the dura mater appears where bone is awanting. Mild, simple dressing to the wound; bowels to be strictly attended to; milk diet; seclusion.

12*th Jan.*—Healthy granulations springing up at almost every part of the wound, which has contracted somewhat since admission. A portion of the integument has become adherent to dura mater at anterior parts of wound. Motions of brain at this part still

very distinct. Dura mater, where not covered by integument, secreting healthy pus. Pulse 80; tongue moist, but whitish. ℞ Hydrg. chlorid. gr. ii.; Pulv. rhei, gr. xii., m.; Fiat pulv., statim sumendus.

14*th.*—Bowels moved by medicine; tongue clean; pulse 80; sleeps well; no pain in head.

16*th.*—Bowels regular; progressing favourably.

21*st.*—Slept none last night from pain in head. Edges of wound swollen and glassy; pulsations of brain obvious and strong; tongue moist; pulse 88. Applicent. Hirud. viii. nuchæ. A wine-glassful of black draught, night and morning. No one but nurse to be admitted to patient.

22*d.*—Leeches did well; bowels moved five times by medicine since yesterday; head relieved; feels altogether better; wound improving.

25*th.*—Slept well last night; tongue clean; appetite good; sore contracting, and discharging a small quantity of healthy pus; to have beef-tea to dinner.

1*st February.*—Patient sits up in bed; is in good spirits, and appears to be almost quite well; sore healing rapidly. Two or three small and thin loose scales of bone were removed with the finger and thumb from the surface of parietal bone, near anterior part of wound, which gave no pain. Appetite good; sleeps well; to have a more generous diet, and to be allowed to get up and walk about.

22*d March.*—Since last report, health and strength have been steadily improving, and without one bad symptom. Cicatrization of wound all but closed in. Leaves the hospital to-day at her own desire, and apparently in perfect health.

The principal points of this case are the intensely-marked condition of the symptoms of compression from the extreme violence inflicted—violence which not only fractured the skull, and beat down the bone at two places upon the brain, but produced also a comminuted state of the pieces so depressed. It is surprising that the patient was not killed upon the spot. In such a case as this, no doubt could exist regarding the treatment to be pursued. The brain was obviously and dangerously oppressed, and, till the oppressing cause was removed, there could be no reasonable hope of a recovery. To Dr. Paxton, credit is due for the prompt and successful manner in which he carried out the operative part of the treatment. He freely exposed the bone at the site of the injury; he cautiously removed, or picked out, the loose depressed fragments of bone at the anterior part of the wound; and finding the posterior depressed portion fixed, he applied the trephine, and thus made an opening which enabled him to raise the other depressed portion. That the practice is good, as well as successful, there cannot be shadow of a doubt, and it is worthy of imitation. The case is important, too, in a general way, as it places

in bold relief the practice to be followed in such cases, and conduces to the establishment of a principle which may probably apply more extensively in the treatment of such injuries, than many surgeons are willing, practically at least, to admit. Yet it must be conceded that the subject is attended with difficulties. Cases of compression occur, in which it is not easy to determine whether we should interfere or not, even to lay open the scalp, not to speak of the cranium; and it cannot be doubted, we ought never wantonly, or without sufficient reason, to denude or expose an internal organ. Still, it is equally just and proper, and founded upon the soundest principles of medical science, that any deleterious cause acting upon any organ should, if practicable, be immediately removed. In such cases we have to weigh the consequences of two dangers—that of doing possible injury by operating, thus aggravating the evil; and that of not rendering assistance when help is required, and thus leaving the patient to his fate. Were all the cases of compression of the brain like that of Paterson, the rule of practice would be clear, definite, and indisputable—it would be that of interference, that of removing, and at once, the compressing cause. But in many cases the injury is far less serious, the symptoms by no means so intense or urgent, and the brain, though oppressed, obviously suffering only in a slight or minor degree. Unless we are assured that nature is totally helpless in all such cases, or that the symptoms must necessarily become worse, the same rule of practice cannot be supposed to apply. We know that nature is not so helpless, that blood acting as a compressing cause may be absorbed, and that the brain can accommodate itself under certain circumstances to various degrees of compression, and be restored under that compression to its wonted powers. If we are not, in all cases of compression of the brain, to remove or attempt to remove the oppressing cause, under what circumstances are we to operate for its removal? This is a question of great practical import, one on which surgical authorities are divided, and the solution of which is attended with many difficulties. These difficulties have a reference to a variety of considerations, as to the danger of the operation itself, which, if cautiously and properly performed, is not, however, very great, and more especially to the uncertainties often connected with the nature, with the seat, and with the extent of the injury inflicted. Thus a patient may be brought into the hospital, from a railway accident, with all the symptoms of compression of the brain strongly depicted. There may be few or no external marks upon the head. The patient, however, may be totally insensible, with every symptom indicating severe and overwhelming compression of the brain. We have, in such a case, no means of determining with certainty the condition of the parts within. There may be effusion of blood with or without fracture, and the blood may be situated immediately under the skull, under the dura mater, or, still

more deep, in the substance of the brain; and even when the scalp is wounded, and the bone found fractured and depressed, we cannot tell whether or not the fracture extends to the base of the cranium, or whether the depressed piece or pieces be placed in a new or dangerous relation to the dura mater as well as to the brain. With such uncertainties and difficulties existing, no general rule of practice, applicable to every case, can be laid down or safely followed. The rule, to operate in all such cases, or never to operate under any circumstances, would be nearly equally preposterous. Much must be left to the discretion of the surgeon, for he must often be guided by considerations which vary with the individual case, and which no rule can reach. If we are to be influenced by any *one* consideration more than another, it is, I conceive, by the *symptoms;* and in determining the question of operative interference, the *symptoms* alone not unfrequently must be our guide. If the symptoms are *mild*, we should not trepan, but trust to the efforts of nature—assisting her by the various other means we have in store. If the symptoms, on the other hand, are *intense*, we should have recourse to the operation, because the magnitude and immediate nature of the danger demand this interference. If we can, in such circumstances, remove the oppressing cause, we do much good, and may save the patient. Should the cause actually lie beyond the reach of the operation, operative procedure can do no harm. It is, however, the patient's last chance, and surely it is right that that chance should be afforded him.

But, in determining this question, we must often be guided by other considerations than symptoms. Even when the symptoms are mild, we may require, in certain cases, to operate. If the scalp should be laid open, for example, and the bone found fractured, depressed, and comminuted, we should not hesitate to raise and remove the comminuted or aberrant pieces; and this may often be effected with the finger, with the forceps, with the elevator; conjoined, it may be, with Hey's saw, or with the assistance of the trephine. It is obvious, then, that the state of the parts, as well as the condition of the symptoms, must be frequently taken into account in forming our decision. When the parts affected are patent to observation, or easily and safely exposed, their examination ought never to be neglected, as we may thus obtain information of the most valuable kind. If, however, there is no external wound, and if the nature or extent of the injury inflicted can only at best be a matter of conjecture, we must, in such cases, be guided by the symptoms alone. If the symptoms are mild, we should not operate. On the other hand, if the symptoms are severe, intense, or overwhelming, and were so from the first, or soon after the accident, operative interference is indispensable, because we can, by such interference only, remove, or rationally hope to remove, the exciting cause of danger.

In these cases we should trepan at the seat of the external injury; and if no such injury exists, the trephine should be applied over the site of the middle meningeal artery, as that vessel is frequently ruptured when the bone over it is neither fractured nor depressed.

Our grand object in the treatment of compression of the brain is the removal of the compressing cause, whatever that cause may be, or wherever situated. The removal of the cause must ever constitute the leading idea of our treatment; and no practice can be sound that disregards this principle, whatever exceptions to operative interference we may be inclined or induced to make, from mildness of symptoms, or uncertainty of site, or nature of the compressing cause.

VI. *Report on, and Chemical Analyses of, the Moffat Mineral Wells.*

By John Macadam, Esq., F.R.S.S.A., Lecturer on Chemistry, and Analytical Chemist, Glasgow.

The long-established reputation of the mineral waters of Moffat for their curative or therapeutic effects, naturally suggested the inquiry as to their intrinsic properties, and to wherein they differed from the waters of other districts, or from those ordinarily in use. The first attempts to satisfy this reasonable curiosity, were made at a period when chemical science was much less advanced than at the present time; and accordingly, any analysis which was then effected, naturally partook of the comparative inferiority of knowledge and method which belonged to a less developed condition of science.

In the year 1659, Mr. D. Matthew Mackail, of Edinburgh, gave a chemical and medicinal account of the sulphureous water of the district, and framed a rather curious hypothesis as to the origin, peculiarities, odour, &c., of this water, attributing it to the droppings of birds, which were dissolved from the hillsides by rain, and which, percolating through the soil, escaped by fissures in the rock, which formed the site of the present well. The views of Mackail have considerable interest, as they serve to indicate the intelligence of the time in which he lived, showing the imperfect notions which prevailed on physical subjects; while, at the same time, they marked in him a reflective mind, which, in a true spirit of observation, sought to account for an unusual appearance by a suitable explanation. Mackail mentions the water as having been discovered some years previous to his examination of it. The Moffat sulphureous water has therefore been known, and its medicinal properties taken advantage of, for at least two hundred years.