LECTURES

ON THE

PRINCIPLES OF SURGICAL DIAGNOSIS:

ESPECIALLY IN RELATION TO SHOCK AND
VISCERAL LESIONS.*Delivered at the Royal College of Surgeons of England.*

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LECTURE III.—Continued.

Pain—Sleep—Objective Signs; viz., Deformity, Colour, Transparency, Temperature, Consistence, Edema, Crepitation, Crepitus, Fluctuation—Diagnostic Value of Treatment—Shock—Definition, Causes, Physical, Mental, Toxic, Predisposing—Effects at Different Ages—Railway Collision—Effects of Shock on Nerve-Centres; on Heart—Temperature in Shock, and Reaction—Shock in Relation to Operations—Value of Stimulants in Diagnosis—Causes of Fatality in Shock.

I HAVE thus, Sir, endeavoured to place before you in a condensed form—too compressed and imperfect to satisfy myself, and needing your indulgent criticism—the leading principles which, I think, should guide the practitioner in the diagnosis of surgical diseases and injuries. I am conscious of having introduced much that is elementary in my observations; but I am not without hope that, in a collected form, these “first lines” may be suggestive, if they do not prove instructive.

In accordance with my proposal, I now proceed to exemplify these principles in their relation to Shock and Visceral Lesions; and I may at once remark that it does not form part of my arrangement or design to import speculative theories into these Lectures, or to attempt an exhaustive treatment of any part of my subject. It is my intention to state simply the results of my own observation, in the diagnosis of the interesting and important class of maladies which are included in the category I have mentioned.

That condition which we denominate Shock is well known to the surgeon by its symptoms. But these symptoms are sometimes present under circumstances which would scarcely justify the use of the expression in its ordinary acceptance; for this word seems to imply that which is the immediate sequence of a sudden cause—a collapse of energy from a diversion of force. Yet this definition is not strictly accurate in all instances in which we meet with those symptoms that, in the aggregate, constitute the vital depression of shock. In the moribund, we constantly notice in many respects a closely allied condition; and this is not surprising, inasmuch as the state of severe shock is in reality a critical one, which sometimes does terminate fatally without reaction. The peculiarity of shock, then, is this vital depression, generally sudden, which follows the exciting cause, whatever that may be, and which is marked by the influence thus exercised primarily on the nerve-centres and on the heart; and, secondarily, by implication or sympathy, and necessarily through the intervention of the nerves, on the organs of respiration, of assimilation and secretion, and on the senses. I say primarily on the nerve-centres or heart, because the immediate consequences of sudden and copious loss of blood are, in effect, those of shock; the diminished quantity of the circulating fluid depressing the action of the heart, and thus influencing the nerve-centres. Where this hæmorrhage is not apparent, the early stage of simple shock is not distinguishable from that resulting from loss of blood. The sudden collapse consequent on the introduction of air into a vein may be placed in the same category. The differences exhibited in some of their details, in these causes of shock, are due to the appeal being made indirectly to the nerve-centres through the medium of the heart. As conventionally understood, the symptoms which collectively are named, or are characteristic of, shock, are essentially those which denote that the centres or sources of nerve-force or energy are under the potent spell of some powerfully depressing agent, whether physical or poisonous, whereby their influence in the animal economy is disturbed, partially suspended, or perverted.

When the causative injury is physical, as in a crushed limb, the effect upon the brain is seen in the mental and muscular prostration. The relaxed sphincters and general atony of the muscles indicate the share of the true spinal centre in the hurt inflicted. The feeble pulse and cold surface measure the impression made upon the heart; whilst the clammy sweat, the arrested or disturbed secretions, the nausea or vomiting, manifest the sympathy of the assimilative organs, consequent

on the more direct implication of the cyclo-ganglionic nerve-centres. The expression of the face is in unison with the general condition of the patient, betraying alarm, anxiety, and distress. But, when the shock of an injury is received directly upon the head, the symptoms are modified, but only in so far as the hurt has expended its force chiefly upon the brain. We thus have superadded, in severe concussion of the brain, to the other symptoms, loss of consciousness, which may endure for a considerable time, but which may be regarded as an accidental concomitant, and not an essential feature, of shock.

Again, the rupture of some important viscus—say, of intestine or bladder—is immediately succeeded by all the symptoms of shock: a condition which, in its early stage, is identical with that which is unattended by any visceral lesion.

Extremes of temperature, when sufficiently intense or long continued, are followed by severe and protracted shock, often terminating fatally.

In our surgical operations, we inflict shock upon our patients, varying in duration and intensity according to the severity and protraction of the operation, and the susceptibility of the sufferer.

Mental emotion, apart from bodily hurt, may produce similar phenomena, varying likewise in their degree, in accordance with the exciting cause: and there is no doubt that alarm and anxious suspense, when a surgical operation is impending, tend very much to complicate and aggravate the shock of the operation itself; and herein is chloroform a friendly agent in modifying the depressing effect of our handiwork, in that the mind of the patient is tranquil in the anticipation of passing through the ordeal without pain. Some of the symptoms of blood-poisoning resemble those of shock; indeed, their identity can scarcely be doubted in the early stage of fatal contamination, although the different adventitious and associated circumstances subsequently impart a special type, which is manifested according to the nature and dose of the poison imbibed. The transient shudder consequent on the mechanical irritation of introducing a catheter into the urethra, and the terrible rigor which ushers in pyæmia, are alike due to an impression made on the nerve-centres. I am aware that, in extending such latitude to the interpretation of the word “shock,” I am overstepping the limit of its conventional meaning. But, if I am not mistaken in this view, I think it desirable to identify conditions which, though apparently dissimilar, are essentially the same in character, and exhibit phenomena, the analogy of which is not disproved by the variety of the exciting causes, and the consequently modified character of the resulting details. It seems to me that, wherever this can be safely accomplished, an advancing step in generalisation is thereby attained.

There can be no doubt that shock affects various individuals in a very different degree; and this, probably, in strict accordance with their natural or acquired susceptibilities. Certain mental peculiarities, allied with emotional sensitiveness and what is termed the nervous temperament, constitute the natural conditions which predispose to the severest consequences of shock; and disease, whether functional or organic,—especially the degeneration or textural change of some important viscus, operates by aggravating the immediate effects of an injury, but more particularly in protracting and complicating the effects of shock. Unsuspected degeneration of the liver or kidney, and, *à fortiori*, of the heart, are thus not infrequently revealed; and I believe that, in many instances, death after the shock of an injury or operation is due to this cause. For example, the organs of elimination, prior to such injury, were competent to the performance of their ordinary duties, by assisting one another; but, when taxed by the urgent demands of reparation, and impaired still further by the disturbed or perverted nerve-force, the assimilative process is left uncompleted; and death ensues, sooner or later, in consequence of the blood being poisoned by the retention of the products of organic conversion. This appears to me the most probable explanation of death occurring, as a remote sequence of shock, where such visceral deterioration exists; and even under other circumstances, where there is no organic change, it is quite conceivable that the assimilative, and especially the excretory, organs, would be so far prejudicially influenced by the derangement in the supply of nervous energy, that they should be incapable of properly performing their eliminative functions, and the blood should be thereby poisoned. Under these circumstances death may result, and that in some instances speedily, without the presence of pyæmic deposits, or other material effect being discovered after death. Of the direct agency of shock in altering the condition or constituents of the blood, I do not know anything.

As regards the effects of shock at different ages, my own observation has led me to the conclusion that, in the very young, the ordinary impressibility of childhood is manifested, as under most other circumstances in which it is evoked. But the shock is simple, uncomplicated by mental influence; and reaction is rapid in favourable cases. In fact, it would appear that deferred reaction in early life means no reaction. The most frequent opportunity we have of witnessing these phenomena

in young children, is in cases of severe burn. Precisely the converse obtains in old age. The aged are less impressible than the vigorous adult; the effect of shock is less profound, but more often fatal, in consequence of the impaired resiliency of the organism,—the incapacity of the controlling centres to recover the equilibrium which has been abruptly disturbed; the enfeebled vessel has been so rudely jarred, that its contents have been spoiled by the commotion; and the lamp never burns brightly again, though the flame may flicker for a while in the socket. It is certainly in the prime of life, when the natural vigour is unabated, that the consequences of shock are most pronounced. And this is what we might anticipate, as the nerve-centres have then attained their full development, their mutual relations and sympathies are matured, and their functions, physical, psychical and organic, are most active. It is these same conditions, also, which determine a more energetic reaction,—proportioned to the vigour of the individual, and, within certain limits, to the gravity of the shock. Beyond such limits, *i. e.* where the shock is severe, the reaction is tardy and protracted in its full re-establishment; although indications of an effort to restore the lost equilibrium may be observed at a comparatively early period.

In that form of shock which is consequent on *Railway collision*, usually the distant sequelæ are more noticeable than the immediate effects; and I may remark that these, as far as my experience enables me to judge, are more often observed in the adult than in the very young and aged. No doubt this relative proportion is in a measure due to the circumstance that there are comparatively few old persons and children who are travellers; yet, I think it may be accounted for, partly, by the relative susceptibility of different ages to which I have alluded. Unfortunately there is one seriously disturbing element in the data on which we may found any conclusions respecting this class of injuries, *viz.* : the temptation to the patient, from pecuniary considerations, to make the worst of his case; and it is almost impossible to arrive at the truth, where so many of the symptoms rest exclusively upon the sufferer's assertion. I speak especially of that class of cases—the most numerous—where there is no evidence of physical lesion, and in which the symptoms supervene at an interval, longer or shorter, after the occurrence of the shock. Some of these instances are, no doubt, genuine; and in them we have the opportunity of studying the remote effects of shock, in which the spinal cord is the nerve-centre which is often primarily, though not exclusively, involved. In some which are characterised by loss of muscular strength, shrunk limbs, defective power in coordination, feeble exercise of motive volition, and even paralysis and imbecility, there must be organic change, which is often progressive, and marked by corresponding development of the signs and symptoms above enumerated. But in others the morbid condition is evinced by deteriorated health and defective nerve energy; and in these probably the impaired health is due to the indirect influence exercised on the organs of assimilation, and a reactionary impression exerted on the nerve-centres themselves.

Certainly, one general feature which I have noticed in this class of injuries is, that the shock at the time is comparatively slight and usually transient; or, if enduring, unmarked by any extreme symptoms or excessive reaction. Of course I refer to such cases as come within the category of so-called “railway injuries”; and not to those which present the usual characteristics of concussion of brain or spinal cord from other causes; and the shock of which I speak is that which I have already defined. The peculiarity of these accidents appears to be that the spine is roughly jarred, sometimes subjected to a succession of minor concussions or violent oscillations, and that the entire nervous system is simultaneously agitated. There is, consequently, no immediate persistent incapacity, as in ordinary concussions from a blow on the head or spine; but a prolonged series of symptoms ensue, directly traceable to the shock, and often assuming a more aggravated character as time elapses. But I am anticipating the next division of my subject, when I shall again refer to these injuries, and to the diagnostic features by which they are characterised. I may, however, be permitted to make a passing observation in reference to the remarkable, I fear I must say almost uniform, diversity of opinion which these cases elicit in medical witnesses, in courts of justice. This subject, as is not unnatural, is regarded in its moral rather than its scientific aspect by the public, and in a way not very complimentary to the profession. No doubt much of this antagonism is due to a cause which I have already touched upon, *viz.* : the deception practised by patients, and the consequent suspicion aroused in the minds of those who are required to investigate critically the veracity or probability of their statements. Suspicion may, in some particular instance, ripen into an assurance of fraud; whereas, a confidence, which may be apparently well founded, in the honesty and truthfulness of the same individual, may induce another medical man to take an entirely opposite view of his case, which rests chiefly on assertion, or on symptoms which may be simulated. Nevertheless, after making every allowance for discrepancies arising from this cause, it must be admitted

that there is left sufficient to constitute just ground for severe criticism on the part of jurists and of the public at large. I think this state of things is much to be regretted, and that an effort should be made to rid ourselves of the consequent scandal which attaches to the profession. The only remedy which suggests itself to me is, I fear, too utopian to hope for, and too simple to realise. It is that, when medical men are engaged in the prosecution or defence of such claims, they should make it conditional that they be permitted to confer together, and, at the least, attempt to arrive, by consultation, at a joint opinion as to the true nature of the case and validity of the claim; leaving, of course, the amount of compensation, if any, to be assessed by the jury. I trust, Sir, you will not think that I am deviating too far from the path of my duties, in thus glancing at an ethical question which involves the honour and credit of our profession.

To return from this digression, shock and impaired nerve-function are, in one sense, identical; that is, shock is impaired nerve-function, although the converse is not the case. Yet, certain symptoms are present which, in paraplegia, are fully established, and possess an intelligible meaning; such, for instance, is the apparent anomaly of retained urine and involuntary evacuation of the bowels. This, however, is no real anomaly, but a consistent consequence of the cause in operation; for we know that the contractility of the bladder, and the peristaltic action of the intestine, are under the control of distinct nervous centres. Volition is suspended by compression or laceration of the spinal cord, but the cyclo-ganglionic influence is unimpaired. Peristaltic movement, therefore, proceeds; and the resistance,—probably enfeebled by the injury—due to the excitomotor contraction of the sphincter, is overcome by the *vis a tergo*; the action is entirely independent of the will. In some instances, in fact in most, of fracture of the spine, the general symptoms of shock give rise to difficulty in precisely defining the extent of permanent lesion; but as reaction succeeds, and the temporary disturbance in the circulation and respiration subside, the healthy restoration of the upper part of the body offers an interesting contrast to the suspended animal life of the lower half. The influence of shock on the heart introduces the question of the dependence of this organ on nerve-energy for its contractility. Its essential independence has been assumed by physiologists, although nervous control has been admitted in its fullest sense. That the muscular tissue of the isolated heart is contractile there is no doubt; but so is that of any other isolated muscle; such, for instance, as in an amputated limb. But I apprehend the rhythmic action of the heart after death or removal, and the peristaltic action of the intestines under similar circumstances, may be explained in the same way, *viz.* : by the limited generation of nerve-force within the organs themselves, derived from the scattered ganglia which pervade their structure. Rhythmic or regulated action would seem to imply the existence of a co-ordinating influence.

[To be continued.]

TETANUS SUCCESSFULLY TREATED BY ATROPIA.

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A HEALTHY looking lad, aged 14, was seized with lockjaw and severe pain in the cervical and dorsal regions, with fever, a few days after jumping from a coal-waggon. On my visit (fourth day of symptoms), I noted well marked risus sardonius; incisors separable for less than half an inch; masseters rigid; cervical and dorsal vertebræ arched forwards; sterno-mastoids and muscles of back rigid; abdomen flat and hard; legs and feet rigidly extended; tenderness along spine; arms free from tetanic symptoms; paroxysms of severe general spasm every few minutes; pulse 140; sleepless. I ordered one-sixtieth of a grain of atropia every three hours; and linimentum belladonnæ to be well rubbed over the spine and rigid muscles every six hours.

Within twenty-four hours, the physiological action of atropia showed itself; then the clonic spasms became less severe, and of shorter duration; and the tonic rigidity gave way, first in the legs and neck, then in back, and last of all in abdomen and masseters. On the sixth day of treatment by atropia, rigidity of the masseters alone remained. He was kept under the influence of atropia for three weeks. He then quickly and completely recovered his usual health under steel and quinine.

It is said by Brown-Séquard, that belladonna reduces congestion of the blood-vessels of the spinal cord and its membranes; that its principal physiological action is “spinal anæmia”. I believe that the tetanic symptoms in this case depended on an excitability of the spinal cord, probably caused by “spinal congestion”—a derangement of the vaso-motor nerves of the cord and its membranes, which allowed more blood than normal to circulate through the contents of the spinal canal. If so, we have the *rationalité* of the therapeutic action of atropia in this and allied cases.