The treatment of nervous affections following gunshot wounds and other injuries

by

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I purpose to write concerning the various affections of the nervous system consequent on Gun-shot wounds and other injuries. I shall first give an account of the primary effects of such injuries on the system generally, and then those produced when nerves of special function are injured. I shall then treat of their effect on sensation, on muscular action, nutrition, calcification &c. passing from these I shall mention Epilepsy, Chorea, Amaurosis &c. as among the most interesting after consequences of nerve lesions, the best modes of treatment will then be fully discussed.

The importance of nerve lesions has been admitted by all surgeons, but strange as it may seem, it is nevertheless true, that we have no systematic treatise on this subject in our language.
I do not propose to write such a treatise, and being fully aware of my incompetency to fulfill this task, even were I inclined, I must crave the kind suffrages of my readers, and hope that they will make allowances for the numerous imperfections they may meet with.

Our old military surgeons looked upon these cases of nerve injury with despair, and we find Hennon in his work on Military Surgery thus expressing himself: "The mechanical injuries of the nerves are entirely beyond the powers of art to relieve effectually; but they are objects of great curiosity, and illustrative of many most important symptoms that occur in the course of practice" and others are not backward in endorsing his statement.

I hope to be able to prove in subsequent pages that these injuries, grave as they always are, may be cured or at least greatly alleviated by proper and judicious treatment.

The varied phenomena I shall describe will be found to depend as to whether one or all of the following systems of nerves are implicated in
the lesion, viz.
Motor, nerves of motion
Sensory
Vaso-motor
Destruct (Inhibitory of H. Jones)
Thus in lesions of motor nerves we shall have
paralysis, in sensory, loss of sensation and other
effects due to reflex action, and so on.
I shall now speak of the primary effects on the
system, due to nerve lesions under the following
heads.

(a) Shock
(b) Paralysis of motion
(c) Loss of sensation
(d) Pain.

Shock. The symptoms attendant on the phenomenon
known as shock are as follows, coldness of the
surface, pallor, feeble pulse, tremors, sighing respiration,
partial or complete paralysis of the bladder and of
other organs, these symptoms combined with others
from or less frequent occurrence appear to be present
in all cases of nerve injury, especially when
situated in the upper part of the body, and that
they are not due to loss of blood is evident for we find that even when the hemorrhage from the nature of the wound could not have been such as to produce them, they still are present. But sometimes to the symptoms enumerated above with which every surgeon is familiar are added others often as curious as they are rare and unexplainable, thus, many of well known and tried surgeons have on the receipt of a wound often of a very trifling nature shown signs of great trepidation and fear, a traumatical hysterical state (if I may use the expression) ensuing. Again in some cases local shock may be present, the constitutional symptoms being present, thus, the arm or leg may lose their power of motion for a few days and then in part regain it, but on careful examination it may be found that a group of muscles have been totally paralyzed.

I think we may explain shock as due to reflex action, thus, an injury is received by a centripetal nerve at its periphery or in any part of its course, the effect of the injury is transmitted to the medulla oblongata and from thence reflected by the
pneumogastric to the heart, and its healthy action greatly depressed. To this reflex action also may in part be due the bad effects which sometimes occur when chloroform is administered. The paper by irritating the periphery of the nerves distributed to the lungs causes a depression of the heart's action. 

But though reflex action may be the means by which these states of the system are brought about, it cannot be denied the primary cause of the symptoms present in nervous shock, this may be told does not require a genius to show, the lesion must of course be the primary exciting cause. This is all very true, but we are as far off a solution of the difficulty as ever, it is a gratuitous assertion and explains nothing, may nor how therefore is to show what shock is and what it is not, but its cause, and this I propose to do on the theory of the relationship existing between the vital and physical forces. Thus I believe shock to depend on the relationship or correlation of the force existing in the body inflicting the wound and the vital forces acting within the organism itself. Professor Grove in his work
on the Coolation of the Physical force has shown that
face is indistinctable and that when it appears
tous to be entirely lost, it still exists but under
another form its physical properties only being
changed, thus heat becoming electricity, and so on.
Dr. Carpenter in his paper on the Relation between
the Vital and Physical force has proved that they
are in direct relation to one another, and that
animals and plants cease to exist if deprived
of light and heat. Now I believe that the Physical
forces can be directly converted into the Vital force.
thus to explain my meaning let me suppose
that a man has received a blow on the head with
a stick or other weapon, the force with which that
blow was struck according to Professor Prevost's
is not lost but becomes converted into another force,
now having seen the relationship between the vital
and physical forces as demonstrated by Carpenter,
I see no difficulty in conceiving that the physical
force in this instance is directly changed into
vital force, which ensuing an excess upon one or the
of the vital forces, and by this very excess slight
though it be, is yet capable of destroying the
equilibrium of the forces in the organism and the phenomena of nervous shock produced. In the treatment of some of the diseases due to nervous lesions I shall again recur to this theory.

Loss of Motion. This appears to take place almost immediately after any severe injury to a nerve centre or a nerve trunk in any part of the body, and there may, in complete loss of voluntary power when the head or spinal column is the seat of the injury, or only partial when a nerve supplying a limb has been divided, and this loss of voluntary motion may also occur by reflex action, for we find it present when from the position of the wound no large nerve supplying the part affected can have possibly received any direct injury. An interesting fact connected with these injuries and one it is somewhat difficult to explain, is that motion may almost or entirely lose in a limb and yet sensation slightly if at all impaired.

How are we to account for this? Are we to infer that the nerves of motion are more easily affected by external influences and their power of conduction,
destroyed than those of sensation. That voluntary movements require very powerful excitation from the nervous system and that when one-half or one-third of the normal amount of excitation is missing what remains is insufficient; or again we suppose that when a nerve has been injured the galvanic state existing between it and the muscles to which it is distributed is so disturbed that they no longer act in unison. I do not mean simply that nerve force and galvanism are identical but I believe that they are analogous, and also that the muscle are always in a state of polarity opposite to that in which the nerves are, and that when this equilibrium is destroyed paralyses is the result. Whatever may be the true explanation of this fact, it is I think evident that there must be some very material difference either between the constitution of sensitive and motor fibres, or between the "fluids" or states of polarity of the different fibres. It may be stated in passing that hyperesthesia may be present with paralyses of motion of a part.

Loss of sensation. This is not always present in

...
nerve lesions, as I have shown above and in most cases is only a temporary effect, a return of the power of conducting sensitive impressions being more rapid than that of voluntary motion.

Pain. This is the last but not least of the primary effects of nerve injury is present in almost every case, but not always to the same extent, nor is the sensation of pain always referred to the seat of the injury, but often to distant parts of the limb or body. We may have pain due to reflex action, thus in an injury to the right elbow we may have pain in the left, and care should be taken that all applications be applied to the right elbow, then as soon as the motor action is arrested the sympathetic pain in the left will also probably cease. I think that in these cases where a wound has been received in the upper part of a limb, and the pain referred to its extremity, that the nerve supplying the painful part has been divided in its continuity, the pain felt being referred to its periphery, as in often the case in patients whose limbs have been amputated, referring the
sensation of pain to the loss of the absent limb.

Injuries to the head and spinal column.

Injuries to the head when not immediately fatal are particularly interesting from the varied diseases which are produced as after-consequences of the primary lesion, of these I may mention, Chorea, Epilepsy, Paralysis and in some cases even Insanity, of these affections I shall treat more at length presently. I may also here draw from the experience of Dr. Vallis who says that among the most dreadful consequences of injuries to the head, which have come under his notice, are intermittent headaches; a remarkable feature in these head cases is the fact that the setting up of subacute inflammation shows itself by an aggregation of the leading symptoms—whatever that may be—which had existed before: the headache, palsy, or epileptiform fits.

Of direct injuries to the spinal cord, I mean those in which from the direction of the wound, and either from the escape of portions of bone, the
vertebra have more or less suffered, and fragments of bone perhaps forced in and pressing on the cord, the prominent symptoms are as follows—loss of consciousness, (about six or seven cases) pain in one or all the extremities, spasm of the muscles, saw, total paralysis of the limbs lasting for a longer time in some patients than in others, but in most cases after the general paralysis has disappeared one limb becomes permanently paralyzed and the muscles contracted.

Of indirect injuries, those in which the toe ball passes in the close proximity of the spinal column without injury into bony case, the symptoms are, paralysis of motion in all the limbs, hyperesthesia of the skin of the body and extremities with an hyperesthetic conditions of the muscles of the latter. In some cases the patient fall unconscious this state lasting generally from half an hour to two or three hours, of course this state is sometimes more or less prolonged. In most cases sensation returns some time before taste power is regained. The after effects of these lesions are, permanent paralysis of one or more of the extremi-
cities, contraction and atrophy of the muscles supplied by the nerves given off by that portion of the cord in the immediate vicinity of the wound. It appears probable that in cases of indirect injury to the cord the general paralysis is due to the concussion of the spinal cord, but that the effect is soon removed from, except in that portion in the immediate vicinity of the injury, which receives the full effects of the force with which the missile is projected, suffers accordingly more severely. I think that the permanent paralysis of some of the muscles is due to inflammation of the nerves as secondary to the changes set up in the neighbouring tissues around the track of the projectile, and that the junction of the spinal cord is in any way destroyed as a conducting medium, for the fibers coming from the lower extremities must of necessity pass through that portion of the cord in the immediate vicinity of the primary wound and permanent paralysis ensue which is found out to be the case. Again it is also noticeable that patients often complain of formication, taper frequently with vision during
pain, which spreads in paroxysms like electric shocks along the branches of the nerves, and besides an added flirite excitement, cramps & convulsions. It is stated by some that paralysis in these cases may occur and yet be not due to reflex action, but simply due to the commotion or shock to the cord, in the same way that the brain is deprived for a time of its functions by a violent blow on the head. The facts given as proof of the paralysis mentioned above being not due to reflex action viz: that from the course of the wound no large nerve can possibly have been wounded, I think prove nothing, for some nerve or other however small must be injured in every lesion of the body, and as we know not how large a nerve must be to produce a reflex act we are not justified in asserting that because a large nerve was not wounded therefore the paralysis is not due to a reflex act.

Of injuries to the Great Sympathetic, Facial and the facial nerves.

Of the phenomena noticed in man.
with regard to injuries of special nerves, such as
the sympathetic. I have looked in vain for a
description of these in one text books on surgery
or in the works of Military Surgeons, it was therefore
with no small amount of pleasure that I found
the record of a case grounded in the sympathetic
given in a short but most interesting little work,
published in America, and which from its rarity,
and instructive value, I shall take the liberty
of quoting in full.

Case: Edward Mooney at 24, enlisted July 1861, Co E 110th Penn Vol.
He was perfectly healthy before and after enlisting, until wounded
at Chancellorsville, May 3, 1863. He was standing erect, and was
looking towards the left side. Then a ball entered his right neck
on and a half inches behind the stumps of the jaw at the anterior edge
of the stern clavus muscle. The ball passed across the
neck rising a little, and emerged immediately below, and half an
inch in front of the angle of the jaw on the left side. He fell instantly
and judging from the movements of his regiment, may have remained
so during half an hour. On awaking, he found his mouth full of
clotted blood, which he pulled out. The bleeding did not continue.
After a short rest, he was able to walk nearly three miles to the rear,
where his wounds were dressed with cold water. On his way he
discovered that his speech had become hoarse, difficult, and painful, and that deglutition gave rise to great uneasiness and to burning pains. He says the sensation of pain was felt as though behind the grooves of the back. After five days of quiet suffering and utter inability to swallow, he obtained some relief; but, for a month or more, was forced to swallow a mouthful of water after every mouthful of solid food. The power to swallow gradually improved, and soon was as good as it ever was. About two weeks after he was wounded, he became able to articulate without pain, although still hoarsely. This difficulty also lessened by slow degrees. At present, July, 1863, his voice is still a little hoarse. During his recovery, which was rapid, the wounds healing within six months, he had a good deal of pain in the back of the neck. He says that he had headache, that after the injury he attempted to write, and set about himself; but he describes the headache as chiefly behind the ear and in the back of the head, with some general pain. About one month after he was hurt, a comrade noticed the peculiar appearance of his right eye, and called his attention to it. A little later, it began to be troublesome in bright lights, and has remained so ever since, and I hope some change for the better. July 15, 1863. The pupil of the right eye is very small, that of the left eye unusually large. There is for both slight but very distinct pains of the right eye, and the outer angle appears as though it were dropped a little
lower than the inner angle. The ball of the right eye looks smaller than the left. These appearances existed whether the eye was opened or closed, and gave to that organ the ball of being tilted out of its usual position. The conjunctiva of the right eye is somewhat redder than that of the left, and the pupil of the right eye is a little deformed, oval rather than round. In a dark place, or in half lights, the difference in the pupils was last seen; but in very bright light, as sunlight, the two pupils became nearly of equal size. The eye secretes a good deal, but has the better vision, the right eye having become myopic. In sunlight he sees well at first, but, after a time, observes red flashes offricts in the right eye, and finally, after long exposure, the same appearances with the left eye also. He complains of a good deal of frontal headache at present, and thinks that since the injury his memory has been failing, although lately it has improved. Has lost flesh and strength since he was wounded.

About the 30th August, the patient came to the office of D. L., and examined his eyes with the ophthalmoscope, but found no abnormal retinal appearances. Dr. L. walked from D. L.'s office to the hospital, an unusual exertion, as he was weak, and avoided exercise on account of the headache. He was accompanied by some of the hospital staff upon this occasion, and remarked to some of the hospital staff upon the singular appearance which his face presented after walking in the heat. It became distinctly
flushed on the right side only, and pale on the left. This fact was
afterwards observed again by us. The patient had used exercise
and had just come in. The right half of the face was very red.
The flush extended to the middle line, but was less definite as to its
limits on the chin and lips than above these points. He complained
of pain on the right eye, and felt flushed in that eye. A careful
thermometric examination, made during exercise, showed no
difference in the heat of the two sides within the ear or mouth.
We regret that it did not occur to us to repeat this when the face
was flushed by exertion. Under a tonic course of treatment he
recovered ground rapidly. The eyes became less sensitive, the pupils
more nearly white, the line of the lid straightened. He had several
attacks of faintness after exposure to the sun, and these, with
occasional dizziness, retarded his recovery. He was at last
able to return to duty, and left for that purpose in October, 1863,
early all of his peculiar symptoms having disappeared, and his
general health having been altogether restored.
So much for this remarkable and interesting case, it may be questioned whether there be a true case
of wound to the sympathetic, from the effects of
experiments on the lower animals. I believe it was
I shall finish what I have to say on wounds to
special nerves by treating of the effects produced by
the fifth and seventh pairs of central nerves are complicated. I shall therefor describe the symptoms as fully as I possibly can from the knowledge I have been able to glean from the careful study of cases presenting themselves at the general hospital wards of the Infirmary and St Bartholomew's Hospital. and from the reported cases of other observers, and then I shall try to offer some explanation of their phenomena and facts of the fifth.

The symptoms due to injury of the fifth appear to be as follows, loss of consciousness due perhaps though not in all cases never to the sudden shock from the injury than lesion of the nerve, loss of sensibility in the part supplied by the ramifications of the nerve, paralysis of one or both the upper extremities with sensation also lost, secondarily Amniositis, atrophy muscle change in the color and functions of the iris, cataract &c. &c. Of the effect of a blow on the forehead causing syringa I have seen one well marked case, it occurred in the person of an Irish lad of about 14 years old. Whilst attending midwifery at the New York Dispensary I was asked by one of my patients there her son asks
against firmly with the left eye, I did so, and
being an attendant at the eye wards at the Infirmary
at the time, I brought him to W. Walton, who
then expressed it as his opinion that the strabismus
was due to a blow which the boy had received a few
years before on the forehead just above the left supra-
orbital foramen. In this case no operation was
attempted.

With regard to the paralytic of the upper extremities
I believe it due to a reflex act, for I see no other
way to account for the phenomena. Of the influence
of reflex action in producing the effects on the eye
which I have mentioned above, has been called in
question by men of great reputation, among them
I may mention the names of Walther, J. Mueller
and Dr. Tichel, the first, says that there is not a
single proof of an anaesthia being due to injury of
the supra-orbital nerve, and the last two last
consider that anaesthesia is attributable more
to commotion of the eye and optic nerve than to
a reflex act. Against these statements we have
the facts brought forward by Dr. Rotter of congestion
of the eye and photophobia consequent on neuralgia.
of the trigeminal, and also those of M. James of abnormal
caused by the same complaint. The abnormal in
many cases existing only during an attack of
neuralgia and disappearing on the cure of the nervous
affection. In multiply cases would be of no use, as
the Authority's have quoted I consider quite sufficient
for the purpose of proving the influence of peripheral
irritation as a cause of this affection.
Passing now from the discussion of the effects pro-
duced by injury to the fifth nerve let us briefly
consider the phenomena produced when the
Plexus Dura is implicated in any lesion of the
part to which it is distributed. The most startling
of these effects are paralysis of the muscles of the face,
pain in the neck, shoulder and hand of the side
injured, the power of taste sometimes being affected,
with impaired movements of the tongue, loss of electric
contractility in the muscles of expression, lasting
sometimes for the whole life of the patient at other
times for only a few days or weeks, diminu of
vision, inability to close the eye, the patient making
up for this loss by rolling the eye upward and
thus covering the iris. If this injury extends
as far backwards as to implicate the posticus muscles, we may have rotational convulsions, difficulty of walking straight, the control of the will over reflex action being either lost or lessened.

On the effect of nerve injury on sensation, muscular action, Nutrition, Calorigenesis &c.

On sensation. In all cases of injury to nerves sensation is more or less primarily affected, the anaesthesia sometimes followed by the most acute hyperæsthesia, as if the sensory nerves after recovering from the effect of the injury are more exquisitely endowed with sensation. True tactile hyperæsthesia is rare, and it is even doubtful if it ever occurs. A hyperæsthetic condition of the muscles is often also present, at times affecting a group of muscles as the flexors or extensors of a joint, motion increases the pain, and the state of the weather has a more or less influence on it. Is what are we to attribute this condition of the muscles? for it often exists in parts distant from the injury and cannot therefore be due as thought by some to inflam-
motion extending along the nerves. Of the fact that patients often return before motion I have already spoken and have only to add here, that as these injuries are often attended by severe pain on motion, the patient not willing to cause himself pain does not by an exercise often will attempt to move the limb, thus in many cases we have not the power of judging the exact amount of motion possessed. Total loss of sensation may occur, but is often only temporary. Pain and that of the most agonizing character is often a common sequel of nerve lesions, it is described by patients as a "burning" or as "mustard and hot" or as "a red hot file rasping the skin." It is represented by those surgeons who have paid particular attention to these nervous affections, as attacking chiefly the foot and hands nerves the trunk and seldom the arm or leg. It is often superficial but as often deep seated. Exposure to the air is dreaded by the sufferer, whilst moisture relieves the pain, often a time he becomes hysterical and dreads the approach of any one for fear of being touched, and even places stones in his boots to lessen the shock of walking. Cold in cases the pain, sage dipped in petrol also gives relief
heat and a peculiar position of the limb increased. The temperature of the part is higher than the rest of the body. In some cases the pain lasts six weeks or others as many months.

On muscular action. Paralysis may be caused in three different ways. First by a nerve being cut across, secondly by contusion, and thirdly by reflex action. The prognosis is unfavorable if there is early loss of motion, tone in the muscles, rapid shrinking in size, and contraction due to change in nutrition and not to spasm. As after effects we may have permanent contraction of the flexors or extensors of a joint, ankylosis of the joints or atrophy of the paralyzed muscle act. Contraction may be due to loss of power in opponent group of muscles, organic alteration of tissues and tonic contraction without atrophy. The first effect of a ball passing through a muscle is spasm, fibre shortness, and subsequent relaxation. Sometimes muscles are thrown into a chronic state where the influence of the will is brought to bear on them, this affection is readily cured by friction and passive motion.
On nutrition. The muscles, joints and skin with its appendages the nails are all subject to undergo a change in their proper nutrition by injuries to the nerves which supply them. Thus the musculoskeletal and connective joints become painful, the pain being described as identical with that caused by rheumatism. These rheumatic pains in the joints generally follow injury to the spine, and this fact led the late Dr. Mitchell to consider rheumatism as due to spinal affection and must be explained by the chemical theory as was propounded. And now I turn to a phenomenon which from its parity and singularities claims our attention and to which we will now address ourselves. I refer to the peculiar change which the skin undergoes and which has been denominated by Mr. Paget and other observers as "glossy chillies." In these cases the skin becomes red or white in patches, the epithelium having peeled off as we sometimes see it in the dead house, the cuticle is shrunken, and drawn tightly over the subjacent parts, the denuded cuticle appearing as if varnished. Mr. Paget compares these patches to child's lair. Often together with their glossy appearance...
of the skin we have the burning pain mentioned above. Eczema often occurs, and then the pain which was
begun almost intolerable subsides; this eruption is
sometimes seen in patients suffering from neuralgia.
As the wound heals or the patient's health becomes restored
the eruption vanishes. The hair drops off the parts
subject to this depraved eruption. The nails become
changed and variously curved. The alteration in the
nail consists of a curve in its long axis, an extreme
curvature at its extremity, and sometimes a thickening of the
cutis beneath the extremity. Sometimes the nail at the
end of the nail part to the third finger joint becomes
retracted, leaving the sensitive portion partly exposed.
At the same time the upper line of union of skin
and nail retracts into a ridge. The latter part, and
in place of a smooth edge, is seen through the nail
as a ragged and notched border. When the toe nails
are affected, which rarely occurs, small painful ulcers
defects heal on produced. The skin is often dry
after complete division of the nerves of a limb, in
some
others the sweat is present but only on certain well
defined portions of the limb, and in a third class the
perspiration is excessive and of a peculiar heavy
Coloration. The temperature varies greatly sometimes being quite normal, at another time higher than the sound limb, and in a third class of cases, less.

The after effects of injuries to nerves.

Epilepsy. This affection often occurs after lesions to nerves, and is often cured by the extraction of the missile which has been found to be pressing on the principal nerve of the limb or part of the body. A case is recorded of a soldier who received a bullet wound in the buttock, ten months after the injury, he had a fit of epilepsy, and for three months after had them every three weeks. The bullet which had lodged was found in close proximity to the sciatic nerve; and which on removal a cure was complete. Dr. Portal relates a case of a man who had been shot in the neck, and who had regular attacks of epilepsy, for some time, when an abscess formed in the neck from which one of the shot came out, and he then recovered. Shefferbach gives the
case of a young woman cured of epileptic fits by the extraction of a piece of glass from the hand. Schreoder van der NOLLE (if I understand him correctly) considers that epilepsy is due to an exalted sensibility and excitability of the medulla oblongata causing this part on the application of any irritation liable to discharge its force in involuntary reflex movements, making it in fact a kind of nervous battery. The fact that epilepsy may be caused by external injury at once destroys the theory of Dr. Todd who attributed the fits to the gradual collection of some mobile material in the blood. A late writer on this disease thus epilale, epilepsy is for the most part a diathetic and not a toxic affection, and that the elimination of a materia mati is not to rule our therapy. The effective causes are mainly those which produce dynamic derangements, and which so far as we know can generate an poisonous mater. If I may be permitted to press any opinion on this subject I may say here that I believe all disease of the system generally are primary due to the derangements of the several forces in the body collected and shown under the paper.
The physical forces have been shown to have a direct relation to the forces acting within the animal body, that it would not require any great stretch of the imagination to reconcile the theory themselves that it is by the excessive action or decrease of action of one of the physical forces on the body which is the primary cause of disease. Let us take for instance the effect of heat on the body; heat applied to the body becomes changed into one of the forces acting within the organism, this being abnormally increased deranges the whole system, and disease sets up. It may be asked how by the slight excess your force the whole organism is so materially affected, to this it may answered that if the mere displacement of you pin in any one of your most simple machinery may render it unfit to perform its usual work, why should not the preponderance of a force however slight it may be, and incapable from its very minuteness to be duly appreciated by us derange and destroy the well being of a machine so complex as man. I believe that to properly understand th
causes of disease we must be first acquainted with the action and effects of force, and for this reason I disagree not with those who consider all diseases as originating in the nervous system, or in the stomach and bowels, for they assign no reason for the primary disorder which must have taken place in their favourite first cause before that the system as a whole became affected. To say that cancer is only an abnormal increase of cells in a part of the body, is merely echoing the speech of a celebrated statesman. "That dirt was only on the skin is a wrong place without giving any explanation of the cause of this Increase in the accumulation of cells or dirt in or on any part. It has been noticed by many writers on nervous disorders that galvanism sometimes does good at all times, but as the true explanation of this fact, that in the first case the 'vital nervosa' is deficient and therefore the galvanic force has become changed into purgative influence, and the deficiency is thus made up, whereas in the latter case this purgative is in excess and remedies which have a purgative effect on the system, such as kautz, belladonna & c.
Of course we must allow something to peculiarities of constitution, or in other words to the special combination of the forces existing in each separate animal, which may in all probability be due to the various phenomena caused by what we designate "peculiarities of constitution".

Amaurosis. Whilst speaking of the effects of injuries to the fifth pair of nerves mentioned, the occurrence of blindness in some cases due to cataract, in others due to degeneration of the retina. Of these affections I shall therefore say no more here.

Starnus. I have merely mentioned this disease here, not that I have any new facts relating to bear on its pathology, but that I am accused of having callously left it out. At the same time I cannot agree with these gentlemen who regard starnus as the result of a poisonous matter formed in the blood, or absorbed into it from an unhealthy secretion of the sounds, and that acting like a morphine sets up that peculiary irritable state of the coat which is the essential condition to produce the
symptoms of the disease.

Chorea. Cases of this affection by Dr. Montenour and Kew in their paper on "Chorea affection following injury to nerves", and also some reported by Prof. Boulli of Turin and Prof. Andral. Trembling movements without palsy are mentioned by Dr. Hassel and Lawe, and in some others the convulsive movements became general.

Rotatory movements. Of these I spoke when talking of injury to the auditory nerve.

Sehtria. See the American Journal of Medical Sciences for April 1851. Also a case of this affection brought on by temporal neuralgia mentioned by Dr. Brachet.

Treatment. And now we have come to the most difficult part of our subject, and one where the resources of the surgeon will be most tried, and when he will often meet with the most discouraging results, but he must with faith of his faith...
in one attempt, but still continue longer than remiders which experience has taught him are most to be relied on.

And first let us consider the treatment of pain.
The first thing to be done is to examine the cicatrice and if it is probable that a nerve may be implicated in the cicatrice it may removed. Fictions on the surface of the scar, or passive motion of the limb, leeches, blister, the actual cautery or hypodermic injections of morphia. The treatment of the burning pain described above resolves itself into the continual blistering of the part which has undergone the malnutrition which we have shown almost always accompanies this burning pain. Blisters to the cicatrice heal this do no good, and the cold water which the patient constantly applies only produces temporary relief.

Malnutrition. Electricity repeated daily for ten or fifteen minutes at a time, each muscle being electrified in turn, passive motion, the cold douches and shampooing should all be tried, for often when one fails part one or twoucceed
will another. The spasmotic contraction of that muscles such as those of the fingers, are often cured by the injection into the body of the muscle of a solution of atropine, this treatment fails in the long muscles. Electricity is of little use in these cases spasmotic contraction of muscles due to injury. The general health must be attended to, bathe, fresh air and good and nourishing food.