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[To be continued.]

THE REMOTE EFFECTS OF SPINAL INJURIES IN MINERS.¹

By P. RHYS GRIFFITHS, M.B., B.S.LOND.,
Senior Assistant Surgeon, the Infirmary, Cardiff.

MINERS, from the nature of their occupation, are peculiarly liable to injuries of the spine and spinal cord. These generally result from falls of coal, stone, or rubbish, causing in the majority of cases what the miners describe as a doubling up of the body.

I wish to limit myself as far as possible to a consideration of the remote effects of spinal injuries, and only of those which are not dependent upon gross lesions such as fracture or dislocation of the spine, rupture of the cord, hæmorrhage upon or into the substance of the cord.

The great obstacle to the clear understanding of the surgery of the spine has been the loose and careless manner in which terms have been bandied about, and the retention of old-fashioned descriptive terms. It is difficult to steer clear of all the objectionable features of the older classifications, but I have ventured with some considerable diffidence to do so by dealing with my subject under the following heads:

1. The effects of spinal sprain.
2. The effects of injury to bone of a nature not sufficiently grave to constitute a gross lesion.
3. The effects of molecular disturbance of spinal cord in conjunction with sprain of spine.
4. The effects of molecular disturbance of the nervous system with or without those of sprain of spine.

I.—SPINAL SPRAIN.

From the first class, spinal sprain, I wish to exclude the spinal cord entirely. When one considers the anatomical relations of the cord, it becomes evident at once how admirably, safely and securely it is protected from external violence. Where nervous conditions have resulted after sprains these may readily be assigned to conditions quite independent of the cord. If we regard the spine for surgical purposes in the same light as we do any other joint, it will be clear that the condition of spinal sprain must obviously differ very greatly in extent and severity. In the mildest form the skin is stretched and the muscles damaged; in the more severe form, in addition to stretching and tearing of muscles, the ligaments of the spine are involved; they may be stretched, and are probably often torn.

In the worst forms, in addition to the foregoing lesions, we meet with rupture of nerves and hæmorrhage, often of a severe character, extradural or intradural, and often into the substance of the cord. But, as I have already stated, this is excluded from consideration.

Amongst the miners who have come under observation many have suffered from the effects of the first and second forms, and, as we should naturally expect, the symptoms have varied very considerably both in extent and severity. The most prominent have been weakness, stiffness and rigidity of spine, varying degrees of immobility of spine, muscular rigidity, unilateral or bilateral, and local tenderness. All these, you will observe, are conditions which prevail wherever joints are sprained.

The effects of spinal sprain last for variable periods. Erichsen states that recovery from spinal sprain after railway accidents takes place generally in six months. In young miners, very few of whom have come under observation, the symptoms pass away in a few days or weeks, but in the older men they may persist for many months with such severity as totally to unfit them for work.

II.—INJURY TO BONE, NOT CONSTITUTING A GRAVE LESION.

I have placed here those cases which have presented signs and symptoms of caries of the spine. I have notes of three cases. In the large majority of cases of caries of the spine, we are able to elicit a history, clear or obscure, of traumatism, and patients will generally ascribe their diseased conditions to it. I do not support the proposition of direct causation by traumatism, although in the cases that I shall submit to you we were unable to obtain clear evidence of a tuberculous taint or diathesis. Perhaps the correct way of regarding these cases is to suppose that some vasomotor changes were set up in the bone as the result of the accidents, and that tubercle bacilli availed themselves of these changes to form for themselves a resting place and breeding ground. In two of the cases the disease confined itself apparently to the spine alone; in the third case, it appeared more than probable that the lung mischief was secondary to the spinal.

Briefly, the notes of the cases are these:—

CASE I.—J. J., aged 16. A large stone fell upon the lower part of his back. He walked home from the pit, a distance of half a mile, and then went to bed. He was in bed for a week, then got up and moved about the house. No symptoms prior to the accident. Two months afterwards he noticed a lump over the middle of his back, and he was put up in a plaster jacket, which he had worn up to the time of his examination. There was a well-marked posterior curvature of the dorsal spine.

CASE II.—C. R., aged 37, seen in October, 1888. A block of stone with debris fell upon his shoulders in December, 1887, squeezing him down to the ground and almost burying him. He was carried home, complaining of great pain in his back, more particularly in the lower dorsal region. A fortnight after the accident he was able with much difficulty to get about with the aid of crutches. He was obliged to use crutches for two or three months, and then he was gradually able to walk out a little, still complaining of pain in the back. He was not able to tell how soon after the accident he first noticed the lump in his back. There was a decided lateral and anterior posterior curvature of the spine, the most prominent point being at the lowest dorsal spine, and here he evinced great tenderness to pressure.

CASE III.—J. S. After a similar accident this patient developed spinal caries. At the time of examination there was also distinct evidence of lung mischief, which we were of opinion followed in point of time the appearance of spinal mischief, and was probably secondary to it. Unfortunately, in the notes there is no special mention of the true relations of accident and disease, but it was clearly our opinion, as the following note states that the spinal mischief was directly dependent upon the accident: "The spinal mischief was no doubt set in motion by the accident."

III.—MOLECULAR DISTURBANCE OF CORD.

I have adopted the term "molecular disturbance" in the third class to indicate a condition in which, to quote Erichsen's words "the intimate structure of the spinal cord is more or less deranged, by which its functions are greatly disturbed, and in which various symptoms indicative of loss or modification of innervation is immediately induced." I am quite aware that upon the pathology of this condition there will probably be a considerable difference of opinion, but I shall not enter upon a defence of my position, because this would be quite foreign to the object of my paper.

A history of modification of innervation I have been able to elicit in many of the cases which have come under observation. Generally it has assumed the form of temporary paralysis or paresis, temporary sensory disturbance in the form of numbness and tingling, or temporary interference with the process of urination. As far as I have been able to ascertain, motor disturbances are more frequent in their occurrence than temporary loss of control over the bladder.

Is this a common experience after spinal injuries? If it is then the following important question should not be difficult

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to answer: Do organic lesions of the cord result from this molecular disturbance?

It is important in this connection that we should exclude pre-existing disease, for it has been stated on good authority that organic disease never starts from a traumatism such as is here implied, and that where it is stated to have done so the probability is that there was pre-existing disease.

I shall submit notes of a case where pre-existing disease was seriously aggravated, and I hope to prove that organic disease may originate in miners after injuries such as I have described.

CASE IV. Aggravation of Pre-existing Symptoms.—J. F., aged 55, was examined October, 1888. He attributes his condition to an accident during the previous year. He states that in November, 1887, whilst walking down an incline in a coalpit he slipped and fell backwards, straining his back and striking it against the ground. He was carried home, and remained in bed for three weeks, during which time his legs were very weak, and he could not retain his urine, having to get up seven or eight times in the night. After this he got up and moved about the house. Twenty years before this he fractured his right leg. For ten years previous to the fall he was not quite steady in his walk. He was obliged to steady himself with a stick, and his gait somewhat resembled his present one, except that since the accident it had become more unsteady. He is fairly well nourished, but gives the impression of a man in failing health. There is a general shaking of the body when he stands; the walk is very unsteady and jerky. When he stands with his eyes closed his condition is typically ataxic. The tongue is unsteady, constantly tremulous. The patellar reflexes are exaggerated. Wrist reflexes are marked. There is no ankle-clonus. The head twitches. Very sensitive to pressure on the spine.

CASE V. Organic Disease following Injury.—T. T., aged 29, single. He met with an accident in April, 1886. He was completely buried under a very heavy fall, which altogether he estimates must have been about 3 tons. He was carried home on a man's back and put to bed at once. He passed urine the day after the accident without instruments. The bowels, he says, acted all right. He was in bed for a week; could not move his legs. He got up and walked about the house for a few days, and then went out "hobbling" about on sticks. He began to work three weeks after the accident. Occasionally after working hard he had pains in the lower part of his back. He left the Mon. Valley for the Rhondda in July, 1887, and pain in the lower part of the back was still felt after working hard. From this time forward he continued to suffer from pain in the back, and, as far as could be made out, it was after his return again to Monmouthshire in August, 1893, that he began to notice weakness and trembling in his legs, and, as he stated, in "his system generally." There was no history of specific disease. When seen in April, 1894, he crawled about the room. There was evident weakness of both legs; the reflexes were exaggerated; tactile sensation was defective up to the umbilicus; he said he had complete control over his bladder; occasionally he had to run off quickly to relieve his bowels. There was an acne rash on the shoulders, and some discoloured spots on shoulder, arms, and thorax. There were no scars on the neck nor in the throat; he had right external squint; the upper extremities were apparently normal; he said he could use them as well as ever.

This case appears to me to be clearly one of organic disease resulting from molecular disturbance of cord. I have notes of two other cases in which it seemed fairly certain that organic disease originated in this way; and, moreover, as side-lights upon this interesting question, I have brought with me sections of the spinal cord from a case of disseminated sclerosis under the care of Dr. Bastian when I was his house-physician which are interesting because the patient's condition was attributed to the class of injury which we are considering. I have no doubt we can most of us adduce evidence from cases in practice other than mining of some causative relationship between accident and disease such as is assumed under the present class.

If, then, organic disease does originate in this way, the next question is, how often? The kind of evidence we want I have indicated, and it is of very great importance that extreme accuracy should be observed on account of the important bearing these cases must of necessity have upon medico-legal investigations.

IV.—MOLECULAR DISTURBANCE OF THE WHOLE NERVOUS SYSTEM.

The most diverse and often extraordinary symptoms are included under the term "railway spine." It is the general belief amongst those members of the profession not familiar with mining accidents, and put forth as a conclusion by Dr. Byrom Bramwell, based, as he states, on a large body of evidence collected, but not from any under his personal observation, that miners very rarely manifest the train of nervous symptoms which frequently occur after railway accidents and injuries. Upon this point I desire to join issue with him, and to state that I have frequently observed in miners these nervous symptoms. The most common symptoms have been general debility, prostration, and exhaustion of a very marked character, marked emaciation, extreme

nervousness, often a morbid condition of excitability (in one case there was a clear history of a condition of unstable mental equilibrium of an extreme nature, bordering upon the maniacal), extreme hypersensitiveness of skin, not confined to the spinal regions, defective memory, weakness of sight, feeling of weakness in one or both legs, and exhaustion after walking short distances, pain and weakness in the back, loss of weight, loss of appetite, vomiting. There was no evidence in these cases of organic mischief of the brain or cord.

Mr. Thorburn divides these cases into two classes, (a) neurasthenic, and (b) traumatic hysteria; the former characterised by a general defect in nutrition and nerve power, the latter by well-defined and localised symptoms dependent upon localised molecular disturbance, probably of some portion of the cortex.

The very great difficulty in cases where compensation is claimed or where a fund is involved is to differentiate between real suffering and the feigned symptoms of unscrupulous individuals—between voluntary and involuntary excitement of the imagination.

With these few preliminary remarks may I be permitted to invite discussion upon the following questions:

1. How long do the symptoms of simple spinal sprain in miners last?
2. Do miners frequently suffer from molecular disturbance of the spinal cord?
3. Does organic disease of the spinal cord originate from molecular disturbance, and, if it does, how often?
4. Do miners often manifest the nervous symptoms which are so frequently met with after railway accidents and injuries?

5. What influence, if any, has the establishment of the South Wales and Monmouthshire Permanent Miners' Fund had upon the genesis of neuroses?

I have purposely avoided the introduction of such terms as concussion of the spine and concussion of the spinal cord, because I consider them singularly unhappy and inappropriate as applied to mining injuries, and because they have caused endless confusion and misunderstanding in the past.

[The result of the discussion went to show:

1. That symptoms of spinal sprain vary in duration mainly according to age—the younger the individual the more quickly he recovered. Old men might suffer for long periods. The difficulty was to exclude neurasthenia.
2. That molecular disturbance of the cord after accidents necessitating the use of a catheter was very rare—less rare, perhaps, were temporary and sensory disturbances.
3. That organic disease following upon molecular disturbance was very rare.
4. That neurasthenic disturbances were common after spinal accidents.
5. That the South Wales and Monmouthshire Permanent Miners' Fund had a good deal to do with the genesis of nervous symptoms after accidents.]

TUBERCULOUS DISEASE OF THE PORTIO VAGINALIS.

By JOHN D. WILLIAMS, M.D. EDIN., B.Sc.,
Freeland-Barbour Fellow Univ. Edin. 1888-90,
Cardiff.

RECENT observation has shown that tuberculous disease of the female pelvic organs is not so rare as was formerly believed to be the case. The *post-mortem* investigations of Pollok,¹ Kiwisch,² Courty,³ Schramm,⁴ Cornil,⁵ Zweigbaum,⁶ and Whitridge Williams,⁷ has thrown considerable light on its frequency, and according to these authorities the disease was met with in from 1 to 8½ per cent. of the cases examined. In 100 necropsies examined by myself, tuberculosis of the female pelvic organs was encountered in 3 cases, one of which, a case of primary tubercle of the Fallopian tubes and uterus has already been published.⁸ The percentage of genital tuberculosis as determined in the operating theatre by different operators, varies: Edebohl gives a percentage of 4, Martin a percentage of 3, whilst Whitridge Williams,⁷ who carefully examined the operative material of the Johns