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A CLINICAL LECTURE ON A CASE OF UNILATERAL (HEMIPLEGIC) SPASM AND CONTRACTURE WITHOUT PARALYSIS.

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By SIR T. GRAINGER STEWART, M.D., LL.D.,

Professor of the Practice of Physic, Physician-in-Ordinary to the Queen for Scotland, and President of the British Medical Association.

I show you three cases presenting considerable superficial resemblance. The first is an example of old-standing hemiplegia with descending degeneration and spasmodic contracture of the muscles of arm and leg. The second is a typical case of the cerebral palsy of childhood exhibiting along with a

Fig. 1.—Showing general appearance and attitude of J. J. From a photograph by Dr. Dingwall Fordyce.

degree of paralysis very well-marked spasm of many muscles interfering with the action of the limbs. And the third, the case which is to be our special subject to-day, is a man suffering from unilateral spasm, and at first sight closely resembling the

hemiplegic patient, but really differing in most important particulars.

You observe that each of these cases exhibits the ordinary features of spasticity. You see the tense contraction of the affected muscles; you see how this has in some regions passed into a condition of contracture, with alteration of the muscular tissue and of the joints and even bones associated with them. You see how in each of the three the deep reflexes are exaggerated, although it is not easy to show this fact in some parts, in consequence of the state of contraction or contracture in which the muscles habitually are.

But when I proceed to test the motor power of these three patients, a great contrast emerges. With regard to the legs you notice that while all of them can stand, the hemiplegic walks only in a very awkward way, and is unable to run, while when he attempts to step up on a chair he signally fails. You will notice that the second patient stands well enough,

Fig. 2.—Showing impression of footprints of J. J. From a photograph by Dr. Dingwall Fordyce.

but is rendered unsteady by the occasional spasms as well as by the deformity which the disease has caused in his foot, that he walks fairly, but is distinguished by many associated involuntary movements which attend it, that his running is so

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awkward as to be scarcely possible, and that it is with extreme difficulty if at all that he can manage a high step. But in the case of the third patient, you notice that notwithstanding the deformity of his left foot he stands as steadily as if on drill with his regiment, he walks quite well, though with a peculiar gait, and planting his left foot in a peculiar way, as the photograph taken by our usual method shows, but he runs better than he walks, showing no tendency to stumble, nor anything like the amount of disability one would expect. When I ask him to step on to this table he raises the foot of the affected side with little difficulty, and by the power of the leg alone steps up to this height of 3 feet.

Examination of the arms of the three patients brings out corresponding results, although the arms being more affected than the legs in all of them, they act much more imperfectly. You perceive that the hemiplegic patient can make no use of the hand at all, cannot extend the spasmodically bent fingers, can scarcely move the wrist, flex or extend the elbow-joint, or make much movement with the shoulder, while the infantile case, although more capable of purposive action, is much embarrassed in movement by the irregular spasmodic contractions of many muscles.

On the other hand the patient whom we are especially to study shows that although his hand is so spasmodically contracted as to be quite useless, he yet can in a measure move some of the fingers, while he definitely can make movements at the wrist, and his power of flexion and extension at the elbow, although hindered by the simultaneous action of opposing muscles, is yet so powerful as to rival the best efforts of the athletic student whom I have asked to endeavour to hinder the patient's movement. You see that notwithstanding the best the student can do the patient holds his own. And then as regards the shoulder-joint the patient can, though with difficulty against much opposition by the antagonistic muscles, raise his arm above his head.

With regard to the muscles of the face in the three patients, you will notice that in the hemiplegic they show some degree of paralysis, the two sides of the face moving therefore unequally. In the second case you will observe that spasmodic movements similar to those occurring elsewhere affect the muscles of both sides of the face, so that grimaces and contortions are commonly present. But in our special case of to-day you notice there is little difference between the two sides of the face, and it is only when we carefully compare the two halves of the tongue that the left is found slightly more voluminous than the right, and when we compare the facial muscles there seems to be a condition of hypertonicity on the left side, but I have had difficulty in making up my mind on this point.

This third case is thus really quite distinct from the others, and it is to be for the rest of our lecture our special subject of study. I shall first give you an account of the history and present condition of the patient, and then demonstrate certain points of special interest.

J. J., aged 25, soldier, and lately a miner, was admitted to the Royal Infirmary on November 4th, 1898, complaining of stiffness of the left arm and leg, which condition had lasted three years and a-half. His family history shows no unfavourable point. He was a healthy child, and originally began work underground when 12 years old. He continued that employment for six years, but at the age of 18 he enlisted. After two years' soldiering at home he was sent to India in 1894. On April 23rd, 1895, while serving in the Argyll and Sutherland Highlanders at Meean Meer, he took typhoid fever, and passed through a long and severe attack. He says he was unconscious for five or six weeks, and the Netley authorities, who have kindly favoured me with an extract from their notes and reports, say he was ninety-three days in hospital, and then transferred to Kasauli for change. He states that on recovering consciousness he found himself unable to bring together or to bend the fingers of his left hand, and that he dragged his left foot on attempting to walk.

Gradually the disability as to his fingers increased. They became strongly flexed, and his hand bent to the ulnar side. Then his wrist became flexed, and early in 1896 his arm had twisted round, so that his hand was behind his back, and he was quite unable to bring it forward. At the same time his toes gradually got more and more bent, the great toe upwards and the others downwards, especially the smallest toe, and

so walking became painful and difficult, but he thinks that he had no real weakness in the leg. The army report states that in the course of his typhoid he had thrombosis of the right femoral vein, and lost power of extension in fingers of the left hand, so that he was useless as a soldier. The illness was not aggravated by intemperance or other vice, or by misconduct.

The summary of causes of invaliding on being examined at Netley, December 18th, 1895, are stated as follows: "Much worse; has spastic contraction of fingers and wrist, left extremity, and all toes of left foot; cannot pronate or supinate left arm, or raise it above head; can flex elbow slowly; has no loss of sensation; is pale, but fairly well-nourished; the spleen but slightly enlarged; left leg smaller than right; vision good. Disability points to brain lesion; unfit for further service; invalided; will not be able to earn a livelihood."

He says that after leaving Netley he gradually became worse, and since I began to prepare this lecture I have ascertained that he was for a while in Glasgow Royal Infirmary under the care of Dr. Lindsay Steven, who published the case in the *Glasgow Medical Journal*. From that record I find that he was admitted on April 11th, 1896; the description of the arm and leg given by Dr. Lindsay Steven is as follows: "The fingers are flexed upon the palm of the hand more or less. They can passively and slightly, by voluntary effort, be extended within narrow limits. The thumb is turned outwards and flexed at the inter-phalangeal joint. Forcible extension of the fingers is accompanied by considerable pain, but the thumb is less painful in this respect. The wrist-joint is fixed, evidently largely by muscular spasm, and not by definite ankylosis. Movement of flexing the forearm on the arm is perfectly easily accomplished, but it is accompanied by considerable fine tremor of the whole arm. On attempting to raise the left arm above the head it becomes evident that there is little movement at the shoulder-joint. Most of the movement is accomplished by moving the arm and shoulder *en masse*, and, as a result, the range is much more limited than on the other side. There is no definite wasting of any of the arm muscles. The position of the thumb in relation to the other fingers is very noted. It is turned round in such a way that it rests upon the radial aspect of the first phalanx of the forefinger. As regards the foot, there is noted a spastic condition, evidently involving the extensors, so that the toes are all drawn well up upon the dorsum of the foot, the first phalanx in each case being drawn far back upon the metatarsal bone. The extensor tendons stand out like cords. Despite this, movement of the ankle-joint is fairly free, although rather jerky. The power of the muscles of the thigh, as tested by making and resisting movements of flexion and extension of the knee, is fairly good in both lower extremities, and no appreciable difference is made out between the two sides. Sensation is tested in both upper and lower extremities, and found to be normal. The reflexes (tendon) in the left upper extremity are abolished, in the right normal. The superficial abdominal and cremasteric reflexes on the right side are easily elicited; the former can be faintly brought out on the left side, but the latter on the left side cannot be elicited. The knee reflex is distinctly exaggerated on the left side, and ankle clonus is very marked, while on the right side the knee reflex is normal, and there is no ankle clonus. There is no facial paralysis, but there is a fine tremor of the eyelids of each side when they are closed.

The right calf, 5 inches below patella, measures 14 inches, the left 12½ inches.

Girth of wrist just above styloid process (narrowest part of forearm), 6½ inches on both sides.

Three inches below external condyle of humerus, right side 9½ inches, left side 9 inches.

At deltoid insertion, on right side 9½ inches, on left side 9 inches.

At mid-upper arm, right side 10½ inches, left side 10 inches."

From this report it is clear, as will be seen when we complete our own examination, the state of matters was in April, 1896, substantially the same as it is now.

We have further ascertained that the patient has twice been in Stirling District Asylum at Larbert suffering from mania. He was there from July 11th, 1896, till March 13th, 1897, and from June 15th, 1897, till February 12th, 1898.

Dr. McPherson, the medical superintendent, and Dr. McGilchrist, the assistant physician to the institution, have

kindly favoured me with notes of their observations as recorded in the case books of the institution: "Patient is an alcoholic. State on admission: Upper limb flexed at every joint, and forearm pronated; fingers flexed at metacarpo-phalangeal joints; toes of left foot distorted, and left leg weak, kept stiff, and dragged after him in walking; toes appear flexed on themselves, but (especially the great toe) over-extended at proximal joint. There does not appear to be any atrophy of muscles in either limb; sensation is undisturbed; any attempt to straighten the arm appeared to be consciously resisted, in fact the more it was tried the more exaggerated became the flexion; reflexes are exaggerated on left side. Progress, August 1st, 1896: No change in arm or leg; he has never been observed to straighten out the arm; the contraction is not diminished during sleep; he complains much of pain in wrist, especially when, as at times it happens, the contraction is increased. There are many things about him which suggest hysteria. September 20th: An attendant says he saw him stretch out his arm when, as patient thought, no one was looking. There is still no sign of atrophy. He has been treated with faradism for three or four weeks without any improvement. Six attempts were

Fig. 3.—Showing usual position of fingers, hand and wrist. From a photograph by Dr. Dingwall Fordyce.

made with hypnotic treatment but without effect. December 1st: Only change is appearance of atrophy of affected parts, probably from disuse. January 4th: Under chloroform flexion and pronation disappeared, and arm could be freely moved into any position. The only remaining trace was that the fingers, though relaxed, could not be straightened at metacarpo-phalangeal joints. The first sign of returning consciousness was a reappearance of flexion and pronation. Veins in left arm and leg were more apparent than on right side and more distended. During his second stay in this asylum his physical condition was much the same as above."

Dr. McPherson writes: "After careful consideration of the symptoms, I came to the conclusion that they were due to hysteria and not to toxic action upon the cells of the cord. No doubt the typhoid fever occurring in a neurotic and predisposed subject, probably also an alcoholic subject, may have been the starting point of the neurosis. The patient was sent here on both occasions labouring under mania, with mild intellectual excitement and exaltation, and complete absence of the moral sense and general mental instability, which I suspect is congenital. I failed to discover any cerebral or cortical lesion, while the absence of atrophy and the disseminating character of the contractures appeared to me

inconsistent with degeneration of the spinal ganglia either anterior or posterior. I therefore looked upon the case as a functional neurosis. Of course, by this time organic changes in the nerve centres involved may probably have occurred." We shall return to these observations and that expression of opinion when we discuss the nature of the process.

His medical history is thus unusually complete, for he left the asylum in February of the present year and came under my care in November. He says that notwithstanding his disability he has been able to work occasionally as a miner. On his admission, we found him a robust-looking young man weighing 11 st. 6½ lbs; his height was 5 ft. 8 in. He presented the appearance of a patient suffering from hemiplegia with post-hemiplegic spasticity.

Fig. 4.—Skiagraph of hand showing outline of hand and wrist with position of bones. Taken by Dr. Dawson Turner.

On examination we found all the systems, except the nervous and the locomotory, quite healthy. On detailed examination of the nervous system the sensory functions were found normal. It is true that he complained a good deal of pain, but this was due to cramp-like contractions of his muscles. The testing as to all kinds of sensory impressions gave normal results; his field of vision was normal, as was also his colour perception. The ophthalmoscope revealed a normal fundus. With regard to motor functions, the organic reflexes were normal; the skin reflexes, and especially the plantar, were exaggerated, the epigastric and abdominal were difficult to elicit on the left side, apparently because of the muscular rigidity. The deep reflexes were difficult to elicit, owing to the habitual condition of the muscles, but it was clear that the knee-jerks on

both sides were exaggerated, though in a different manner, being sharper in the right and stronger in the left, and there seemed to be occasionally a tendency to ankle clonus on the left side, although for the most part attempts to evolve it produced no response and it was rather a pseudo-clonus than a true one. No reflex could be obtained in the arm owing to the spastic rigidity. With regard to voluntary movement, when asked to wrinkle his brow the right side moved much more than the left, and was more elevated. When making a forced inspiration the muscles on the right side of the nose act strongly, while there is sinking in on the left side. There is no marked difference between the sides when the patient is told to close the eyes firmly. The tongue, when protruded, deviates slightly to the right, and the left half is seen and felt to be rather more voluminous. The left half of the face also appears slightly fuller than the right. Dilatation of the left pupil is occasionally observed. The movements of the eyes are normal.

Fig. 5.—Showing the contrasted condition of the toes of each foot. From a photograph by Dr. Dingwall Fordyce.

When clenching the teeth tightly and opening the lips the right side of the mouth opens up more widely, the left side appearing not paralysed but stiff. The patient is unable to shrug the left shoulder, the shoulders being in a constant state of extreme shrug, and can make only very slight movement at the shoulder-joint, the whole shoulder girdle for the most part acting as one, and the muscles being almost constantly rigid. The left sterno-mastoid is larger than the right. The upper part of the trapezius is sometimes lax, usually spasmodically contracted. The same is true of the deltoid. In both of them the contraction is so strong that voluntary effort seems to have no effect. The biceps and triceps are always more or less rigid, but can be made to contract further at will, still the antagonistic action prevents free movements. He is unable to touch

his left shoulder with his left hand, and can get no nearer than his chin. After some time, and considerable exertion, he is able to straighten his arm, but cannot supinate his hand. He has power of movement in his thumb and slight power in the fingers. The hand is kept twisted to the ulnar side. Movements in the leg are comparatively good except in the toes, especially the small toe, which is constantly kept flexed. The great toe is bent upwards almost to a right angle at the metatarso-phalangeal joint, while at the interphalangeal joint it is flexed to an obtuse angle. A reference to the skiagraph shows the direction in which the distal phalanges are distorted. Measurements show the right arm at insertion of deltoid 11 in., left 10½ in. Right over centre of biceps 11 in., left 10½ in. Right forearm 11¼ in., left 10 in. Right wrist 7 in., left 6½ in. Leg: right ankle 9¼ in., left 8½ in.; right calf 15 in., left 12¾ in.; right thigh 21 in., left 20 in. The left or affected side is thus smaller than the right, although its muscles are constantly contracted and their consistence distinctly firmer.

Fig. 6.—Skiagraph of left foot showing the position of the phalanges of the toes. Taken by Dr. Dawson Turner.

With regard to the motor functions, I wish to insist on the fact that his disability is mainly or indeed exclusively due to a contraction of the opposing groups of muscles occurring when he seeks to bring any particular muscle or group of muscles into play—as, for example, when he wishes to flex his arm the biceps acts readily, but the triceps also follows suit and hinders the work of its antagonist. Secondly, it is worthy of note that on sudden or rapid action the antagonists do not come into play quickly enough to tell, and so he runs better than he walks, and even with the arm makes a sudden movement better than a slow one. (As is implied

in what has been already said, co-ordination shows no deficiency.)

The condition of the electrical reactions was carefully studied by Dr. Alex. Bruce and myself; but we thought it well to get a special report from Dr. Milne Murray, the accomplished electrician to the Royal Infirmary, and his report is as follows:

Motor Points.		Galyanic.				Faradic.	
		KCC	ACC	AOC	KOC	Coil.	Ratio.
1	Flexor carpi radialis, right ...	0.5	1.4	9.0	—	135	} 4
2	" " " left ...	6.5	6.0	14.0	—	90	
3	Peronei " right ...	1.0	1.3	2.9	—	115	} 10
4	" " left ...	1.0	5.0	4.0	—	110	

Test No. 1 gives nearly normal reactions, except that KCC comes rather early, while ACC is considerably deferred. Faradic excitability is nearly normal.

Test No. 2 shows great lowering of the galvanic excitability, especially in KCC. This requires about twelve times as much as in the right side, while ACC requires $\frac{1}{3}$ times and AOC $\frac{1}{3}$ times as much as on the right side. The faradic excitability is also considerably reduced, the minimal contraction requiring $\frac{2}{3}$ times as much as on the right side.

Test No. 3 (lower limb) gives a normal reaction both to galvanic and faradic stimuli.

* Test No. 4 gives a normal KCC, while ACC and AOC approach each other, the latter slightly preceding the other. The faradic excitability is depressed as compared with the right side, in the ratio of 10 to 13.

The result of the examination shows great lowering of the galvanic and faradic excitability in the left upper limb and a smaller lowering in the left lower limb. The character of the response on the left side is not in any way abnormal. There is none of the "laziness" of contraction so often seen in certain stages of the reaction of degeneration.

Now if you refer to the table on the board you will see in the three columns into which it is divided, first, the normal relations of the faradic and galvanic current to healthy muscle and nerve; secondly, the conditions found by Dr. M. Murray in case of J. J.; thirdly, the conditions of reaction of degeneration.

	Normal.	J J. (Affected Side).	Reaction of Degeneration.
<i>Faradic :</i>	Reaction readily obtained	Excitability diminished especially in arm	Reaction greatly diminished.
<i>Galvanic :</i>	Reaction prompt and sharp	No laziness in contraction	Reaction lazy, sluggish, and prolonged.
		Arm.	Leg.
Appearance of contraction :	1. KCC	1 & 2. KCC and ACC (practically simultaneous)	1. KCC
	2. ACC		2. AOC
	3. AOC	3. AOC	3. KCC
	4. KOC	4. KOC	4. AOC

The condition thus bears no resemblance to the reaction of degeneration. With regard to vasomotor and trophic functions, the only point to be noted is that not only does the left leg measure less in circumference than the right, which might be explained by the old thrombosis, but the left arm also measures less than the right one, notwithstanding the fact that its muscles are generally in a state of violent contraction, and are so vigorous. The measurements taken in Glasgow compared with those we made here are as follows :

	Glasgow Infirmary.	Edinburgh Infirmary.
Right calf	14 $\frac{1}{2}$	15
Left calf.	14 $\frac{3}{4}$	14 $\frac{3}{4}$
Girth of wrist just above styloid process—right	6 $\frac{1}{2}$	7
—left	6 $\frac{1}{2}$	6 $\frac{1}{2}$
At deltoid insertion—right	9 $\frac{1}{2}$	11
“ “ —left	9 $\frac{1}{2}$	10 $\frac{1}{2}$

Comparing these measurements, we find that the girth has increased on both sides during the past two years and a-half; that the left or affected side is smaller than the right; and that the growth on the left side has been less than that of the right at all points measured excepting one—namely, the insertion of the deltoid.

These differences appear to imply a trophic change in the muscles of the left half of the body, and the appearance of a distinct degree of increased growth on both sides since he was examined in Glasgow. The shortening of the muscles, and the changes in joints and bones which the skiagraphs reveal appear to be secondary results of the long-standing spasm rather than of neurotrophic origin.

The cerebro-mental functions are at present natural, as are also both the spine and the cranium.

It is necessary to restate the facts of the case in brief form:

A soldier, aged 25, had severe typhoid in India ; on recovering from coma, found himself unable to use his left hand on account of stiffness of the fingers. Gradually they became flexed, and the arm, foot, leg, and left side of face became rigid with constant hypertonicity and frequent tonic spasms. This condition makes him resemble a case of hemiplegia with descending sclerosis, but there is no paralysis, and all the muscular disability is due to antagonistic action of opposing muscles. Otherwise at present no abnormality of any system or of the nervous system in any respect, except the unilateral spasm. The locomotory system is interfered with only in 'so far as the spasm, the contracture, and the consequent changes in joints and bones are concerned. He has, since his illness began, had two attacks of mania.

It should be particularly noticed, as to the state of the muscles, that the deep reflexes are exaggerated, and that, although the electric relations differ in the two sides of the body, there is no trace of the reaction of degeneration.

(To be continued).

ON THE ORGANISATION OF LABORATORIES IN HOSPITALS.

BY PROFESSOR DR. CARL VON NOORDEN,
Chief Medical Officer of the Municipal Hospital in Frankfort-on-the-Main.

If we cast a glance back over the scientific literature of medicine we shall see that a remarkable change has come about in the last decades. Only the literature which is concerned with clinical description has retained its ancient character; this will always be the case, since the varieties of the pathologic-clinical processes are inexhaustible. There will always present themselves to the attentive observer at the bedside novel phenomena which broaden our knowledge of diseases, and are full of importance in diagnosis.

If, however, we look beyond the records of symptoms, we are struck by the fact that the subjects to which our scientific investigations are directed have become altogether different. The journals and periodicals of the seventh and eighth decade of this century are filled with contributions on physical diagnosis, especially on the employment in diagnosis of auscultation and percussion. He who came to the study of his patients with acute senses and good powers of observation could at that time count upon making new discoveries and rendering important services to scientific diagnosis. Physical diagnosis in the narrower sense of the term was rendered complete down to its finest details upon the basis of the comparison of clinical phenomena with the results of *post-mortem* examination; what later years have added is very little. Beyond the pleximeter hammer and the stethoscope, the thermometer, the as yet imperfect microscope, and in rare cases the sphygmograph, were almost alone of service to the practitioner of medicine. A place of great importance was assigned to the thermometer. The investigations and discussions upon thermometry, on the course of febrile diseases, and on the therapeutic means of influencing the course of fever were scarcely less numerous and important than those on percussion and auscultation. At a later date and more slowly the microscope attained to a position of general importance in scientific work at the bed-