INFANTILE CEREBRAL PARALYSES

by

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The series of cases, which I have chosen as the subject of this paper, form a group to be found in greater or less numbers, in most Workhouses and Infirmaries where wards are provided for Imbeciles. The apparent reason for this is, that the paralysis with which the patients are affected, is generally associated with more or less mental deficiency, and in many cases also with Epilepsy; consequently though they may enjoy average general health, most are quite unfit to follow any occupation, or even to take care of themselves. Their leading feature is a spastic paralysis, which dates from infancy, and is of Cerebral origin: the distribution may be either unilateral or bilateral.

All of the cases I have observed during my term of residence, in the Workhouse Infirmary, Birmingham; and to the visiting staff of that Institution, I am indebted for the privilege of reporting them.

The clinical aspect of their permanent condition is more especially referred to.

CLASSIFICATION.

The cases may be classified in two ways -

1. According to their time of onset.
2. Clinically, according to the distribution of the Paralysis.

1. As regards the time of onset they may be said to be -
   a. Congenital - in which the lesion takes place while the child is in utero, or during the act of birth.
   b. Acquired - in which the lesion occurs at some subsequent period of infancy, or childhood.

2. As regards the clinical distribution of the paralysis: this may assume any of the three following forms, viz:-
   a. Hemiplegia, i.e. affecting the face, arm and leg on the same side only.
   6. Diplegia or Bilateral Hemiplegia i.e. affecting all four limbs.
   c. Paraplegia i.e. affecting both lower limbs only.

No definite relationship can be observed between the time of onset and the distribution of the paralysis, for both the Congenital and acquired may assume any of these three forms:

the Diplegic and paraplegic varieties however most frequently originate as birth palsies. The unilateral distribution of the paralysis is much the commonest of the three varities of the disease, nearly 80 per cent of Osler's cases being Hemiplegias.

Aetiology

The greatest proportion of Infantile Cerebral Palsies occur during the first three years of life. Their causation depends on whether they are Congenital or acquired in origin.

The Congenital cases, and those in which the paralysis is first noticed within the first few months following birth, are probably due in most instances to difficult or abnormal labour. Direct injury to the head in applying the forceps by causing fracture of the bones, and meningeal haemorrhage was at one time thought the most likely cause: few cases are to be found however, in literature; and most cases formerly assigned to instrumental injury, are now ascribed to the asphyxiated condition which necessitates the use of instruments.

Little, in a paper dealing with the relation of abnormal parturition to physical defects in the child, men-

tions only four instances in which forceps were used, and says nothing at all of injury. Among the abnormalites of labour, may also be included the difficulty in extracting the head in breech positions, and the various abnormal positions of the foetus in Utero.

In many cases no definite cause can be found beyond the statement of the mother, that she had a fright or an injury before her confinement; as regards these, a fright during pregnancy could have no effect whatever in inducing a paralysis in the foetus. As regards injury, Sachs mentions a case cited by Cotard where the mother had a blow on the abdomen during pregnancy: the child was still born three months afterwards, and exhibited contractures of both the left upper and lower extremities. Among my Congenital cases there is one in which the mother had a bad fall 5 weeks before her confinement: she continued without any bad symptons during that time and then had a prolonged difficult labour. As the child was born with the breech presenting, it is questionable if it sustained any injury while in Utero.

Hereditary Syphilis may be mentioned as a rare cause of Intrauterine palsies. Very few cases at all have been seen

by experienced authorities. Wallenberg alludes to it only, and gives no instances.

A very marked predisposition to the occurrence of Haemorrhage within the Skull in infancy, under these conditions, is afforded by the exceeding delicacy of the pia-mater and its Capillaries, so that when the latter become distended with hypervenous blood they are liable to give way. Added to this, is the soft almost semi-fluid consistence of the brain in the new born infant, which can afford very little support to the vessels.

The history of these cases commonly is, that the child was born "blue" and continued so for some days, and that efforts of resuscitation had to be persevered with for a considerable time, before it cried, or even breathed without assistance. In some a convulsion has occurred soon after birth but not in all.

With regard to Heredity, these paralyses sometimes occur with a history of hereditary Epilepsy or of hereditary insanity. Oppenheim reports two cases showing inheritance of Diplegia. The mother was very severely affected from birth, and had athetosis and also paralysis of several Cranial nerves. The daughter was affected in the same way but

to a lesser degree.

The commonest causes of the acquired cases is a series of convulsions: these may occur after an injury or a fright. They very frequently come on during the course or convalescence of an acute illness, but in some cases are reflex from "teething" or intestinal irritation. The acute febrile diseases often form the primary illness E.G. Diphtheria, Scarlatina, Measles, Pneumonia etc., Abercrombie lays special stress on this. Of thirty-six cases quoted by Osler in Wallenberg's series, 9 followed Measles, 13 Scarlet Fever, 3 Diphtheria, 6 Epidemic Meningitis, 3 Whooping cough, 4 Typhus Abdominalis, and 2 Vaccinia. The occurrence of a very high temperature in these diseases, is sometimes sufficient to excite the convulsions. It is only of recent years that the convulsions have been recognised as the cause of many of these lesions. The tendency has been, and especially amongst the French Authors, to regard the paralysis as due to the infectious diseases thenselves, and the convulsions as symptomatic only. Strümpell set them down to a "poliocncephalitis".

Hereditary Syphilis is found in a few of the cases, I have been able to get a definite history in three cases;

and two of these have exhibited very marked features of the disease.

Traumatism is the cause of a few cases also. I have been unable to definitely assign any to it, but one case shows a Cranial defect which was probably due to injury. A few have occurred during severe vomiting and coughing e.g. in Whooping Cough. Among the very rare causes may be mentioned Tuberculosis as in a case recorded by Sachs & Peterson and Ligature of the Common Carotid mentioned by Osler: Tetanus has also been mentioned to end fatally in this way. The remainder may be ascribed to idiopathic causes

SYMPTOMATOLOGY.

The symptoms at the onset of a birth palsy are vague in many cases. The most common symptom which ushers in the malady is a series of convulsions, and in after years the abnormal conditions of the child are referred to these by the parents. These convulsions, however, do not occur in all cases, the proportion of children so affected being "more than half" according to Gowers. There may be a single convulsion, or a number of them lasting throughout several days: in most cases they are accompanied by coma and unconciousness. In a few instances they have been replaced by delirium and vomiting only.

The child is said to have been born "blue" and to have remained in this condition for some days, that its faces and head were greatly swollen, and that there was considerable trouble in getting it to breathe at first. Marks of the forceps may also be evident.

The presence of the paralysis is frequently not observed by the parents, until towards the end of the first year, when the child ought to be commencing to walk. Meanwhile the following conditions may have been noticed - difficulty of catching the nipple, and a tendency to be easily choked by the milk when suckling, a certain limpness of the extremities with stiffness at the joints, delay in walking and peculiarity of gait. The child continues to be babyish and often is dirty in its habits, and it shows no signs of learning to speak. Occasionally the crossed position of the legs from overaction of the adductor muscles of the thighs, and drooping of the foot forwards and inwards, have also been observed by the relatives.

As the child reaches the age of 2 or 3 years and the symptoms are fully developed, the permanent condition becomes more apparent: the distribution of the paralysis may be hemiplegic, diplegic, or paraplegic. The initial symptoms however, have meanwhile undergone a certain degree

of improvement.

Recovery from the primary symptoms does not always take place however, as the convulsions may be so violent, that the case ends fatally within a few hours. Eustace Smith quotes a case of this kind recorded by Valleix.

In the acquired cases of these paralysis, convulsions are also most frequently present at the onset, and the paralysis sets in suddenly and as a surprise to those in charge. For some weeks, and even for several months afterwards in some cases, the child lies in a dull stupid helpless condition.

The temperature is generally raised to some extent and in those cases occurring during the course of an acute disease, it may become hyperpyretic. The opportunities of observing this have been very few. Turner quotes a case resulting from convulsions, in which the temperature rose to 103·4°F. and was not normal until the morning of the third day. Ashby & Wright mention a case that occurred during measles in which the temperature kept as high as 107°F for some hours.

The degree of mental enfeeblement varies considerably: in the great majority of the cases there is a certain

amount of it. In the cases I have noted, I find 14 out of 20 are quite imbecile. The most profoundly affected are those in whom the paralysis dates from birth. The mental condition also bears a relationship to the severity of the motor affection, and to the presence of Epilepsy. Many of the patients may appear quite rational at first sight, but are found to be subject to attacks of violent temper, and even mania at times.

Epilepsy is frequently associated with these paralyses, and may be one-sided or general in distribution: the fits commonly commence in the affected limbs in the Hemiplegics, and afterwards become general. They may be very slight or very severe, and may set in immediately after the onset of the paralysis or after an interval of some years they mostly appear within 2 or 3 years. Epilepsy is most commonly associated with hemiplegia.

Aphasia and imperfections of speech are most noticeable in the bilateral forms of the forms of the paralyses: these are frequently due to motor defects, and to inability on the part of the patient to form the words. The patient appears to understand what is said to him, but his attempts to speak result in spasm of the lips and tongue accompanied by contortions of the features.

Disorders of voluntary movement such as Chorea,

Athetosis, tremor and mobile spasm are not uncommon.

The paralytic symptoms will be alluded to, along with the cases, and as the hemiplegias are much the commonest I shall describe them first.

INFANTILE SPASTIC HEMIPLEGIA.

This condition seems to affect the two sides of the body in about equal proportions: in Osler's cases 68 had paralysis of the right, and 52 of the left side. In the 15 cases which I have observed the right hemiplegias outnumbered the left by 11 of the former to 4 of the latter.

The severity of the paralysis, after the initial symptoms have subsided and the stage of recovery has ceased, varies greatly: there may be only a slight weakness of the arm and leg, with some degree of inco-ordination of the muscles brought into play in the finer movements of the affected members, or there may be complete loss of power accompanied by spastic rigidity and contractures.

The face in many cases shows no trace of paralysis: when affected it is as a rule only in its lower half. Overaction of the muscles about one side of the mouth, and prominence of the naso-labial fold, are then often seen on movement only. In some cases the affection is noticeable even when the features are at rest, and becomes more marked

on movement. The tongue is mostly protuded in the middle line, and the muscles about the forehead appear unaffected.

The arm is as a rule much more affected than the leg. In the extreme cases it is considerably less in size from arrested development, and has quite the appearance of a withered limb. It is generally held close by the patient's side, flexed at the elbow and wrist and with the fingers contracted into the palm of the hand. Movements are generally much better performed at the shoulder and elbow joints, while about the wrist and fingers they are sprawling and exceedingly awkward: the inco-ordination of the latter is most noticeable when finer movements are attempted. Grasp is very feeble and sometimes associated with delayed relaxation. Muscular rigidity on passive movement, is present to a certain extent in almost all cases, being one of the principal features of the disease: it is increased by emotion, and also by forcible attempts to overcome the spasm. The limb may also show any of the disorders of voluntary movement alluded to.

The leg is generally much less affected than the arm, recovery being more rapid and more complete; in most cases the muscular development is good and the limb is of fair size. The patient is quite able to get about, but the

gait is characteristically hemiplegic as a rule, and the pelvis will be found tilted on one side to allow the limb to be freely swung round. Atrophy and contractures are frequently found about the ankle and foot, giving rise to various forms of talipes, the commonest of these is Talipes Equino-Varus. Contractures of the hamstring tendons also occur sometimes. The leg may be affected with post hemiplegic tremor while in motion: this consists in a fine tremulous movement of the affected part on attempts at voluntary movement,

The deep reflexes, both in the arm and leg, are almost invariably increased: the knee jerk is generally much exaggerated in the affected limb, and slightly also on the sound side. Ankle clonus can be produced in some cases only: the rigidity in many instances prevents its being seen. The tendon reflexes of the forearm and Triceps musele above the Olecranon are usually very active.

The superficial reflexes are normal. The Electrical reactions of the muscles are normal in all cases, at least qualitatively.

Sensation is also seldom disturbed. Vasomotor disturbances, such as coldness and blueness of the extremities, are common in patients in whom the paralytic phenomena

are severe. Dr. Suckling mentions a case, in which on drawing the finger nail along the skin a blush appeared more quickly and lasted much longer than on the sound side.

Speech as a rule is well developed in these cases: some degree of slowness of speaking is commonly present. Where the patients are idiotic, it is of course very deficient.

The mental enfeeblement is not usually so marked as in the bilateral forms of paralysis. The earlier the age at which the cerebral affection sets in, the greater seems to be the mental defect. The association with Epilepsy also appears to increase it.

With regard to Epileptic seizures, they are much commoner in the hemiplegics than in either of the other varieties. They often do not develope until some weeks after the onset of the paralysis: and most commonly they commence at puberty. The fits may vary from the mildest minor attacks to convulsions of the most violent kind.

Involuntary post-paralytic movements may be found of two kinds - Athetosis in which a slow regular to and fro movement of the fingers takes place, due to the successive contraction of opposing groups of muscles, and Chorea in which the muscular contractions are quite irregular.

Case 1. Right Hemiplegia after a convulsion at the age of 8 months. Imbecility

Past Epilepsy

Thomas S--- Age 23.

History The patient was born healthy and continued so until 8 months old, He then had a convulsion without any apparent cause, the twitchings were confined to his right arm and leg and he was unconscious for some time, the face was also drawn to the right side, and he had convergent squint. Unconsciousness lasted three quarters of an hour, and he was then found to be paralysed on his right side: his face was twisted to the left. There was no recurrence of the convulsions. He never learned to speak except to say Yah and No indistinctly and did not always use those correctly. He has always been silly and weak-minded. He had Epileptic fits until 10 years old and has had none since then: they always began in his paralysed limbs.

Present Condition - The patient is quite imbecile and spends his time playing about in the yard. He behaves sensibly as a rule, but is childish and quite unable to look after himself. He cannot speak beyond saying Yah and No indistinctly, but appears from his actions to understand

what is said to him.

His head is normal in shape and the eyes move naturally. The right half of the face is less developed than the left: the expression and muscular action are also less marked his mouth being drawn to the left side when he smiles. The tongue is protuded in the middle line.

The right arm measures the same in length as the left, namely 19¼ inches, it is much smaller however, especially the forearm. The temperature of the limb is less. Movement about the shoulder is free, but the patient only uses the limb a little when dressing, and never at all at meals. The shoulder is generally adducted and the elbow flexed at an open angle. The forearm is pronated fully, and the wrist flexed at a right angle to it; the fist is generally closed but there are frequent irregular sprawling movements of flexion and extension in the fingers and thumb. All the joints are passively rigid.

The right leg is the same in length as the left - 30½ inches: it is one inch less in girth at the middle of the calf. There is no talipes. The gait is swinging and hemiplegic with the pelvis tilted sideways. There is spastic rigidity at all the joints; but no involuntary movements.

Reflexes. The reflexes of the tendons of the fore-

arm and of the muscles about the chin and lower part of the cheek are active on the right side. The knee jerk is exaggerated alike on both sides. There is no ankle clonus, but the front tap of Gowers is present in the right limb.

Sensation is questionable, as the patient is quite imbecile and unable to speak.

The Electrical reactions are normal. The General health is satisfactory.

Case II Right Hemiplegia at 2 years of age.

Congenital Syphilis. Imbecility and Epilepsy.

Ellen P--- age 22

History Well marked family history of Congenital Syphilis, the patient being the only surviving member of the family: three others died in infancy and the mother had one miscarriage. The patient was born apparently sound in all her limbs but was always delicate and wasted. At the age of 2 years she had a convulsion with unconsciousness whilst "teething" This affected her right side more than the left: it lasted an hour and was succeeded at short intervals by similar convulsions for nearly a week. The right arm was then noticed to hang helplessly by her side, and her face was

drawn so that when she was fed almost everything ran out at the right side of her mouth. Her leg was not observed to be useless till she tried to walk some months afterwards. She began to have Epileptic fits at the age of 7 years: at first they were very slight, but after a time became very severe and accompanied by unconsciousness: they were general in distribution.

Present Condition. The patient has well marked features of Congenital Syphilis, namely large overhanging forehead with bosses on the temples, Cicatrices of old mucous patches about both sides of the mouth, Interstitial Keratitis in both eyes, and Hutchinsonian teeth. She is imbecile and childish. She has one epileptic fit with unconsciousness on an average every week. She speaks well and the movements of the eyes are natural. There is slight but distinct overaction of the muscles of the right side of the face.

The right arm is an inch and a half shorter and is much thinner than the left, the difference being most marked in the forearm and hand. It is rigid to passive movement at all the joints: voluntary movement however is pretty good at the shoulder and elbow, but with a feeling of stiffness to the patient. Grasp of the hand is very feeble. The wrist is flexed and the fingers bent over the thumb on to the palm.

There are frequent sprawling and awkward movements of the fingers at all the joints: with over-extension of some of them. When getting about the patient holds the limb out from the side with the shoulder raised and the elbow at a right angle: the limb is rotated outwards.

Reflexes. The radial and triceps tendon reflexes are active on the affected side only. Sensation seems normal.

The right leg is three quarters of an inch shorter than the left, and ½ inch less in girth round the middle of the calf. The foot is much smaller. The patient is able to put the sole of her foot flatly on the ground but has had the Tendo Achillis divided for Talipes Equinus. She now has slight Talipes cavus. The gait is swinging and hemiplegic, with the pelvis rotated and the toe at times dragging. There is spastic rigidity at all the joints. She also has irregular sprawling involuntary movements of her toes. Sensation of the limb is normal, also the Electrical reaction of the muscles. The knee jerk is exaggerated on both sides; there is a tendency to ankle clonus in the left limb. The superficial reflexes are normal.

Case III Right Hemiplegia after Scarlet Fever.

at the age of 7 years. Athetosis.

Ellen B--- Age 38

History - The patient enjoyed good health until 7 years of age , when she had Scarlet Fever with Dropsy. A fortnight after the fever began she was seized with a convulsion, and afterwards found paralyzed on her right side. The convulsions did not return.

Present Condition; The patient speaks well but is somewhat imbecile: She has no fits: She has been deaf ever since her attack of fever.

Her head is normal in shape, and eyes show no defect of movement, the face shows some weakness of muscular action on the right side on movement.

She holds her right arm by her side in the fully extended position; the elbow joint is over extended and the wrist fully flexed. The limb is of the same length but much smaller than the left: it is rigid to passive movement, and is not used at all by the patient. The power of grasping is very feeble. There are rhythmical Athetoid movements of the fingers, producing alternate flexion and extension at the Meta-Carpo-phalangeal joints with adduction and abduction of the thumb. The tendon reflexes in front of the forearm are lively. Sensation is normal.

The right leg is thinner by ½ inch at the middle of the calf. The gait is markedly hemiplegic: the foot shows Talipes Equino-varus. There are no involuntary movements of the toes. The knee jerk is exaggerated on both sides, but more so on the right. Sensation is normal.

Electrical reactions are normal.

Case IV Right Hemiplegia Congenital Epilepsy

William C. A. Age 17.

History The patient's mother had 10 children born at or near full term: of these 6 were still births forceps being used in all except one. Of the others at present living, 2 appear quite healthy, while one is delicate and "always ailing" The patient himself was born at full term, after a very prolonged labour, and chloroform and instruments were used. Considerable efforts were required to resuscitate the child and he continued "bluish black" in color for a week. He retained the marks of the forceps for some days also. He was not observed to have anything the matter with his limbs until he was 2 months old: then without any convulsion or premonitory symptom he was noticed not to use his right arm. It became fixed at the wrist joint and his fingers and thumb doubled up into his

palm. His right leg was soon afterwards found to be limp and helpless. He began to walk at the age of 22 months, but dragged his leg in doing so: neither of the affected limbs appeared to grow like those on the sound side. His mental intelligence has always seemed satisfactory. He began to have Epileptic fits when 7 years old, and sometimes has as many as six daily.

PRESENT CONDITION The Patient's mental intelligence is very good: he speaks well and as a rule does a little work about the Infirmary. He has at times very severe Epileptic fits of general distribution. There are no signs of Congenital Syphilis.

His head is exceedingly narrow and flattened in both parietal regions. Eyes are natural; no strabismus. Face is rather smaller on the right side, but shows no signs of Paralysis. The right arm is colder than the left; it measures 1¾ inches less in length, and 1½ inches less in the circumference of the forearm. The limb is held close to the trunk, with the shoulder raised and the edge of the trapezius muscle prominent.. The Elbow and wrist joints are both flexed: the thumb is adducted and tucked into the palm the fingers being flexed over it. There is fairly good movement at the shoulder and elbow, and the patient can grip

a piece of flannel tightly enough to wring it after being scaked: he holds it by pressing his thumb by his adductor muscles against the palm. He can also extend the fingers fully. There is very little power of pronation and supination. The limb is rigid to passive motion at all the joints, and forced extension of the wrist sets up clonic movements.

The right leg is 1½ inches shorter than the left, and the girth of the limb is much less, the comparative measurements are— circumference of the thighs, right 16½ inches, left 18¾; and of the calves - Right 10½ inches, left 13¼ inches. The foot is in the position of extreme Talipes Equinus, the head of the Astragalus projecting prominently on the dorsum. The gait is hemiplegic. Movement at the hip is free, but spastic rigidity is present at the other joints; it is slight at the knee but marked at the ankle.

Reflexes. - The radial and triceps reflexes are very active on the right side only. The knee jerk is exaggerated on both sides alike. Ankle clonus is present in the right limb only.

Sensation and Electrical reactions are normal.

General health is very satisfactory

Case V. Right Hemiplegia after Whooping Cough

at 2½ years of age Imbecility

Julia P--- aged 38

History The patient was quite healthy until 2½ years of age. She then had whooping cough. Some weeks afterwards she had a convulsion with unconciousness, and was ever afterwards paralyzed of the right arm and leg. She had two convulsions of a similar kind on the same day.

Present Condition. The patient is quite imbecile but not subject to Epilepsy. She has spastic Hemiplegia of the right side. Her head is normal in shape, the face shows no signs of paralysis, and there are no signs of Congenital Syphilis.

The right arm is very cold and blue. It measures 1½ inches less in length and 1½ inches less in girth of the forearm than the left, the whole limb looks withered and small It is held close by the side: the shoulder is adducted, the elbow flexed, the forearm pronated, and the wrist flexed. The thumb lies against the palm and the fingers bent over it. There are no sprawling movements. There is rigidity at all the joints.

The right leg is the same in length but less in size than the left - the girth of the right calf is 11½ ins.

and the left 13¼ inches. There is no talipes. The gait is typically hemiplegic with dragging of the toe on the floor.

Sensation is normal.

The radial reflexes are active in the right arm only: the knee jerk is exaggerated in both legs but more so in the right. There is no ankle clonus.

The patient apart from her paralysis and imbicility is in very good health.

Case VI Left Hemiplegia. Epilepsy

Helen A--- Age 18.

History The only history obtainable is that the paralysis dates from infancy.

Present condition The patient has left Hemiplegia. She speaks slowly and with slight difficulty of articulation, but is quite intelligent. She has frequent severe Epileptic fits with unconsciousness, which commence in the left hand and ultimately become general in distribution: they affect the left side more however. The patient is able to sew at times, but requires to be looked after on account of the fits.

The head is normal in shape and shows no cranial defects: there are no signs of Congenital Syphilis. There

is no facial paralysis, but the left side of the face is considerably smaller than the right.

The left arm is diminutive and is contracted at the elbow. It is 2 inches shorter than the right and 1½ inches less in girth of the forearm. It is rigid to passive movement. Temperature is not lowered. The hand is much smaller. The wrist is flexed and the fingers flexed on the palm. There are irregular involuntary movements of the fingers and thumb. Grasp is very feeble.

The left leg is as rigid as the arm: it is one inch shorter than the right, but equal in circumference. There is Talipes Equino-Varus. Gait is swinging and Hemiplegic. There is rigidity at the joints and irregular movements of the feet and toes.

Sensation is normal.

Reflexes. Radial and triceps reflexes are active: knee jerk is exaggerated on both sides but more so on the left.

Electrical reactions are normal

Case VII Right Hemiplegia after Measles at 4 years of Age Hystero Epilepsy

Kate S--- Age 22.

History The patient's father died of Diabetes, all other members of the family, 7 in number, are in good health. She herself had no illness until 4 years old, when she had measles. Soon after the onset of the disease she had a single convulsion which left her with right sided paralysis. She began to have mild Epileptic fits at the age of 11, with an occasional severe attack.

Present condition - The patient is fairly intelligent unless after Epileptic seizures. For the past 12 months she has had a series of fits usually 6 in number at each menstrual period. They affect the paralyzed side most and are accompanied by glycosuria. The patient afterwards becomes hysterical and at times even maniacal for some days. Her manner apart from this is very nervous.

Motor System Right Hemiplegia

The leg much more affected than the arm - face not at all affected. No signs of Congenital Syphilis.

The right arm is the same in length as the left, and a little less in size. The hand is much smaller and grasp exceedingly feeble, the wrist is flexed and the hand deviated to the ulnar side: the fingers are either fully flexed or else over-extended and spread out. The wrist and elbow joints are rigid to passive movement: voluntary movement at the shoulder is free.

The right leg shows no difference in length but is much less in size than the left. Gait is hemiplegic. No talipes. There are sprawling movements of the fingers and toes with flexion and extension of the ankle joint. The patient states that she had the tendons of her thigh divided in infancy as one leg was drawn across the other and prevented her walking.

Sensation is normal.

Reflexes in the arm normal.

Knee jerk is exaggerated in both legs, there is no ankle clonus.

CASE VIII

Left Hemiplegia during whooping cough at the age of 4 Athetosis Epilepsy

Jane P--- age 31

History The patient is the second eldest of a family of 12: of these 7 died in infancy, one later on of Phthisis, and 3 are living and in good health. She herself had no illness until 4 years of age: she then had whooping cough and during a'severe fit of coughing had a stroke' She has been paralyzed of her left side, and has had frequent severe Epileptic fits with unconsciousness ever since.

Present condition. The patient is imbecile, and has turns of religious delusions every few months: She also has 4 or 5 very severe Epileptic seizures weekly. The left side of her face is involved in a large scar, resulting from a burn through falling against the fire whilst in a fit. Her left eye was destroyed at the same time, and the remains of it have been removed from the orbit. Her mouth is drawn considerably to the left side by the scar and the lower eye-lid is everted keeping the orbit open.

The left arm is weak but very slightly rigid: its comparative measurements with the right are - length of limb

left 16 inches, right 18½ inches. Circumference of middle of forearm-left 6 inches right 6¾ inches. The shoulder and elbow have fairly free movement. The forearm is fully pronated and at the wrist flexed. The thumb is adducted and flexed at the Meta-Carpo-Phalangeal joint and over extended at the other joints. The fingers are overextended at all the joints so as to be almost at right angles to the dorsum of the hand. The hand is much smaller and the grasp very feeble.

When the arm is at rest there are rhythimical movements of the wrist and fingers: the wrist is alternately flexed and extended while the fingers and thumb are flexed against the palm, and afterwards all extended and spread out in a sprawling manner. This is aggravated by directing the patient's attention to it; and she states she is unable to keep the hand at rest. When she is walking the shoulder is adducted and the elbow flexed, the whole limb being everted and carried far out from the side, like the wing of a bird, and the fingers spread. The temperature of the hand and forearm is much less than on the right side, Tendon reflexes are active. Sensation normal.

The left leg is not very rigid: the calf muscles are very atrophied. The limb is ¾ inches shorter and 2½ inches less in the girth of the calf than the right.

The muscles are soft and flabby, and without firmness, The tendo Achillis has been divided. The foot shows Talipes Cavus with extreme flexion of the toes on the sole; the great toe exerted under the others. The ankle joint is loose and flail-like. The foot is cold and blue and presents a sore above the heel. The gait is not hemiplegic the patient walking entirely on her heel with the rest of the foot drawn up. Both knee reflexes are very active: there is no ankle clonns.

The superficial reflexes are normal

The general health is satisfactory.

Case IX Right Hemiplegia Congenital and Syphilis

Convulsions at three months.

Sarah R--- Age 42.

History. The patient's mother had 8 confinements and 4 miscarriages: she is at present in the Infirmary under treatment for Syphilitic Rupia. The patient was observed to have a weak right arm and leg since birth, and wasted rapidly. When three months old she had a series of convulsions, each lasting half an hour and accompanied by unconsciousness. They went on for several days and affected

her right side most. She was born naturally without any difficulty.

Present Condition: The patient speaks well and is intelligent. She has no fits. Her head is well formed and eyes show no evidence of past disease. The upper incisor teeth are pegged and there are rhagades about the mouth on both sides. There is no facial paralysis.

The right arm is ¾ inch shorter than the left, and much less in size. It is held close to the side flexed at the elbow, and fully extended at the wrist. The finger joints are mostly overextended. Grasp is fairly good, but the limb is very little used. The hand is very small and there are sprawling irregular movements of the fingers. The joints are passively rigid.

The right leg is shorter and less in size than the left. The gait is hemiplegic with the toes trailing on the floor. Talipes Valgus.

Reflexes. The knee jerk is alike exaggerated in both limbs. There is no ankle clonus. The radial reflexes are active in the right arm only.

The electrical reactions are normal

Sensation also is undisturbed.

Case X Right Hemiplegia after a convulsion at 2 years of age. Imbecility

Cranial Defect

Arthur A.--- Age 22

History: The only history obtainable is that the patient was healthy until 2 years of age, and that he then had a convulsion and was afterwards paralyzed on his right side. He had Epileptic fits for some years following.

Present Condition. The patient speaks slowly but distinctly: he is quite imbecile and childish. He has no fits. Face shows no paralysis. Head is well formed: there is a circular depression of the skull, about $\frac{5}{4}$ inch in diameter, in the left parietal region. Its centre is situated about 2 inches behind a line drawn vertically from the Auditory Meatus and its upper margin is $\frac{1}{2}$ inch from the middle line. The bone is depressed and covered by a bald ciciatrix.

The right arm is much smaller than the left, measurements being as follows - length right $18\frac{1}{4}$ inches left 20 inches. Girth of upper arm Right $7\frac{5}{4}$ inches left 9 inches and Girth of forearm right $7\frac{1}{2}$ inches left $8\frac{5}{4}$ inches The muscles about the scapular and Pectoral regions are badly developed. The limb is useless and is generally held

close by the side, the elbow flexed, the wrist also flexed and the fingers bent over the thumb which is tucked into the palm. The joints are passively rigid and the tendons contracted. When the patient gets excited the limb is held high and out from the side, and there are frequent sprawling movements of the fingers with extension of the wrist.

Right leg is also less in size than the left. Length of right 30¾ inches left 31½ inches. Girth of thigh Right 13¾ inches Left 17 inches. Girth of Calf, Right 10¼ inches Lft 12 inches. There is Talipes Equinus with the head of the Astragalus displaced prominently forwards. The patient stands with the limb abducted. He walks with the paralyzed side in advance of the other and with hemiplegic swinging gait. The hip and knee joints are rigid movement at the ankle is very limited in all directions.

Both the arm and leg are colder than on the sound side.

Sensation is questionable on account of the mental condition..

Reflexes. The myotatic irritability of the Scapular, Pectoral, and Deltoid muscles is very marked. The olecranon reflex is also active and clonus is set up by extending the wrist joint. The knee jerk is exaggerated on

the affected side, but also very active in the sound limb. There is no ankle clonus but considerable tremor on attempts at voluntary movement. Superficial reflexes are normal.

Electrical reactions are normal

Case XI Left Hemiplegia after a convulsion at the age of 7. Maniacal attacks

Charlotte D--- Age 36.

History: The patient had no ailments in infancy and appeared quite strong until 7 years old. She then, without any apparent reason, had a convulsion, with twitchings of the left side only, and followed by unconsciousness. It lasted 11 hours, and was followed two days afterwards by others much similar. She was then observed to be paralyzed on the left side. The other members of the family are all strong and healthy.

Present condition: The patient has no fits but is imbecile. She has maniacal attacks at times, and has been in an asylum on two occasions. As a rule she is very ill-tempered and generally has a very sullen expression. Face shows no paralysis.

The left arm is smaller than the right: it measures 2½ inches less in length, and the forearm is 3 inches less in

girth. The Deltoid and Scapular muscles are very poorly developed. The limb is adducted at the shoulder, and held with the elbow at an open angle and the forearm pronated. The wrist is flexed against the forearm so that the ends of the radius and Ulna project prominently. The fingers are bent into the palm. Movement at the shoulder is free, but there is spastic rigidity on passive movement at all the other joints.

The left leg is half an inch shorter than the right: the circumference of the calf is 3 inches less: Talipes Equinus. The gait is hemiplegic with the pelvis tilted to one side.

Reflexes. Tendon reflexes of the forearm and triceps are very lively in the affected arm only. The knee jerk is exaggerated on both sides but more so on the left.

Sensation is normal.

Case XII Left Hemiplegia dating from Infancy

Imbecile

Sarah W--- Age 63.

History The paralysis came on suddenly in infancy but further particulars cannot be ascertained.

Present Condition: The patient is quite imbicile and laughs immoderately at all remarks made to her. She has no fits. She speaks distinctly. She now lies in bed constantly as she can go about only with great difficulty. Face shows no paralysis.

The left arm is much smaller, and measures an inch less in length than the right. It is colder also. The shoulder is adducted and the Deltoid and Scapular muscles are very small. The elbow is held flexed, and movement at both it and the shoulder is very limited. The wrist is so extremely flexed, that the palm of the hand is almost in contact with the forearm, and the lower ends of the bones project under the skin. The flexor tendons of the carpus are contracted. The fingers are flexed at the Meta-Carpo-Phalangeal joints, and over-extended at the phalangeal joints The thumb is adducted towards the palm. There are occasional irregular movements of the fingers, but without change in the position of the wrist.

The left leg is the same in length as the right: the pelvis is tilted when the patient is made to stand. The hamstring tendons are contracted, and the limb is rigid when moved. The foot shows Talipes Equinus with a tendency to turn outwards. There is some spasm of the adductor muscles of the thigh, causing the patient to lie with the

left leg crossed over the right; this becomes more marked on attempting to hold the knees apart.

Reflexes. The knee jerk is exaggerated in both limbs alike. There is slight ankle clonus in the left limb.

Sensation is questionable on account of the patient's imbecility

Case XIII Right Hemiplegia after a convulsion at the age of 3 years Nystagmus

Milly B---- Age 35.

History: The only history obtainable is that the patient was quite healthy until 3 years of age. She then had 'Gastric Fever' with vomiting and diarrhoea. Soon after this commenced she had a convulsion which left her paralysed in the left arm and leg.

Present Condition. The patient is intelligent and has no fits. Her mouth is drawn to the left side in speaking. She has well marked nystagmus in both eyes. There are no signs of Congenital Syphilis.

The right arm is useless and is much less in size than the left. There is spastic rigidity, but no involuntary movements. The patient holds it close to her side with the elbow at an open angle and the wrist flexed. The thumb

is turned in towards the palm of the hand, and the fingers are flexed at the Meta-Carpo-Phalangeal joints and over extended at the others.

The right leg is $\frac{3}{4}$ inches less in length than the left, but about the same size. Talipes Equino-varus marked. Gait is characteristically hemiplegic. The hip and knee joints are passively rigid

Reflexes. The tendon reflexes of the forearm are active. Knee jerk is exaggerated on both sides but more so on the right. No ankle clonus.

Electrical reactions are normal.

Case XIV Right Hemiplegia dating from infancy

Imbecility.

Mark B---- Age 30.

History. Beyond the fact that the paralysis followed a convulsion in infancy, nothing further can be ascertained.

Present Condition. The patient is imbecile, and generally very ill tempered and quarrelsome. He can speak, but only slowly and indistinctly. He has no fits.

His head is flattened in the left frontal region compared with the right. The mouth is drawn to the right when he speaks: this is more marked when he smiles.

The right arm is smaller than the left; measurements being as follows - Length, Right 20¼ inches. left 22¾ inches. Circumference of middle of upper arm, right 7½ inches left 9 inches. Girth of forearm right 8 inches left 9¼ inches. The hand is smaller also. There is free movement at all the joints. The patient holds it fully extended by his side and rarely ever uses it at all. The hand is directed towards the ulnar side and the fingers flexed. Grasp is very feeble. The tendon reflexes are very active in the forearm.. The right leg is not so severely affected as the arm; it is the same in length as the left leg. The thigh is ¾ inches less in girth and the calf one inch less. The foot is smaller but there is no talipes. Gait is hemiplegic and both leg and arm are spastic.

The knee jerk is exaggerated in the right limb only. There is no ankle clonus.

Sensation normal.

Case XV. Right Hemiplegia at the age of 5

Congenital Syphilis.

Elizabeth B. Aged 29.

History Her mother had 10 children born alive and 2 miscarriages. She had no difficulty at any of her confinements except when the patient was born and the latter is the only one of the family affected. The patient was very delicate

and wasted in infancy and had Scarlet Fever. At the age of 5 years she had a convulsion one evening while sitting at the tea table: she fell off her chair and was unconscious for some time. On recovery her right arm and leg ~~was~~ were found paralyzed. She has always been weak minded and has been in an asylum once.

Present Condition: The patient has well marked features of Congenital Syphilis - large bosses on the temples, sunken nose, and cicatrices about the nostrils and mouth. Her teeth are almost all decayed. She has no fits and is fairly intelligent at present. Face shows no paralysis.

The right arm is 2 inches shorter than the left, and much smaller generally: it is practically useless, and is rigid at all the joints. The patient holds it adducted at the shoulder, and the elbow and wrist are flexed. The flexor tendons of the forearm are much contracted. The thumb is adducted towards the palm, and its terminal joint very much over extended. There are no irregular movements.

The right leg is 1 inch shorter than the left but not much less in size: the foot is much smaller. She had talipes Equino-Varus, and was operated on when 9 years old, so that she can now put the sole of her foot flatly on the

floor. There is rigidity at all the joints. The gait is swinging and hemiplegic with the pelvis tilted to one side.

Reflexes. The tendon reflexes of the forearm are very active. Knee jerk is exaggerated to about the same degree on both sides. The superficial reflexes are normal.

There is no alteration of sensation.

The electrical reactions of the muscles are normal.

Case XVI Right Hemiplegia at 3 months.

Convulsion.

Mary A. S--- Age 39.

History The only obtainable history is that the paralysis came on after a convulsion when she was 3 months old.

Present condition. The patient is intelligent and works in the Workhouse. She speaks very slowly but distinctly. She has no fits. Head is well formed. Face shows more expression and movement on the left side. Eyes move normally.

Right arm is 1½ inches shorter and much smaller than the left: the shoulder is adducted and the elbow held at an open angle. The wrist is preternaturally flexed, so that the hand almost touches the forearm. The terminal phalanges of some of the fingers are so over-extended that

the joints are subluxated: each phalanx stands at a right angle to the next. The limb is cold and blue about the hand and forearm.

The right leg is rigid at all the joints: it is the same in length as the left, but smaller. There is no talipes. The gait is hemiplegic with the pelvis canted to one side, and the foot dragging on the ground.

Reflexes The knee jerk is very active in both limbs. Ankle clonus is present in the right only. The tendon reflexes of the forearm are lively. Superficial reflexes are normal.

The general health is satisfactory.

Sensation is normal.

INFANTILE SPASTIC DIPLEGIA.

This condition which is called by Osler, Bilateral Spastic Hemiplegia, is characterized by a spastic paralysis affecting both sides of the body. It presents a marked contrast in its aetiology to Infantile Hemiplegia, in that almost all the cases originate as birth-palsies, i.e. they are congenital in origin. Little, the orthopoedic Surgeon in the London Obstetrical Society's transactions 1862, has dealt very elaborately with its relationship

to abnormal parturition, so much so indeed that on certain parts of the Continent the affection has been called Little's disease. A few cases have followed the Specific Fevers and convulsions.

On account of its frequent congenital origin, the early symptoms of Diplegia have very seldom been observed carefully, and to say the least are still vague. The symptoms of the permanent condition however are quite characteristic. All four limbs are affected with paresis and tonic spasm, the legs being generally much worse than the arms.

The legs are usually of the same length but poorly developed, and as a rule are quite useless. The tonic spasm of the muscles and rigidity give rise to contractures and certain well-known deformities. The feet are commonly turned in at the ankles, and in the position of one of the forms of talipes: the most common is talipes-Equino-varus. The thighs are strongly adducted and can only be separated with some difficulty - the so-called 'Clasp-kinfe' rigidity: when the patient sits the legs are crossed in a tailor-like posture, and if he is able to walk a cross-legged progression results.

In a severe case the patient is unable to either stand or walk, and lies helplessly in bed: the lower limbs then become contracted into various positions. In one of my cases one leg was abducted and rotated outwards, and the other adducted and rotated inwards from the patient constantly lying on the same side, and being unable to turn over. Most of the patients are unable to walk, but in those that can the gait is like the paraplegics: the knees are kept tightly clasped together with the feet apart, and the weight of the body balanced on the balls of the toes from the talipes, the body is then rocked from side to side to bring one limb in advance of the other. The steps are short, stiff, and shuffling, and the arms are often held out to maintain equilibrium. In some of the worst cases the patients are at the most able to crawl on all fours. Sachs describes one case in which the contractures of the hip and knees were so extreme, that the patient could walk only by skipping in the manner of a frog. This has been called the 'Frog-gait". Irregular sprawling movements of the toes are very common.

The arms are fairly well nourished as a rule: their movements are weak and awkward, and there is always

some degree of rigidity. This rigidity ceases during sleep and is intensified by attempts at voluntary movement. The ar grasp is feeble, and in some cases accompanied by delayed relaxation; in one case I have observed this. Spasm in the arms as a rule is not so marked as in the hemiplegies. There are irregular sprawling and athetoid movements of the fingers which increase during excitement.

The muscles of the back and of the neck are very weak, and in many cases the patient is unable to sit up unsupported. The head sinks between the shoulders, or falls forward on the chest and there is a general bending forward of the spine, with or without lateral Curvature. Rigidity in these muscles may also be extreme: in a case mentioned by Dr. Railton the spine became so rigid that the patient could be lifted by a hand under the occiput.

The face shows no paralysis, but frequently an exaggeration of the normal lines: this arises from irregular frequent movements of the muscles of expression. They are seen on the forehead from elevation of the eyebrows, and about the mouth from overaction of the levator and depressor muscles: they are well illustrated in one case I have seen. Nystagmus and Strabismus have been seen in a few cases.

The condition of the teeth has been called attention to by Dr. Alice Sollier: they are notably decayed and irregular.

The Bladder and Rectum are unaffected.

Sensation is not disturbed, and the electrical reactions of the muscles are unchanged.

Both the deep and superficial reflexes are increased: the knee jerk is always exaggerated, but ankle clonus cannot be produced, frequently on account of foot deformity. In many, the superficial reflexes are so active that the slightest tap causes spasmodic rigidity of the whole body.

The mental condition in Diplegia is much worse, as a rule, than in either of the other forms of the Cerebral palsies. Idiocy is very common. The patient's habits are frequently filthy, and dribbling of the saliva from the mouth is also common. Of the three cases I have noted two are idiots and one imbecile. Epilepsy on the other hand is very much less common.

Speech is very defective: this arises either from Imbecility or from Motor Spasm involving the power of articulation. The latter condition is very plainly marked in some patients, the tongue being held behind the teeth and the lips tightly clenched so as to utterly prevent a sound.

Cranial defects are sometimes seen in these patients: the most frequent is a microcephalic condition of the skull.

Case L. Spastic Diplegia of Congenital origin.

Idiocy

Mary A.J--- Aged 30.

History. The patient is the eldest of a family of eleven. Her mother states that she had great difficulty at all her confinements, and was delivered with the Forceps at three of them. The patient was born after a labor lasting four days: after birth she was enormously swollen about the head and face, and unable to open her eyes. The child remained quite blue about the body for the first ten days. The midwife who attended the confinement spent about quarter of an hour in getting the child to breathe. Her limbs were always limp and useless, and she seemed very weak about her neck. She has always been quite imbecile but has had no fits. She has never been able to speak.

Present Condition. The patient is a certified lunatic with markedly idiotic expression and features: the saliva generally runs from her mouth down over her clothes. She appears to understand to some extent what is said to her, but when she attempts to speak, she stutters only parts of words very indistinctly, at the same time gasping and closing

both her eyes. She has no fits. She is cleanly in her habits. Her head is narrow and somewhat flattened in both parietal regions: the palate is very highly arched and the front teeth badly decayed. She has no nystagmus and no facial paralysis. When excited she at once becomes rigid in all her limbs.

The patient spends most of her time lying in bed, but is able to sit up in a chair. She is unable to walk.

Her legs are the same in length and size: each measures 28 inches. In the recumbent posture, voluntary movement is fairly good at times. Both limbs are rigid to passive movement; so that when one is raised from the bed the other rises also. There is also considerable spasm of the adductors on attempting to separate the thighs. There is no talipes but both feet tend to fall inwards. There are frequent involuntary sprawling movements of all the toes with extension of each limb.

The muscles of the back are exceedingly weak: there is marked general curving of the spine forwards in the Dorsal and cervical regions, with lateral curvature to the right in the lower dorsal region. The patient is able to sit up only for a short time without assistance.

The bowels and bladder are unaffected.

The arms are equal in length and muscular develop—

ment: they are both resistant to passive movement. The shoulders are fairly free. The limbs are held in various positions. Grasp is very feeble, and there are involuntary spastic movements of the thumb and fingers with overextension of the wrist joint. The right hand is used a little at times by the patient and does not appear so profoundly affected as the left. The condition of the upper limbs on the whole is not much better than the lower.

Reflexes. The knee jerks are exaggerated on both sides. Ankle clonus is present in the right limb only and is well marked. The superficial reflexes are normal. The tendon reflexes of the upper limbs are very active, both on the forearm and upper part of the limb.

Electrical reactions are normal.

Sensation is questionable on account of the patient's mental condition.

The general health is satisfactory.

Case II Spastic Diplegia of Congenital origin

Imbecility.

Thomas H. Age 18.

History. The mother had 14 confinements and states she had considerable difficulty at all of them. Two

children were still born which was ascribed to prolonged labour. The patient is her ninth child: he was born with the buttocks presenting after she had been in labour for five days. There was some difficulty in extracting the head and efforts of resuscitation were kept up for about twenty minutes, before he breathed properly and cried. He was dark in colour at birth, and continued so for three or four days.

He had a convulsion an hour after birth, and another very severe one on the following day. He always appeared weak in his back and was unable to sit up without being held. He has never been able to walk or to use his hands. He has always been delicate, and also weak minded.

The mother ascribed the patient's condition to a severe fall from a step ladder into a cellar, which she had five weeks before her confinement. During the interval however, she had no bad symptoms.

Present Condition The patient is quite imbecile : he appears to understand when spoken to, but, never says anything beyond yes and no indistinctly. When he attempts to speak he has contortions of his face, with spasms of the lips and tongue, so that his mouth becomes closed tightly. He has no fits. He is dirty in his habits unless strictly

looked after.

The head is well formed and there are no signs of Congenital Syphilis. He has Nystagmus in both eyes. His upper teeth are almost all decayed and gone: the palate is highly arched.

Motor System The patient lies in bed always turned slightly on his left side: his lower limbs are flexed at the knee joints and drawn up, he is unable to turn over without assistance.

The left leg is abducted and flexed at the hip and knee joints, the foot being in the position of Talipes Valgus. The right is flexed adducted and rotated inwards over the left with Talipes Equino-Varus of the foot. There is spastic rigidity at all the joints, and some contracture of the hamstring tendons. Atrophy is most marked below the knee in each limb. There is distinct spasm of the adductor muscles on attempting to separate the knees one from the other. The length of both limbs is alike. The patient is unable to stand at all. The knee reflexes are much exaggerated the left being more markedly so. There is no ankle clonus on account of the spastic rigidity. The Planter reflex is more active on the left side also.

The Bowels and bladder are unaffected. The patient is unable to sit up unassisted, and has to be held when on the night-stool. The muscles of the back and of the neck are very feeble: there is a general bending of the spine forward, with lateral curvature to the right in the dorsi-lumbar region. The slightest tap throws the muscles into a state of spastic regidity.

The arms are freely movable at the shoulder joints, and altogether are not so severely affected as the legs. They are generally spread out on the pillow, on either side of the patient's head. The elbows and wrists are kept flexed and the thumb tucked into the palm with the fingers flexed over it. Grasp is very feeble in both hands and there are constant athetoid movements of the fingers, thumb and wrist, while the patient is awake. There is rigidity to passive movement at all the joints. The length of both arms is alike. The tendon reflexes of the forearm and triceps are very active, and especially so in the left limb.

The Electrical reactions are normal. Sensation seems undisturbed.

When moved, the patient at once spreads out all four limbs, and becomes rigid all over.

The general health is fairly satisfactory: at the time of examination the patient had just recovered from a severe attack of small-pox.

Case III Spastic Diplegia after convulsions at the age of 3 months. Imbecility

Nystagmus; Choreiform movements.

Frederick S--- Aged 46.

History The patient is the youngest of a family of ten: at present only four of them are living. He was born apparently healthy and continued so till three months old. Then "in the night he was taken with convulsions and went black in the face." No further history can be ascertained, beyond the fact that his mother hurt herself shortly before she was confined, by lifting a heavy weight. The others at present living, are all in good health.

Present Condition The patient is quite imbecile and exceedingly ill-tempered as a rule; he is also very excitable. He is unable to speak, but understands language, and makes signs in return which are understood by the attendants. He has no fits and is cleanly in his habits.

Head is small but normal in shape, and there are no signs of Congenital Syphilis. The teeth have all disappeared except one incisor in the upper jaw and two fragments of stumps in the lower. The gums are atrophied and the palate highly arched. The patient during the day sits on a wheel chair and is wheeled about in the open air: he is able to get out of bed and crawl to the lavatory. He can also dress himself, [illegible]. The face shows on the forehead numerous transverse furrows; and also about the angles of the mouth radiating lines, apparently due to overaction of the muscles of expression: these marks become much more distinct when the patient is excited, and correspond with contortions of his features. When he attempts to speak his eyelids, nostrils, and lips, are spasmodically closed: this lasts for a few seconds and is accompanied by noisy sucking respiration which is at times stertorous. The tongue meanwhile is fixed, so that he is unable to utter a syllable until the spasm passes off: he then grunts indistinctly.

There is Nystagmus in both eyes but no Strabismus.

The legs are useless: they are devoid of voluntary power and very rigid: both limbs are alike in this respect. The patient sits with them drawn up and crossed, the right over the left, in a somewhat tailor-like posture.

The ankles are fully extended and both feet turned inwards. Talipes Equino-Varus. There is considerable resistance to passive movement, and spasm of the adductors of the thighs on separating the knees: the latter is more marked in the right limb. The hamstring tendons have been divided in the popliteal space in childhood. Both the limbs are the same in length and size: they are very diminutive about the calves: the feet are very small. There are irregular movements of flexion and extension of the toes with spreading: this is accompanied by movements of the ankle joint. These movements are constant except during sleep, and are much worse when the patient is excited.

The bladder and rectum are unaffected. The muscles of the back, and of the neck, are very weak, so that the head falls forward and sinks between the shoulders when the patient is sitting. The scapulae approach one another very closely with a deep sulcus between them only. There is a general bending forward of the spine, with a lateral curvature to the left side in the Dorsi-lumbar region. The patient is unable to sit up unsupported for more than a few seconds. The slightest tap sets up spasmodic contraction of the muscles of the back and of the neck, with contortions of the face, the head being twisted from side to side

The arms are not nearly so weak as the legs, and are used by the patient to support himself in the sitting posture. They are of equal lengths and are pretty well nourished. The shoulders are adducted and the elbows and wrists flexed. The grasp of the hand is fairly good but with delayed relaxation. There are choreiform movements of the hands and fingers. The hand is deviated to the ulnar side and the fingers are extended.

The reflexes all over the body, both deep and superficial, are all very active. There is no ankle clonus. A slight touch or a sudden noise sets up irregular movements, with spasm of all four limbs, and the patient writhes about with contorted features. He is quiet during sleep.

Sensation is questionable as the patient cannot speak.

The electrical reactions of the muscles are normal.

The general health is very good.

INFANTILE SPASTIC PARAPLEGIA.

This is much the rarest form of Infantile Cerebral paralysis the proportion of Osler's cases being about 7¼ per cent: I have only been able to find one case, but it illustrates some of the symptoms well.

The essential features of the disease are a spastic paralysis affecting the lower limbs, which dates either from birth or the first few years of life, and which is associated with more or less marked cerebral changes. It is not an uncommon affection, but has come under the notice of the Orthopaidic surgeons mostly, on account of the deformities which arise from it. Ross, Gowers, Adams, and Little have directed special attention to it in this country. As regards the primary cause, difficult labour and premature birth are specially associated with it, and of Little's cases, 23 out of 24 had a history of one or the other of these.

The paralysis itself occurring in these cases, at the earliest age, is not so easily discovered by the parents as in the other varieties, and frequently is first noticed when the child commences to walk.

In the permanent state there is a variable degree of paresis of the muscles, but without atrophy. There is always a certain amount of muscular spasm, which may subside when the limbs are at rest, but is very evident both during voluntary and passive movement: this gives rise to several very characteristic symptoms. The "clasp knife rigidity" due to adductor spasm may be so extreme that it is impossi-

ble to separate the thighs. Prolonged spasm of the leg muscles gives rise to various forms of clubfoot: the most common of these is Talipes Equino-Varus. This spasmodic condition may be overcome by forcibly flexing or extending the limb: the leg then yields and in yielding bends like a bit of lead pipe, as described by Dr. Weir Mitchell. As a result of these conditions the attitude when standing is characteristic. There is talipes Equino-Varus so that the patient stands on the balls of the toes with the heels raised and everted, and the knees closely approximated.

The gait is stiff and shuffling, with the knees and thighs rubbing on one another, and the feet wide apart: the body is rolled from side to side so as to bring one foot in advance of the other. The arms are sometimes held out from the side to help the patient to keep his balance. The action of the adductors may be strong enough to produce a cross-legged walk.

Sensation is not affected.

The deep reflexes are increased in most cases: the knee jerk is exaggerated, but ankle clonus cannot be got as a rule.

The functions of the bladder and rectum are not impaired: the patient however may be very dirty in his habits from mental enfeeblement.

Epilepsy is common.

The mental condition is better on the whole in this variety of the disease: 3 out of eleven of Osler's cases were mentally well developed and could speak plainly.

A careful investigation of these cases of paraplegia shows a very intimate connection with the Diplegic forms. In some there is an awkwardness and stiffness of one or both arms besides. The condition of the legs is exactly what is found in the Diplegics, and a weakness of the spinal muscles is at times seen also.

CASE SPASTIC PARAPLEGIA OF CEREBRAL ORIGIN.

CONGENITAL

Mary A.D. Aged 22.

History:- The mother had 14 confinements all of which she states were 'lingering' and at which she had 'hard times'. Her first child was born dead after a prolonged labor. Only 4 of her children are now living: all the others succumbed to illness in infancy. One son at present suffers from Epileptic fits, but he has no paralyzed limbs. The patient is the third eldest: and was born at the end of the

seventh month. She never had convulsions, but her lower limbs were observed to be limp and helpless from her birth. She did not walk until 4 years old, and her gait has always been peculiar: She dragged both her legs stiffly, with her feet turned in at the ankles, and was only able to go a very short distance at a time. She has always been weak-minded, but has had no fits.

Present condition. The patient is quite imbecile and has been in an asylum for the past 2½ years. She speaks slowly and distinctly. She has fairly intelligent expression. She has never had Epilepsy. Head is well formed. Her teeth are good and there are no signs of Congenital Syphilis. Face shows no paralysis and there is no Nystagmus.

She states she feels her back very weak, and there is a slight lateral curavture of the spine to the right in the lower dorsal region.

The arms seem normal in every particular.

The legs are of the same length and are well nourished. They are very rigid to passive movement of flexion and extension. The thighs and knees are held close to one another and show considerable resistance to attempts to separate them. The patient had Talipes Equino-Varus of

both feet, and has had tenotomy performed repeatedly: when she stands she puts the soles of her feet flatly on the floor and has not the characteristic attitude of the disease. Her gait is stiff and shuffling, the knees are held in close apposition and the body rotated laterally so as to bring one limb in advance of the other, There is also some extensor spasm so that the toes appear to cling to the floor: This is more marked in the left foot which the patient still tends to turn inwards, The toes of this foot and especially the great toe are always over-extended. She walks without assistance, but does so slowly and is readily tired out.

Both knee jerks are alike exaggerated: there is no ankle clonus. The plantar reflexes are very active on both sides.

Sensation is normal and there are no involuntary movements.

The Bladder and rectum are unaffected.

The General health is satisfactory.

The Electrical reactions of the muscles are normal.

DIAGNOSIS

It is almost impossible to state at the onset of these paralyses what is the probable malady: the convulsions and high temperature are exactly similar to what occurs

at the onset of any of the acute diseases of childhood, e.g. Meningitis, Scarlet Fever, Pneumonia. The convulsions themselves have no peculiarity; the fact of their being unilateral, and especially if they always affect the same side of the body, would be in favour of a cerebral lesion: but even this is not certain, as the reflex convulsions of intestinal irritation may be one sided in the first instance. Henoch mentions the case of a child of 8 that died of Intussusception of the bowels, who had right sided unilateral convulsions on the day of death: never-the-less the unilateral character of the convulsions is important, and demands a careful examination of the child, and of the history of the attack. Rickets ought to be eliminated as a cause. Uraemia in childhood sometimes begins with viclent convulsions and should also be kept in mind.

INFANTILE HEMIPLEGIA.

The disease which requires to be differentiated at its onset, most commonly, is Acute Anterior Poliomyelitis: this is very difficult in very many cases, as both are generally ushered in with convulsions and a rise in temperature. The hemiplegic distribution of the paralysis, with involve-

ment of the face and speech, point to a cerebral lesion, the spinal paralysis on the other hand is commonly limited to a single limb or even to a group of muscles. Subsequently, the spastic condition which developes, the condition of the deep reflexes, the absence of wasting, and the Electrical conditions will readily distinguish them. The gait of each disease is also characteristic. The association of Epilepsy and Imbecility and the presence of irregular involuntary movements are diagnostic of a Cerebral lesion.

In hysterical hemiplegia there is nearly always loss or impairment of sensation. The presence of other hysterical manifestations, the effect of treatment, history of onset, the condition of the affected parts as regards nutrition, and the absence of epilepsy would all be valuable in differentiating a functional from an organic lesion. The fact of the symptoms occurring in the female sex is of little importance.

Adult hemiplegia may be distinguished by the time of onset, and absence of defects in development chiefly. There is also a certain amount of sensory disturbance in the adult cases, and ankle clonus is stated to be much more common. The mental conditions may assist you, but very

little.

A series of lesions described by Duchenne under the name of obstectrical paralyses requires some notice: they are peripheral in origin and caused by injuries received during birth. The best known is an injury to one of the facial nerves through pressure of one of the blades of the forceps: This is as a rule temporary and passes off in a few days. Another is due to injury to one or more cords of the Brachial plexus, when the arm has been dragged on, or when the finger has been hooked into the axilla. The diagnosis of these conditions may be made by the history of their cause, by their occurrence at birth, by their being confined to the muscles supplied by definite peripheral nerves, and also in many cases by involvement of sensation.

A tumour of the Pons and Medulla oblongata by compressing the pyramidial tract, may give rise to a condition difficult to differentiate. The history of gradual development and steady increase of the symptoms, persistent headache and vomiting, and the presence of optic neuritis would be in favour of a growth. The special symptoms of a cerebellar tumour would suffice to form a diagnosis by themselves in most cases.

A series of functional paralyses of peripheral origin, and associated with some of the infectious diseases, may have some similarity to these cerebral lesions. The most familiar of these is the post-diphtheritic. The loss of the knee jerk and a history of gradual onset after Diphtheria: with affections of swallowing and accomodation would be quite sufficient. The Electrical conditions would also be of value. Measles, Scarlet Fever, Whooping Cough and even Mumps have also given rise to temporary peripheral paralyses. With regard to the last mentioned Gowers thinks the case must have been Diphtheritic.

INFANTILE DIPLEGIA & PARAPLEGIA

These conditions require to be distinguished from a number of diseases affecting the spinal cord. The principal of which are the following

-a- Cord Compression The result of spinal caries, haemorrhage, tumours, etc . The presence of any of these conditions as a cause, the definite localization of the paralysis and loss of sensation to the area supplied by the nerves springing from the cord below the lesion, the history of onset, and the presence of an area of hyperaesthesia at its upper limit, would differentiate these lesions.

-b- INFANTILE SPINAL PARALYSIS has been referred to.

-c- In SPINA BIFIDA with paraplegia the presence of the tumour and its nature, the impairement of sensation, the presence of trophic ulcers, and the involvement of the bladder and rectum, are the characteristic differences.

-d- Syringo Myelia may lead to a condition of paralysis of all four limbs in which that of the upper limbs is atrophic in character while that of the lower is spastic. The characteristic sensory defects readily distinguish this, namely a loss of sense of pain and temperature with presence of touch sensation.

-e- Friedrich's Disease may be diagnosed by its history of heredity, gradual onset, characteristic reeling gait, and absence of the knee reflex. The frequency of Nystagmus, and absence of the mental defects of spastic paralysis would also assist you.

-f- Pseudo hypertrophic paralysis with its history and heredity and characteristic gait, and the appearance of the affected parts could scarcely be confounded.

-g- Primary lateral Sclerosis closely simulates both Diplegia and Paraplegia in its motor symptoms.e.g. rigidity, paresis, and the condition of the reflexes. The history of onset, the slow progress of the symptoms, and the absence

of any mental defect readily distinguish it from those diseases.

PROGNOSIS

The prognosis of these Paralyses is a very important matter, considering they begin so early in life; and it is well always to give a very guarded opinion.

The occurrence of the paralysis is not in itself a necessarily unfavourable sign. There are certain conditions at the onset which may lead you to take a serious view of the case, e.g. the onset of the malady while the child is suffering from some acute illness, or during the debility of canvalescence, also the severity and frequency of the convulsions. Eustace Smith attaches great importance, during the convulsions, to the state of the pupils - if they are dilated and insensible to ~~the~~ light, he thinks the outlook is very bad, and if unequal death may be considered certain. The occurrence of hyperpyrexia is also very grave.

If the child recovers from the initial symptoms, it has a very fair chance of living to a medium, and even in many cases to an advanced age. Of the cases I have noted, the ages at the time of examination were as follows:-

under 20 years	3
Between 20 " & 30	6
" 30 " & 40	8
over 40	2

one being as old as 63 years.

The age at which the paralysis comes on, also helps to guide you as to the future of the case: those cases occurring at or prior to birth are not of such good prognosis, as the acquired cases in any respect.

As regards the paralysis itself, a considerable improvement is to be expected in all its forms. In the hemiplegics, the recovery of the leg is as a rule, much better than of the arm, enabling the patient to get about quite well. The opposite occurs in the diplegics the arms making the best recovery. It has been stated by Starr that the amount of recovery may be best estimated at the end of the second year after the onset. When there is no considerable mental defect, the recovery of motor power is much better as a rule, because the will acquires more power over the limbs, and counteracts the spasm to some extent.

Epilepsy occurs in a very large proportion of the cases at some time or other: it is much more common in the

Hemiplegias, and as a rule bears a direct relationship to the mental deficiency. If the fits occur frequently, there is very little chance of their entire cessation: in some cases they cease when puberty is passed, and in the case of girls when menstruation is established. A cautious prognosis must be given even in those who have only suffered fits at long intervals. The development of post-hemiplegic movements is a bad sign according to Osler, as such cases are more likely to have Epilepsy.

The mental defect varies particularly with (1) the age at onset and distribution of the paralysis and (2) the occurrence of epilepsy. The earlier the onset of the affection, the greater the probability is there of permanent imbecility. As regards paralytic distribution, the diplegic form is associated with greatest mental deficiency.

Speech varies also with the distribution of the paralysis: it is as a rule profoundly and permanently affected in the dipligias, while in the other forms it is seldom greatly interfered with, unless in association with idiocy.

The occurrence of irregular movements in the extremities is very uncertain.

PATHOLOGY AND MORBID ANATOMY.

Post mortem examinations in these paralyses have disclosed many different conditions, and the fact that they have mostly been made long after the original processes commenced to operate, makes them throw a comparatively poor light on the original conditions. In all cases, however, the primary lesion is some affection of the motor centres and motor conducting paths of the brain, and in the majority the Motor cortical centres are themselves involved. A secondary affection of the conducting paths in the brain and cord follows, of course in all cases: it consists either of a descending degeneration or a failure of development, the latter varying with the age at which the primary lesion commenced. The conditions found after death, are generally terminal conditions; most of them may be included under the following (a) Haemorrhage, (b) Embolism, (c) Thrombosis, (d) Porencephalus, (e) General Cortical Sclerosis, (f) Atrophy Sclerosis and Cysts, (g) Tubercle, and (h) "Agenesis Corticalis."

There has been some difference of opinion with regard to the relative frequency of Haemorrhage, Embolism, and Thrombosis, as the cause of the acute symptoms at the onset. Sachs states his belief that haemorrhages are very common. Others are in favor of the greater frequency of

(of) Embolism. Gowers on the other hand, thinks thrombosis of the superficial veins of the brain, really accounts for many cases ascribed to either of the other two causes. Statistics have given very different results. Of Sachs 35 cases of hemiplegia, haemorrhage occurred in 23, Embolism in 7, and thrombosis in 5; while in Osler's examinations of 90 brains, a vascular lesion was discovered in 16 only, and of these 7 were due to haemorrhage and 9 to embolism. The remote period at which autopsies have been made, coupled with the different views held as to the causation of porencephalus, cysts, and sclerosis, may account for this divergence of opinion.

-1- Haemorrhage may be the cause of either the congenital or the acquired cases: it appears to be the most frequent cause of the birth palsies. It may be either Meningeal or Cerebral in origin, the former being by far the commoner of the two: some writers even say it is the almost invariable form. The extravasation is sometimes over the convexity and sometimes at the base of the brain. In the former situation the source of the bleeding consists in the delicate capillaries of the Pia Mater, and arachnoid membranes: and as these are very loosely attached on the surface, Meningeal haemorrhage becomes very extensive as a rule.

When at the base the blood generally collects in the posterior fossa around the Medulla Oblongata and the pons, beneath the tentorium, and then as a rule comes from a laceration of the cerebellum. McNutt states that basal haemorrhage occurs mostly in head presentations, While extravasations over the hemispheres are found in footling presentations mostly.

The damage which a surface haemorrhage may inflict may be any of the following:- Compression; meningitis; softening; atrophy; and interference with development of the convolutions. Mc Nutt records 10 cases of Meningeal haemorrhage, which illustrate these conditions well. In one instance the child lived a few days after the occurrence of the lesion, the post-mortem appearances were as follows:- the right hemisphere was covered by a firm gelatinous dark clot, and the convolutions beneath were in part destroyed, especially the ascending frontal and parietal convolutions; the blood had also penetrated deeply into the brain substance invading and occupying the Corpus Striatum and optic Thalamus. In after years the lesion is an atrophy of the convolutions: these are found small and indurated, their development being prevented by the long compression.

The occurrence of Intracranial haemorrhage at birth is in most cases associated with some abnormality of labour. e.g. very prolonged third stage, deformity of the pelvis, certain positions of the child in Utero, particularly the breech. In all of these the children have been asphyxiated more or less, and a turgid condition of the cerebral vessels with rupture resulted. A good instance of the effect of a narrow pelvis on the results of parturition, is that of Mrs G. recorded by Ashby & Wright - in this family of 7 only 2 escaped uninjured, and of the other 5, 2 are living having sustained brain damage, and 3 are dead, their death no doubt being directly due to injury during birth.

Haemorrhage into the substance of the brain is uncommon and seldom copious. It usually takes place in the course of some other illness, and especially when the blood is in a highly venous condition, and the cerebral vessels are acutely congested. It is generally caused by violent convulsions or severe coughing and vomiting. The blood is seen in minute points scattered about the cerebral tissue or collected in small cysts the surrounding tissue being either normal or slightly softened. These haemorrhages are much more common in the cerebrum than in the cerebellum. A single large haemorrhage into the internal capsule such as

occurs in the adult is rare: Sachs and Peterson mention a case however which presented all the appearances of a moderate extravasation of this kind.

Arterial haemorrhage may result from traumatism or the rupture of an Aneurism. Aneurism is very rare at such an age; it is generally held to be invariably associated with Endocarditis and the dilatation to result from Embolism. Osler records one case of an aneurism of the Anterior Cerebral Artery in a boy aged 6 which was of considerable size. Other authorities on Cerebral haemorrhage are Litzmann, Parrot, Cruveilhier, Hecker and Weber.

-2- Embolism - is no doubt sometimes the original lesion in Infantile Cerebral paralysis, and occurs mostly in children suffering from endocarditis. Rheumatism, pneumonia, and the specific fevers are also conditions predisposing to it. The paralysis is generally hemiplegic in distribution, and sets in suddenly. The sudden onset is accounted for by the sudden anaemia of the part of the brain supplied by the obstructed vessel. Dr.Taylor in the British Medical Journal for 1880 records a case following endocarditis during an attack of Scarlet Fever with albuminuria. Embolism of the middle cerebral artery,

with extensive softening of the left hemisphere was found post-mortem: Also endocarditis of the mitral valve. Trevelyan reports a similar case in a girl of 8, convalescent from Diphtheria. Henoch mentions a case occurring in a child of 2½ years, suffering from acute pneumonia and caseous bronchial glands. Embolism of the left sylvian artery with extensive softening was found.

Embolism is most common in malignant endocarditis, a case of right sided hemiplegia of this nature is recorded by Ashby and Wright: the lenticulo-striate artery was rendered impervious by plugging, and the left lenticular nucleus and the Anterior limb of the internal capsule showed softening.

3. Thrombosis - This has until recently, been regarded as a very rare occurrence in infancy; and it may be said that congenital syphilis does not play the part in its production, that has been imputed to it. Dr. Gowers thinks, however, that when the primary lesion in these paralyses is the occlusion of a vessel, there is more probability of its being a thrombosis, and he considers many of the cases in which no evidence of softening en masse is found, but only a shrinking and sclerosis, may be explained on this

hypothesis. Post-mortem conditions have not demonstrated this thrombosis of the smaller vessels: but Gowers explains the fact by stating that the clotting has extended into the Sinuses, and the presence of the Sinus-thrombosis has caused the venous thrombosis to be overlooked as its cause. He mentions a case published by Money, in which thrombosis was found after scarlet fever, and the extravasations into the brain substance showed that the coagulation had occurred during life.

Parrot considers thrombosis of the Cerebral veins of very common occurrence.

When it occurs, thrombosis is mostly associated at its onset with an extremely debilitated condition, or with amaemia and Cardiac weakness. Children dying with marasmus are most likely subjects.

-4- Cerebral Atrophy and Sclerosis. Porencephalus. Under these three terms may be included the most common post mortem conditions found in these cases of paralysis. They are all intimately associated with each other in their occurrence.

Atrophy and Sclerosis may be generalized over one or both hemispheres, or may be localized to definite portions of them, or may occur in scattered patches on the surface. It is generally secondary to some inflammatory lesion, which

has occurred either during intra-uterine life or after birth, but may also occur as a result of the presence of a meningeal haemorrhage at birth.

Examples of general Sclerotic atrophy are given by Osler, Ashby & Wright, Moore and others. In Dr.Ashby's case which he ascribes to Syphilis, the tissue on the convexity of both hemispheres was hard and shrunken, the convolutions had disappeared, and the surface was granular like a cirrhosed liver: on section the grey and white matter were hardly distinguishable from one another.

Localized atrophy most commonly occurs in the motor areas of the cerebral cortex. A deep sulcus or groove is generally found in this situation, with the overlying membranes thickened and adherent, , and tending to fill up the gap to some extent. The remains of the convolutions are found shrunken and sclerosed at the bottom of the groove. This condition is probably due in many cases, to a meningeal haemorrhage at birth, and subsequent inflammatory changes resulting in atrophy.

In some cases there are large defects in the brain substance, beginning on the surface and penetrating more or less deeply into the hemisphere: these constitute the con-

dition known as Porencephalus. These gaps are generally pyramidal in shape, with the base of the pyramid turned towards the surface: the walls are formed by the adjoining healthy portions of the convolutions, and the space is covered in by the pia-mater and arachnoid. The causation of porencephalus has been ascribed to several conditions. Kundrat suggested that it arose from anaemia of definite areas corresponding to arterial distribution, without any disease of the arteries themselves. Ross believed it due to arrested development. Others have ascribed it to a foetal encephalitis.

Porencephalus is a frequent condition, and was found By Osler in 24 out of 90 post-mortems. It occurs mostly in the area of distribution of the middle cerebral arteries. In some instances there is a defect in the bone corresponding to the hole in the brain.

Simple Sclerotic atrophy, without any depression of the surface, may also occur in the motor areas and in other regions. It has been described by Henoch as affecting the frontal convolutions, and by Richardiere in the temporo-sphenoidal and parietal regions.

The localized form may result from a meningeal haemorrhage, or superficial softening following a thrombosis,

and possibly also a superficial polio-eucephalitis. It is difficult however to find a cause which would lead to sclerotic atrophy of part of the cerebral cortex, and yet leave no adhesion of the pia- mater in the area affected.

-5- Tubercle is so rare that it need only be mentioned.

-6- "Agenesis Corticalis" is a name which was given to two cases of spastic paralysis with extreme idiocy by Sachs : they are described fully in the journal of Nervous and Mental diseases for August 1892. The surface of the brain, in one of the cases, was flattened and showed little sign of being divided into convolutions: the consistence was firm and almost hard. The essential feature appeared to be a true failure of development of the cellular elements, confined to the cortex; pyramidal cells were found entirely wanting here. The condition is not restricted to any part of the cerebrum.

-7- Cysts are very frequently found, and especially in those cases where the initial lesion has been very severe, and the palsy and mental deficiency were very marked during life. Ashby & Wright record a case, in which a large cyst occupied the centre of the convexity of the right hemisphere. It was due to cerebral softening, which followed an obstruction of the middle cerebral artery. Its contents were clear fluid.

As an explanation of the symptoms of Acute Cerebral palsy, Strümpell in 1884 originated a theory of its pathology which has been widely accepted. He confined his explanation to cases of hemiplegia coming on with convulsions and associated with a rise of temperature. He regarded the lesion as a primary inflammation of the cortex of the brain identical with what occurs in the cord in acute infantile spinal paralysis. This change he called polio-encephalitis

The analogy which he drew between infantile cerebral paralysis and infantile spinal paralysis, was based on clinical resemblance. Both have a similiar onset, both occur about the same age, both often follow the infectious diseases. The actual proof of his views was based on the occurrence of two cases in one family, in which two children were affected at the same time, one with a poliomyelitis and the other with a spastic cerebral palsy. Healso records twc cases in the adult, diagnosed as apoplexy with symptoms of embolic softening, in which at the post mortem encephalitis was found.

Against this theory of Strümpell's may be urged the fact, that in no post mortem examination made soon after the onset of the paralysis, has this polio-encephalitis

been found. The only explanation for this is, that even the earliest of these post-mortems was not early enough after the onset. Secondly the cases which have shown Strümpell's typical onset have been proved to be due to other lesions; and besides it may be urged that in post-mortems in cases beginning with typical symptoms, cerebral defects are found which show destruction not only of the grey but also of the white matter. More recently he has modified his views, and now claims that acute encephalitis of the grey as well as of the white matter may form the basis for these paralyses in children.

The symptoms which Strümpell has considered characteristic of so-called polio-eucephalitis, may be explained by other hypotheses. It is well-known that even slight cerebral lesions of any kind in children may lead to convulsions, and especially if these lesions be cortical. The febrile disturbance may simply be due to the convulsions themselves: for it is often observed that in ordinary Epileptic attacks in adults, if the convulsions succeed one another rapidly there is a considerable rise in temperature, and in children in whom the heat regulating centres are much more easily disturbed, a rise of temperature is easily explicable. The paralysis may be explained either as a result

of the original lesion which caused the convulsions, or as the result of the convulsions themselves.

In the light of these considerations it must be concluded that if polio-encephalitis occurs at all in the cerebral cortex it is rare and should only be diagnosed when everything else is excluded.

Condition of the spinal cord. Very little is to be found in books referring to the state of the cord. A secondary degeneration has been found by Sachs affecting the whole of one lateral column. A general dimunition of the whole of one half of the cord, on the side affected, with a slight increase of the connective tissue trabeculae was present in one of Dr Turner's cases.

Of seven cases of Bilateral paralysis, which I have been able to collect from various authors, there was a descending degeneration in 4, an absence of development in two, while one showed a general dimunition of the affected side. In spastic paraplegia Sachs has found distinct degeneration of both lateral tracts.

Pathology of special symptoms. Certain symptoms found in these cases may require pathological explanation. The distribution of the paralysis is explained by the fact, that the thickest part of the extravasation is often

over the motor area: if it be over both hemispheres the paralysis is bilateral, while if it be on one side only unilateral effects are produced. The frequency with which the legs are involved is no doubt due to the position of the leg centres near the longitudinal fissure, and it is here that the extravasation is most abundant. The fact that the leg is much less affected with permanent paralysis than the arm in the hemiplegics, is doubtless due to its being much more perfectly represented in the unaffected cerebral hemisphere.

Mental defects are readily explicable in the light of the extensive lesions of the cortex, which do not confine themselves to the motor parts only, but extend also into the frontal and other regions. Gowers thinks that, the persistence of some nerve cells only slightly damaged, may explain the occurrence of the convulsions and perhaps also the spontaneous movements. The fact that the latter occur after paralysis in infancy with greater frequency than in the adult, is probably due to the fact that growing and developing nerve cells recover more readily than in the adult; and at the same time are more susceptible to perverted function.

The spasm of the muscles is readily explained also, when we consider that the spinal centres have from early years sustained the loss of their controlling cerebral centres.

The occurrence of Epilepsy may be explained on the same theory as the other motor disorders: it is probable however that scars and fragments of the depressed bone may at times act as foreign bodies, and by the irritation of their presence give rise to this symptom.

The failure of development in the limbs, may be explained as the result of more or less destruction of the centres of nutrition, and also to some extent as the result of disease during the period of growth

TREATMENT.

Treatment may be considered under three headings - (1) Preventative (2) Palliative and (3) Curative treatment.

(1) Preventive or Prophylactic Treatment. As birth palsies are mostly due to causes, giving rise to a prolonged asphyxiated condition of the child while in the mother's passages, operative midwifery is indicated. Expediting delivery in head presentations, by means of the forceps, correcting malpositions of the child when these occur, and rapid extraction of the after-coming head in presentations of the breech, are all instances. The use of the forceps in modern midwifery has been very much extended by the most experienced accoucheurs: their early use has been

strongly urged by Sachs and Peterson as a method of preventing these maladies.

In the acquired cases, the presence of hereditary Syphilis indicates that the infant should be treated as early and thoroughly as possible with the usual remedies. All means should be taken in whooping cough to obviate the severe paroxysms of coughing and vomiting which occur, as also the convulsions of the infections and other diseases. When convulsions have been the cause of the extravasation, it is an important matter to prevent their return, as each recurrence is likely to add to the initial lesion. Henoch speaks strongly of checking them at once, by administering chloroform when each attack begins, and has even gone the length of instructing the relatives how to give it in his absence. The bowels should be freely acted on, and the head raised and cold applied to it; also counter-irritation to the back of the neck and warmth to the limbs. The Bromides and Chloral are the most useful drugs: Small doses of Digitalis are also recommended to be given to steady and control the cardiac contractions, when the large vessels of the neck are seen to pulsate strongly.

(2) Palliative Treatment. If the child recovers from the first effects of the attack, the friends should be warned that a cure is improbable from any form of treatment, and

that whatever is done is for the most part palliative. The general health should be maintained at its best, and every effort made to bring out the child's voluntary power. Rhythmical movements and exercises of the limbs and extremities are of special use, because the dimunition of the symptoms is not due so much to the recovery of the damaged structures, as to functional education of those less injured. Massage, rubbing and passive movements ought to be kept up diligently, as they will sustain the nutrition of the paralyzed limbs, and at the same time prevent contractures and deformities to some extent. Electricity does not seem to give much benefit: Gowers speaks of it as useless, and showing no influence on any of the symptoms. Various forms of apparatus may also help to miminise deformities; they ought not to be used however, until voluntary power has been well established.

With regard to tenotomy of the contracted tendons most authors refer to it as giving very good results: in all the cases in which it has been performed that I have noticed, there has been a great tendency to relapse into as bad a condition as before. In one diplegic case with talipes, the plantar fascia was excised, the Flexor Brevis Digitorum muscle divided, and the Tendo-Achillis split and

lengthened: the condition 6 months afterwards was noted "as bad as ever." In three cases where tenotomy was performed for talipes Equino-varus, two of the patients were able to put the sole of the foot on the floor, but all had talipes cavus, one being very extreme. Division of the hamstring tendons has been performed in one of the Diplegics, but without any apparent benefit.

If epilepsy becomes associated with the paralysis, the treatment for the ordinary idiopathic cases by Bromides and Chloral will be found useful: but as the prognosis of its cessation is so bad the subjection of the patient to these drugs is frequently of no avail. Osler states he has found Bromides most useful in the Jacksomian fits.

For the mental enfeeblement, a good deal can be done by careful systematic training except in the severe forms of idiocy.

The post-paralytic movements of the affected parts do not appear to be influenced by any treatment.

Among the poorer classes these patients sooner or later drift into Workhouses and Infirmaries, where they are attended to in a general way and kept from harm. Those that have few fits and are moderately intelligent are given some light work, while others that are more severely affected spend their time wandering about the yards or lying constant-

ly in bed

(3) Curative Treatment. Under this heading may be included attempts to mitigate either the paralysis or the Epilepsy by surgical interference: the question has of late years been much discussed and especially in America. The results so far have not been very encouraging.

At the onset of the disease the blood clot could be removed by operation no doubt, but several circumstances stand in the way of attempting it. A definite diagnosis of the morbid lesion could not be made with sufficient certainty, and besides when we consider how extensive and diffused meningeal haemorrhages usually are, so severe an operation could not be borneat such an early age. Embolism and thrombosis could not be benefited at all by operation.

As regards remote operation: several cases are recorded where the skull has been trephined for Epilepsy. In one, a case of Bullard's there was a scar and depression of the parietal bone due probably to the forceps, the brain was found porencaphalcus, but on the opposite side. The child died on the following day. In another case of Dr.Weir Mitchell's, the skull was trephined and the membranes found oedematous in the Rolandic area: the child recovered from the operation, and the spasm lessened and the epilepsy became less frequent. Sachs reports four cases as follows:-

the first a boy of six, had right hemiplegia, epilepsy and Athetosis: he was trephined over the motor centre for the right arm and the centre exposed only: his attacks disappeared, and he did well for three months following, but was then lost sight of. Another a girl of 16 with right hemiplegia and epilepsy, had the entire motor area exposed: it was then tested with the Faradic current and found to respond: it was therefore left alone. The Epileptic attacks were afterwards transferred to the opposite side of the body: the other half of the brain was next exposed but without any benefit. The third case, a man 32 years of age, with left hemiplegia, contractures and Athetosis was trephined in the motor area: the pia-mater showed haemorrhagic discolouration and was adherent: the adhesions were incised only. He recovered from the operation and his convulsive seizures were much diminished during the following three years. In a fourth caseof left hemiplegia with Epilepsy in a boy of 12, the arm centre was excised as it showed the effects of old haemorrhage: no benefit was derived in this case. Other cases recorded by Keen, Angell and Starr have had but slight benefit from surgical

Angell and Starr have had but slight benefit from surgical

All things considered, radical surgical treatment is not very hopeful in these cases, and should not be

recommended unless the symptoms are very severe.

Sachs does not consider Horsley's reason for removing the focal centre of Epilepsy in these cases as valid since secondary changes seem to be the main source of irritation, and if one focus of disease be removed other parts of the hemispheres will soon become Epileptogenous.

In conclusion I must express my thanks to the members of the Birmingham Medical Institute for the use of their extensive library. Otherwise I feel I should have been unable to follow up the literature of this subject, which is exceedingly scattered, and contained in numerous Societies' reports and transactions.

William Robertson.

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