Some Aspects of the Treatment of Paraplegics

at Stoke Mandeville Hospital, Aylesbury, Buckinghamshire, England.

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STOKE MANDEVILLE HOSPITAL is world famous for its specialised unit in the treatment of Paraplegia. Before I went to Stoke Mandeville I made sure that I knew all the theory of the treatment of paraplegia. It sounded very simple to me and I thought that I would be able to apply my theoretical knowledge with little difficulty. After my first day I realized that Physiotherapists who had been treating Paraplegics for four years and more, were continually learning about the subject. In the brief time I spent there, I could not possibly have learnt all there is to know but I shall endeavour to impart the little knowledge I did acquire.

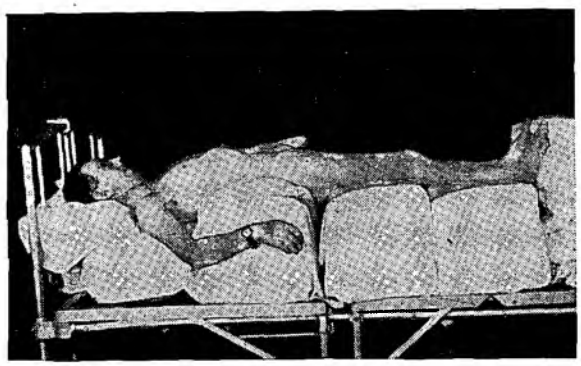
It was during the Second World War, in 1944, that Dr. Ludwig Guttman realized that the methods practised on patients suffering from paraplegia were quite inadequate to restore the physical and mental fitness of patients sufficiently to prepare them for a life of independence. During the ten years since 1944, radical changes in the method of Physiotherapy treatment and in the Medical approach to the problem have taken place. The rehabilitation programme has practically been perfected but even Dr. Guttman finds that he continually has to modify treatment and try new methods. The successful outcome of the rehabilitation of each patieht is largely if not entirely due to the close co-operation between Doctors, Nursing Staff, the Physiotherapist and Occupational Therapist; Social worker and last but not least the patient himself. Petty differences do not exist and the patient's welfare is the only important factor which no one who plays a part in the rehabilitation programme is ever allowed to forget or temporarily overlook.

When a patient with a fracture of the spine is admitted to the Hospital, the fracture is reduced by closed reduction. Open reduction is only used when there is very severe displacement which would cause severe postural deformity if it is not corrected. Operative interference is kept to a minimum because,

(1) During the operation the muscles are stripped from insertions on the spinous processes and are replaced by scar tissue and are weakened. The back and latissimus dorsi muscles are the muscles which are damaged and these are the most important muscles which enable the patient to walk again.

(2) Due to the trauma the spinal cord has already been damaged and extensive haemorrhage has occurred which will be aggravated by operative procedure.

Bone grafts and plating are not employed as these render the spine rigid. When the patient eventually attempts to balance he is unable to let his weight fall back to maintain it. Plaster beds, water beds and splints are not used but the patient is nursed on sorbo-rubber pack beds. He is nursed in lying and side-lying in the early stages and is turned two hourly. Cushions are so arranged that the back is kept in hyperextension whether the patient is in lying or side-lying. Four people are required to lift the patient during the turning process to prevent any movement taking place in the spine. During the early stages of spinal shock the vasomotor control is paralysed. The bloodvessels are atonic and collapsed. If pressure on one particular area is continued for any length of time, ischaemia develops and a local gangrene which leads to a bedsore. Meticulous care has to be taken to prevent the development



The Sorbo-rubber Bed.

of bedsores in these early stages after injury. Although the medullary centre has been severed from the spinal cord there however develops a spinal vasomotor control within approximately eight weeks after the injury. The danger of pressure sores is then diminished and the patient is turned three hourly.

Patients who are admitted from other hospitals with bedsores, are confined to bed and are not allowed to lie on the sore. They are not allowed to get up before the sore has healed.

Treatment of Bedsores:

(a) Ultra Violet Light is never used.

(b) Sinuses are excised by "closed excision" and if it extends to the periosteum, it is excised with it.

(c) Large bedsores are skin grafted.

(d) Excess granulation tissue is removed by scraping or by burning away with a concentrated solution of Flavvazol in Carbon Wax and sterile water.

(e) To clean the sore the following solution is used Flavvazol in 25% Carbon Wax and 100% sterile water.
Normal saline is also used.

(f) 2% Stainless Scarlet Red with soft paraffin is used for the dressings.
When the sore has healed a very light scar massage is given round the area of the sore.

(g) When a patient has bedsores, fluid is lost through the sore and the haemoglobin content of the blood is lowered. Numerous blood transfusions are given which aids in the healing of bedsores and also improves the general condition of the patient.

During the early stages after trauma the treatment is aimed at prevention of bedsores, bladder infection and deformities.

Prevention of Deformities:

Physiotherapy is commenced on the second day after the injury. Passive movements are given to all paralysed limbs. Treatment is given while the patient is in sidelying. Flexion of the knees can then be maintained without the danger of getting movement at the lumbar spine which is

particularly important in cauda equina lesions. No hip flexion is given until approximately six weeks after the injury. Abduction of the hip is given after a month. Special care is taken to prevent hip and knee flexor contractures, equinus deformity of the foot and clawing of the toes, in the cord lesions and in cauda equina lesions contracture of the Quadriceps.

In Cauda Equina lesions electrical stimulation is commenced after a week as these are peripheral nerves and may regenerate. Dr. Guttman then wants electrical stimulation to substitute active movement. Six hundred contractions per muscle per day are given. If Faradism is used a stroking of the entire muscle belly is given.

Special care has to be taken in the giving of passive movements, when severe spasm is present passive movements have to be given "with" the spasm and not against it. When a patient has been a paraplegic for several years, osteoporosis of the bones has developed and fractures may occur even with a mild passive movement. There is loss of all sensation in complete lesions. It is therefore important that the Physiotherapist should watch for any swelling and haematomas which should be reported to the doctor immediately. After three weeks the patient is given a spring with which he is able to do arm exercises. These are done in back lying and an equal bilateral movement is performed. Unilateral exercises are not done until the patient is up out of bed, as these will cause a shearing strain on the fracture site and retard union.

Treatment of the Bladder:

In the early stages the treatment of the bladder is of utmost importance. Immediately after the injury the bladder is paralysed due to spinal shock. The bladder is atonic and stretches in the direction of the force of gravity. When the patient is lying on his back, the physical signs when examining for a distended bladder are very deceptive as the bladder is flaccid and lies more or less flat in the posterial abdominal wall. The patient is left for 24 hours after the injury as the whole system is shocked and little urine is excreted. After 24 hours an attempt is made to express the urine manually but this is usually unsuccessful as the bladder is atonic. The patient is catheterised and absolute aseptic technique is used. This is done three times every 24 hours.

There are alternate forms of treatment:

(a) *Suprapubic aspiration:*

Only performed when the facilities for asceptic technique are not obtainable. It can only be done while the urine is sterile. When the needle is withdrawn from the bladder drops of urine escape into the peritoneal cavity and may lead to a perotinitis if the urine is infected.

(b) *Indwelling Catheter:*

This is hardly ever used as the catheter causes pressure sores of the urethra which lead to necrosis of the urethral mucosa and a recto-urethral fistula may be the end result. An indwelling catheter is never used within the first week or 10 days after the injury and is never left in for longer than three days.

(c) *Suprapubic Cystotomy:*

Used in cases where there is urethral damage or stricture. The position of entry should be high and small to prevent the bladder from shrinking away from the peritoneal wall and a small fibrosed bladder being the result.

Intermittent catheterisation is continued as long as the urine remains sterile.

Prevention of Bladder Infection:

(1) Antibiotics.
(2) A high fluid intake of five to six pints a day.
(3) Aseptic technique of catheterisation.
(4) Keeping the bowels clear and prevent contamination of the bladder by B. coli.
(5) Turning the patient frequently which prevents stasis and the formation of stones in the bladder and kidneys.
(6) Tidal drainage is used when the urine is infected and also for the rehabilitation of the bladder to expand and stimulate it.

In lower motor neurone lesions the bladder may remain atonic. Usually however, when the stage of spinal shock wears off the bladder tone returns. In the bladder wall there are intra-mural ganglia which cause small contractions of the muscle fibres. This occurs in Cauda Equina lesions and is called an Autonomous bladder. The abdominal muscles are trained to express the urine and the patient uses his hands by pushing backwards and downwards to express the residual urine.

Cord Lesions:

The spinal reflex arc is intact. When spinal shock has worn off this reflex arc will be stimulated by the distension of the bladder wall by urine. A reflex arc is set up and the detrussar muscles of the bladder contract and express the urine. This is called the Automatic bladder.

There may occur a neuromuscular imbalance between these detrussar and sphincter muscle nerve supplies so that they contract simultaneously and urine can not be expressed. This is treated by an alcohol block or division of the Hypogastric nerve which supplies the internal sphincter of the urethra.

In the cord lesions the bladder recovers within 6 weeks and catheterisation is dispensed with. Male patients have a bottle when in bed and a rubber urinal when they get up. The urinal is designed to prevent back flow of urine and all parts are detachable for cleaning. Each patient has two urinals.

There are two types of urinals:

(1) *Stoke Mandeville Urinal:*
Used for males without catheter drainage.
(2) *Kipper type:*
A rubber urinal used with an indwelling catheter.

Female patients either have a catheter which clips off or they "clock watch" in order to keep dry.

Approximately twelve weeks after the injury the patient gets up out of bed in a wheel-chair and is then provided with a "monkey-chain" above his bed. The chair is of the "Travaux" type with large wheels in the front and small wheels behind and it is important that it has a good brake. The chair is provided with a sorbo-rubber cushion. The patient is made very bedsore conscious. When once he is up and about in a wheelchair he is responsible for the condition of his skin. He has to lift himself out of the chair every 3 minutes for 20 counts during the first couple of weeks. He now learns to dress himself, get in and out of bed, in and out of his wheelchair. The women learn to do their washing, ironing and sewing and even help with the making of beds from their wheelchairs.

When once the patient is up the Rehabilitation programme is started. This is directed towards the compensatory training of the normal parts of the body. Dr. Guttman classifies this compensatory training in four categories:

(1) *The Restoration of Postural Sensibility and Co-ordination Mechanism:*

This is done by balancing exercises performed in sitting in a wheelchair, on the edge of a plinth and progressed to standing. Balancing exercises are performed in the bathroom of the ward in front of a mirror. By visual guidance the patient gradually develops a new postural control of his hips and back with the aid of the muscles which have escaped injury and which are attached to the pelvis. Of these muscles the Latissimus Dorsi and Trapezius are of extreme importance. Posture correction is very important especially in the early stages of rehabili-

tation, and here the Latissimus Dorsi is also brought into play to maintain the upright position. I shall not go into the detail of the arm exercises which are used in the re-education of balance as they are so well known. When the balance has improved the patient is ready to go to the Physiotherapy Department for his treatment. He now learns to balance on a plinth also with the aid of a mirror. The feet must be well supported on a firm base. In teaching the patient these balancing exercises he must be told, that when the arms are raised to the reach and stretch positions he must throw his weight back and arch his back. These exercises are progressed by performing them without a mirror, closing the eyes, catching and throwing balls, trunk exercises and picking up objects from the floor.

Hand in hand with the re-education of a new postural reflex goes the development and strengthening of the muscles which are attached to the pelvis but have a cervical nerve supply. To the Latissimus Dorsi and Trapezius already mentioned, are now added Pectoralis major, Serratus Anterior and the Triceps. Various exercises can be devised to strengthen these muscles, e.g. Weight and pulley exercises. Back extension in lying against a spring in the Guthrie Smith apparatus and Trunk side swinging to strengthen the Latissimus Dorsi muscle. This side-swinging is also directed towards the re-adjustment of the vasomotor control by virtue of the frequent changing of position. It is in the high lesions above T5 where the splanchnic nerves have been paralysed that these exercises are most beneficial. Abdominal binders are also used to prevent the blood from accumulating in the Abdominal viscera and so aids in the prevention of fainting.

When the patient has mastered the new way of balancing he is progressed to standing in plaster back splints. The splints are made by the Physiotherapist. Special care is taken that there are no ridges in the plaster and no rough edges which may cause undue pressure when the back splints are applied. These are bandaged on very firmly and toe-raising springs put on the shoes. The patient then stands between parallel bars and once more a mirror is used to aid in the re-education of balance in the standing position. Walking is started almost straight away which helps to improve balance.

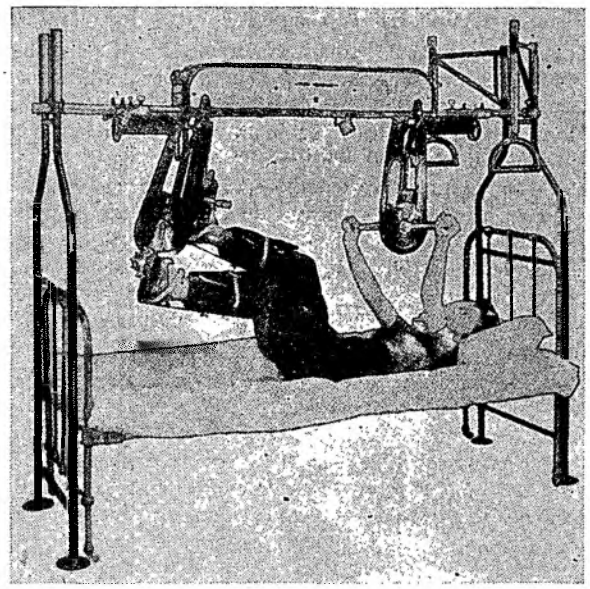
Three types of walking are taught and the most suitable is chosen for each patient. These are the four-point, three-point and swing to and through gait.

The swing to and through gait is not very safe as there is a moment when both feet are off the ground and the patient is only supported by his crutches. It may happen that a patient gets a spasm of the Abdominal and back muscles at that moment and is unable to save himself from falling.

The patient who has a Cauda Equina lesion wears toe springs and is taught control of his feet by employing "Fraenkel-like" exercises. When the patient walks well in plasters between parallel bars calipers are made. In England the orthopaedic technicians really know how to make good calipers! They are made of a very light alloy of steel and alluminium called duralluminium. The patient is able to apply his calipers himself and lock and unlock them. Walking is progressed to walking between parallel bars with one crutch and then two crutches. The wheel crutch, which is provided with a brake, is also used at this stage of the re-education of walking. From crutches the patient progresses to walking on elbow crutches, up and down stairs and getting up and sitting down in his wheel-chair.

Spasticity:

The spasticity which accompanies cord lesions is a serious problem and interferes with the patient's progress. The isolated spinal cord responds to external and internal stimuli by mass movement patterns. Severe spasticity of the adductors of the legs, hip and knee flexors and plantar flexors of the feet occur which prevent walking, locking of calipers, catheterisation and sexual rehabilitation.



The Bed Bicycle.

Treatment of the spasticity:

(1) The stimuli are reduced to a minimum by preventing contracture, bedsores, bladder infection, bladder and rectal distension and anaemia.

(2) Prone lying in bed and standing is encouraged as this produces the extensor thrust reflex and counteracts the flexor spasm. Standing and walking often is the best cure.

(3) Heat is used. There is an indoor swimming pool where patients are treated.

(4) The Stoke Mandeville bed cycle which was designed by Dr. Guttman is used for spasticity. The rationale of using the cycle is to tire out the spasm. The bed cycle is also used to mobilise joints, improve the circulation and has a profound psychological affect on the patient when he sees that he is able to move his legs by using his arms.

(5) An Alcohol block is used in very severe cases but only after very serious consideration, as an alcohol block causes:
(a) Paralysis of bowel function.
(b) Second stage of spinal shock.
(c) Loss of sexual function.

An alcohol block is used when all other methods of treatment have proved ineffective.

(6) Surgery is also employed as a last resort. The following operations are commonly performed:
(a) Obturator neurectomy.
(b) Tenotomy of hamstrings.
(c) Tendon lengthening of the plantar flexors.

Rehabilitation of Sexual Function:

(1) *Female:*

There is amenorrhea for approximately six months after the injury but fertility is not diminished. Pregnancy is contra-indicated where there has been infection of the kidneys and bladder. During pregnancy the female paraplegics have to be kept under careful supervision in the event of renal dysfunction.

Labour can be quite normal as the uterine muscles are able to contract strongly enough to effect labour without the aid of abdominal muscles. Childbirth is completely painless.

(2) *Male:*

The male fertility is usually affected but Dr. Guttman has found Prostigmine of great value. Cauda Equina lesions are not affected by Prostigmine.

Sport and Vocational Training:

These are of the utmost importance in the rehabilitation programme. Archery, Javelin, Net-ball, Swimming, Table-tennis and Snooker are done at Stoke Mandeville. These are all excellent for improving the balance and strengthening the arm and back muscles.

Dr. Guttman created the sports movement in 1948 which since then has become an annual event at Stoke Mandeville. In 1952 it became international, and the Dutch team was the first to compete in the games. Last year fourteen different countries were represented and soon this event will be known as the Paraplegic Olympic games.

The social life at the Hospital is very active. There are weekly film shows, plays are staged and musical evenings are held. Patients are also taken out in the "Spinal Coach" on "Archery shoots," to the motor car races at Silverstone and the Point-to-Point. The Physiotherapists often push patients to Aylesbury which is about one-and-a-quarter miles from the Hospital; mainly for shopping, to the pictures and to the pub!

Before the patient is allowed to leave the Hospital the home conditions are investigated thoroughly and if not suitable the house is adjusted for the use of a wheel-chair and bed. The lavatory is also adjusted. Unmarried men who do not live at home are sent to the Duchess of Gloucester House at Eastbourne where they may live and go out to work. The pensioners are provided with hand-controlled motor cars and a folding chair designed by Dr. Guttman. It is most important that each patient should have a job as it has a wonderful psychological effect when he realizes that he can be a useful citizen in spite of a grave physical disability

During the patient's stay at Stoke Mandeville he has become physically and mentally rehabilitated and most of them leave the Hospital to live a comparatively normal life within reason and philosophical acceptance of their limitations.

The following letter has been received from the Postmaster General:

FREQUENCIES FOR MEDICAL PURPOSES.

I have to inform you that the internationally allocated frequencies for medical purposes will become effective in the Union on 1st January, 1955.

All new equipment which is installed on or after 1st July, 1955, will be required to operate on one or other of these frequencies.

A period of two years, from 1st January, 1955, will be allowed for the conversion of equipment which is at present in use.

The frequencies in question are:—

13,560 Kcs.
27,120 Kcs.
40.68 mcs.
2,450 mcs.
5,850 mcs.

Yours faithfully,
(Sgd.) POSTMASTER-GENERAL.

UNIVERSITY APPEALS FUND

For a number of years the University of the Witwatersrand which has been the training centre for a great number of the members of this Society, has, owing to a serious lack of funds, been unable to afford sufficient staff, adequate buildings or opportunities for research.

For this reason the University Appeal was launched with the target set at £1,000,000. Although more than half of this amount has been collected up to date much still remains to be done. In an effort to provide a portion of the funds needed to attain this figure all Graduates, the University staff, the present Students as well as their wellwishers have banded together to run the University Towns' Festival. Well-wishers include the different national communities in our midst, as well as various Reef Municipalities.

The Festival promises to provide the residents of Johannesburg with one of the finest spectacles ever seen in this city. It will offer every conceivable kind of entertainment and amusement in addition to the fact that there will be on sale the wares and fare of many countries other than our own.

In order to obtain the success which the cause and the enthusiasm of those already at work deserve, it is hoped that further co-operation will be enlisted, particularly from those who have at some time reaped some benefit from the existence of the University.

The S.A.S.P. is giving its fullest support to this campaign, and although by reason of the University's site, most of the practical help must be provided by the Southern Transvaal Branch, donations in money or kind will be most gratefully received from anyone. Help is urgently needed for this great undertaking and the Secretary of our Society will act as liaison between our members and the Appeals Fund Committee.
