



Management
Of the
Neuropathic Bladder

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CONTENTS

1.0	Aims of Treatment	3
2.0	Anatomy and Physiology	3
3.0	Types of Spinal Bladders	4
4.0	Spinal Shock and Acute Care	4
5.0	Intermittent Catheterisation by Staff Member	5
6.0	Maintaining Reflex Bladder Function for the Male Patient	6
7.0	Clean Self Intermittent Catheterisation	7
8.0	In-Dwelling Urethral Catheterisation	8
9.0	Suprapubic Catheterisation	9
10.0	Management of Suprapubic Catheterisation	10
11.0	Implanted Bladder Stimulators	11
12.0	Autonomic Dysreflexia	13
13.0	Medication	14
14.0	Further Information	15

1.0 AIMS OF TREATMENT

Spinal Cord Injury at any level will almost certainly alter or impair control over bladder function. The aims of bladder management are to provide:

- A system of bladder control and drainage.
- Continence and convenience throughout the patient's life time.
- Protection of the kidneys.

The system of care will alter through the period of initial hospitalisation and may require to be revised from time to time throughout the patient's life time.

The specific goals are:

- To prevent infection.
- To ensure bladder emptying at a low pressure.
- To prevent autonomic dysreflexia (thoracic level 6 and above).

2.0 ANATOMY & PHYSIOLOGY

It is important to remember that there are four main compartments to the urinary system:

- The Kidneys
These are excretory in function.
- The Pelvis and Ureters
These are muscular tubes down which urine is pumped at low pressure from the kidneys to the bladder.
- The Bladder
Is a muscular balloon which stores urine until it is socially convenient to empty it. The pressure remains low until micturition occurs.
- The Urethra
The tube down which urine travels from the bladder to the outside.
- The Sphincter
The sphincter is the muscle around the outlet of the bladder into the urethra which must open to allow the passage of urine. This sphincter normally is under voluntary control. Unfortunately in many forms of spinal injury this muscle may remain in spasm and therefore causes retention of urine.

3.0 TYPES OF SPINAL BLADDER

After a spinal cord injury there will be two main types of bladder function depending upon the level of the spinal injury.

1. Upper Motor Neurone/Reflex Bladder

If the spinal injury is above the level of the 12th thoracic vertebra, (T12), the patient will have an upper motor neurone bladder or a reflex bladder. The bladder reflexes are still intact and so when the bladder is full it may empty automatically. Since the nerves above the sacral section of the spinal cord are not connected to the brain, the patient will not have any awareness of the full bladder and will not have voluntary control. The reflex can be triggered by tapping the lower abdomen but may also be triggered by involuntary spasms or movement.

Regular monitoring of the bladder pressure is necessary.

2. Lower Motor Neurone Bladder/ Flaccid bladder

When the spinal cord injury is below the level of the 12th thoracic vertebra (T12), and effects the sacral section of the spinal cord all reflexes are destroyed and the bladder will have no muscle tone. When overfilled dribbling incontinence may occur with back pressure causing eventual renal damage. Again the patient will not be aware of a full bladder and will have no voluntary control of bladder function.

A small number of persons will have a “mixed” bladder when there has been only partial damage to the spinal nerves.

(Note: The reflex bladder may also be known as an automatic or spastic bladder. Similarly the flaccid bladder may be called a floppy or areflexic bladder).

4.0 SPINAL SHOCK AND ACUTE CARE

Immediately after a spinal cord injury all activity is lost for some time (spinal shock) and therefore all patients require immediate catheterisation at the latest in the Accident & Emergency Department.

Acute Care

In-Dwelling Foley urethral catheters (14Fg, 10 ml. water in balloon) will be used initially in the management of patients during the acute phase and especially when there are multiple injuries requiring transfusion and intravenous fluids.

When it is not possible to access the bladder through the urethral route, a fine-bore suprapubic catheter should be inserted under ultrasound control. Catheterisation by the urethral or suprapubic route must be carried out as a matter of urgency to avoid over distension of the bladder during the period of spinal shock. If distension has occurred recovery of bladder function will almost certainly be delayed.

During this phase a closed drainage system must be used which is changed weekly. Specimens of urine are sent weekly to the laboratory. Catheter care is performed daily.

As soon as the patient is stable the aim is to introduce intermittent catheterisation. Urodynamic studies will normally be carried out at this stage.

5.0 INTERMITTENT CATHETERISATION BY STAFF MEMBER

- Start fluid balance chart.
- Prescribe Ofloxacin - give 3 doses of 400 mg. 1 dose prior to removal & 2 doses at 12 hourly intervals thereafter.
- Remove in-dwelling catheter. Send urine specimen to bacteriology.

For reflex Bladders (Above T12)

- Attempt to stimulate voiding every two hours by tapping the lower abdomen or by developing an appropriate reflex, such as massaging the thigh.

Fluid intake must be limited to less than 2 litres per day.

- During bladder training it is important to observe for headaches, sweating and nausea.
- If infection occurs, antibiotic treatment is commenced according to sensitivity result.

If the patient is systemically unwell discontinue intermittent catheterisation and return to in-dwelling urethral (Foley) catheterisation. This allows the use of a high fluid intake either orally or intravenously.

Protocol for Intermittent Catheterisation as part of Bladder training

- Intermittent catheterisation every four hours, by strict aseptic technique; If the volume of urine at catheterisation exceeds 500 ml. fluid intake must be reduced.

Catheterise 6 hourly

When voiding is established (consistently 150 ml or more).

Residual volume below 300 ml. Fluids 2000 ml./24 hrs.

Catheterise 8-hourly

When consistently voiding 150ml or more.

Residual volume below 200 ml. Urine specimen twice weekly.

Catheterise 12 hourly

When fluid intake is 1800-2500 ml. Residual volume below 100 ml.

No longer necessary to drink in sleeping hours.

Urine specimen weekly.

Daily Withdrawl/or Ultrasound

When fluid intake at 2500 ml. or more Residual volume below 80 ml.

Urine specimen weekly.

Catheterisation may cease when residual volume is less than 50 ml. on two consecutive weeks and the urine is free of bacteria. Observe by ultrasound, assess by urodynamic studies.

Note: Protocol for fluid intake with catheterisation at four hourly intervals.

6.00 am - 10.00 am 500 mls

10.00 am - 2.00 pm 500 mls
2.00 pm - 6.00 pm 500 mls
6.00 pm - 10.00 pm 250 mls
10.00 pm - 6.00 am 250 mls

Note: 1 mug = 250 mls
1 can = 330 mls
1 glass = 150 mls

6.0 MAINTAINING REFLEX BLADDER FUNCTION FOR THE MALE PATIENT

Advantages:

- The patient remains catheter free.
- Reduced possibility of infection.
- Tapping is possible with poor hand function.
- The patient will be continent.
- Sexual function is not impaired.
- Good body image maintained.

Disadvantages:

- Requires condom drainage and a leg bag.
- There may be problems with the condom drainage sheath.
- There is a danger of reflux adversely affecting kidney function and therefore regular monitoring is mandatory.

Condom Drainage Systems for the Male Patient

An appropriate type and size of condom drainage system will have been provided in hospital. It is essential to ensure that the condom is a good fit, and that the urethra is not constricted by any additional device.

Care of the Condom Drainage System

The condom should be changed daily and the skin inspected to ensure that there has been no evidence of damage or erosion.

If there is evidence of injury to the skin on the penis temporary indwelling urethral (Foley) catheterisation should be considered.

Leg Bags

In hospital these items will be changed regularly with a larger night bag attached to the system overnight. In practice these bags may be used for up to five days

at home, and if re-used may be rinsed with water and soaked in Milton (50mls Milton to 4 litres of water or Milton 1 tablet to 4.6 litres of water).

Follow Up

It is essential that all patients with a reflex bladder should be followed up at least annually with a minimum of a plain x-ray of the abdomen and/or ultrasound to exclude the occurrence of stone and by an IVU or renogram to determine renal function.

In addition assessment of bladder emptying may be made by regular ultrasonic examinations, but urodynamic studies are necessary to assess voiding pressure. High voiding pressures must be avoided.

7.0 CLEAN SELF INTERMITTENT CATHETERISATION

Clean self intermittent catheterisation is one of the most popular and regularly used forms of bladder drainage for patients with spinal cord injury. Self catheterisation, of course, is only possible for patients with good hand function. The carers of tetraplegic persons may also be taught the procedure.

Advantages:

- No foreign body (catheter) in bladder.
- Has very low infection rate.
- The patient will be continent and will not require an appliance.
- Bladder capacity maintained.
- Sexual function is not impaired.
- Good body image maintained.

Disadvantages:

- The technique requires moderation of fluid intake.
- Reasonable manual dexterity is required.
- A good standard of personal hygiene is necessary.

Principles of Care

10 Stages to Freedom:

The system works by ensuring that the bladder is completely emptied at regular intervals, and therefore bacteria do not have the opportunity to multiply. The home environment contains fewer pathogens than does the hospitals allowing a clean procedure.

Method

1. Gather together all necessary equipment.
2. Wash your hands.
3. Prepare the catheter.
4. Get in to a suitable position.
5. When part of the training regime, tap and empty the bladder.
6. Cleanse the penis or labia.
7. Pass the catheter gently.
8. Ensure that the bladder is empty by gently pressing the lower abdomen.
9. Remove the catheter.
10. If non disposable clean, and store the catheter.

Note: Before leaving the Unit ensure that you have been given the booklet for our particular catheter to assist your Doctor and Community Nurse in re-supply.

8.0 IN-DWELLING URETHRAL CATHETERS FOLEY CATHETERISATION

For some patients because of poor hand function or social or medical circumstances an in-dwelling urethral catheter may be preferred. This requires appropriate care which must not be neglected. For adults 14 f.g. catheter normally will be used. In general the smallest possible catheter with the smallest possible balloon should be employed. A closed drainage system is to be preferred.

In-dwelling urethral catheters must be changed regularly and certainly before the patient experiences any adverse symptoms. In hospital the latex catheters will be changed weekly but Silicone catheters may be changed at four to six weekly intervals.

For patients with sufficient hand control the aim will be to teach the patient how to change the catheter. Similarly to provide the patient with increased independence wherever possible, carers will also be taught the technique.

9.0 SUPRAPUBIC CATHETERISATION

A suprapubic catheter is an indwelling catheter inserted directly into the bladder through the abdominal wall and now is an increasingly popular and acceptable alternative for urethral catheterisation.

Advantages:

- Prevents damage to urethral tissue.
- Easily reversible to urethral catheterisation.
- Can be changed easily by patient.
- Improves difficulty when changed by others.
- If the catheter becomes blocked a urethral catheter can be inserted.

- Cleaner than the normal urethral route.
- It may be better for sexual function.
- Facilitates bladder training.

Disadvantages:

- Obesity can make it difficult to site the catheter.
- Change of body image.
- May require urethral closure to provide continence.

10.0 MANAGEMENT OF SUPRAPUBIC CATHETERISATION

In this Unit most suprapubic catheters are initially inserted as a ward procedure under local anaesthetic.

Protocol for First Change

Subsequent Suprapubic Catheter Change

1. Pre fill bladder with warmed Uro-tainer
100mls (Warmed Saline or Mandelic Acid).



Suprapubic
Catheterisation

2. Change from Cystofix catheter to Foley.
3. Increase catheter size as appropriate for individual patient needs.
4. Check stoma site. Dressing required until stoma site completely healed.
5. Ensure catheter in bladder by checking with bladder ultrasound equipment.
6. Ensure urine draining via catheter.

7. Nifedipine 10 mg capsules should always be available for treatment of autonomic dysreflexia.
8. Prophylactic antibiotic therapy only if indicated and as prescribed by medical staff.

General Information:

1. First catheter change is carried out 4-6 weeks post insertion of suprapubic catheter.
2. First change must be carried out by medical staff.
3. Subsequent suprapubic catheter changes may be carried out by nursing staff trained in the technique unless contra-indicated i.e. initial complication.
4. When suprapubic catheter track is well established Spinal Injuries Liaison Sister will teach District Nursing staff how to carry out procedure.
5. Patients will be instructed on suprapubic catheter change where applicable i.e. paraplegic patients, some tetraplegic patients with adequate hand function.
6. Relatives/Carers of patients with suprapubic catheter can, if appropriate, be taught suprapubic catheter change procedure.

Frequency of Catheter Change

Suprapubic catheter should be changed at 4-6 weekly intervals.

Choosing a Catheter Size

1. Catheter should be increased by one size at each subsequent change until size 16Fg fits comfortably into suprapubic stoma.
2. Catheter size may be increased to a size 24Fg if necessary.

Indications for increasing catheter size to greater than 16Fg:

- a) Repeated urinary infections.
- b) Large amount of debris in bladder.
- c) Repeated blockage of smaller size catheter.

Type of Catheter Used

Teflon coated 2 way Foley catheter (male length) with 10 ml balloon.

N.B. All silicone catheters should only be used if patient suffers from allergic reaction to Teflon coated catheter.

e.g. Local Skin Reaction.
Dysreflexic Attack.

Regular changes help to:

- Prevent urinary infection.

- Prevent bladder calculi (stones).
- Prevent over-granulation around the catheter site.
- To facilitate removal and re-catheterisation.

11.0 IMPLANTED BLADDER STIMULATORS

When the previous methods have not been successful implanted bladder stimulators may be of value for some patients. The implants stimulate the motor nerves running from the spinal cord to the bladder, so it is necessary that these should be intact. The spinal cord lesion must be above T12 and the person must have a complete injury so that there would be no pain on stimulation of the sacral nerves. This can be tested:

- a. Clinically, if the patient can produce bladder contractions by tapping or by some other reflex.
- b. By investigations such as Urodynamics.
- c. By stimulating the sacral nerves with an electrode placed temporarily in the rectum.

Advantages:

- The method provides near normal emptying of the bladder.
- No external collecting system is necessary for a patient with hand function.

Disadvantages:

- The procedure requires a major operation.
- For male patients a further operation on the external sphincter may be necessary to allow the bladder to empty adequately.

The Operation

A laminectomy is performed at L3 to S2 inclusive and the dura is opened to expose the cauda equina. Electrodes are placed around the anterior roots of those nerves supplying the bladder, usually S2 to S4. The cable from the electrodes is brought out through the dura and led around the flank under the skin to a radio receiver implanted under the skin of the chest wall. There are no batteries implanted as the power is transmitted to the receiver from a transmitter outside the body. The transmitter will require to have its batteries charged usually once a week.

Practical Use

The radio transmitter has coils which are placed on the skin of the chest wall over the receiver. They should be accurately lined up with the receiver or the implant will not work. When the transmitter is switched on, bursts of electrical

stimulation are transmitted to the nerve roots and these cause contraction of both the bladder and the external sphincter. Between the bursts the sphincter relaxes rapidly while the bladder remains somewhat contracted and so urine is passed in the intervals between bursts of stimulation. Stimulation is continued until urine is no longer passed in these intervals.

This usually takes one or two minutes. Sometimes a second episode of stimulation after a few minutes rest will produce more urine.

The stimulator may also produce flexion of the toes or foot and this can be a guide to placing the aerial in the correct place on the chest wall. The patient may also learn to recognise certain sensation as a guide to correct placement.

Other Effects of Stimulation

The stimulator does not assist bowel emptying at the same time as bladder emptying but may be programmed to produce bowel emptying. Regular use of the stimulator for micturition may improve the frequency of bowel emptying. In some male patients the stimulator may also be programmed to produce penile erection. If the stimulator produces a headache or a large rise in blood pressure its use should be stopped.

12.0 AUTONOMIC DYSREFLEXIA

Physiology

Patients with a lesion at or above T6 are prone to autonomic dysreflexia (hyper-reflexia). Common precipitants include blocked catheters or rectal examination, instrumentation and operation - thus a general anaesthetic is still necessary for spinal patients even if they have no apparent sensation.

Bladder Dysfunction is the most common cause of Autonomic Dysreflexia

- Bladder distension.
- Blocked catheter.
- High pressure voiding.
- Defective drainage system (e.g. kinked tubing/full drainage bag).
- Urinary tract infection.
- Bladder stones.

Pathology

Reflex sympathetic over activity below level of cord lesion, vasoconstriction and systemic hypertension stimulation of carotid and aortic baroreceptors:

- Increased vagal tone and bradycardia.
- Peripheral vasodilatation which would normally relieve the hypertension, cannot occur because of the injured cord.
- BP continues to rise until cause removed.

Symptoms

- Pounding headache/fullness in head.
- Profuse sweating.
- Tightness in chest.
- Feeling of doom, extreme anxiety.

Signs

- Flushing and/or blotching above level of cord lesion.
- Hypertension and bradycardia.
- Occasionally cardiac dysrhythmia.
- Pupillary dilatation.

Above lesion:

- Pallor initially.
- Flushing head and neck.
- Sweating in area above and around the lesion.

Below lesion

- Cold peripheries.
- Pilo erection.
- Contraction of bladder and large bowel.
- Penile erection and seminal fluid emission.

DANGER - Can result in Intracranial Haemorrhage

Note:

Under normal circumstances a tetraplegic person may have a low blood pressure (e.g. 90/60mm.Hg). A rise to "normal" level of 120/80mm.Hg. may represent a significant elevation.

Regular monitoring is necessary since blood pressure changes can occur extremely rapidly.

Monitor blood pressure every five minutes until blood pressure control is achieved and then every thirty minutes for four hours.

Treatment

General Measures - First Line:

1. Tilt bed head up.
2. Sublingual Nifedipine 10 mg bitten or GTN sublingual.
3. Remove cause.

4. DO NOT USE ASPIRIN OR NSAID for analgesia afterwards. Use Paracetamol/Co-proxamol.

13.0 MEDICATION

The following drugs may be used to stimulate bladder muscle, to reduce frequency of micturition or to improve flow by reducing spasm.

Drugs for urinary retention:

- Indoramin 20 mg. twice daily
- Tamsulosun 400 micrograms once daily
- Terazosin 400 micrograms once daily.

The selective Alpha blockers relax smooth muscle producing an increase in urinary flow rate, and an improvement in obstructive symptoms. Side effects include sedation, dizziness and hypotension.

- Distigmine bromide 5mgs daily.
Distigmine improves voiding by increasing detrusor muscle contraction.

Drugs for urinary frequency:

- Oxybutynin Hydrochloride (Ditropan) 2.5 mg. t.i.d. initially.
- Tolterodine (detrusitol) 2mg b.d.
- Propantheline Bromide 15-30 mg. t.i.d.
(Also used for undue sweating).

Antimuscarinic drugs increase bladder capacity by diminishing unstable detrusor contractions. Side effects include dry mouth and blurred vision and may precipitate glaucoma. May also cause retention of urine and increased constipation.

Other Drugs:

The treatment of involuntary muscle spasm with Diazepam, Baclofen and Dantrolene all may vary flow by their effect on the muscles of the pelvic floor.

Acidification of Urine:

High doses of ascorbic acid (1-3 grams per day) or the use of Cranberry juice may reduce infective symptoms by acidifying the urine, but large doses may cause GI disturbances such as diarrhoea.

FURTHER INFORMATION

For further information and advice please contact:

The Queen Elizabeth National Spinal Injuries Unit
South Glasgow University Hospitals NHS Trust

Southern General Hospital
1345 Govan Road, Glasgow G51 4TF

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