

# The spinal cord-injured patient in the medical ward

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**ABSTRACT – People with spinal cord injury (SCI) suffer from the complications of paralysis in addition to the diseases of the general population. Spinal injury centres in the UK are tasked primarily with looking after newly injured patients and patients with established SCI must often turn to their local hospitals and general physicians for inpatient medical care. This paper outlines investigation and management of some of the common conditions which the physician on the general ward might expect to come across in patients with SCI and also how best to maintain the general health of the SCI patient in hospital.**

**KEY WORDS:** Spinal cord injury (SCI), medical ward, paraplegia, tetraplegia

## Introduction

This paper outlines management of the established spinal cord-injured (SCI) patient on the general medical ward in the UK. There are 40,000 people living with a spinal cord injury in the British Isles, and every year another 800 people sustain a new injury.

Most patients with SCI will be living at home and require little help other than routine GP care and review at their local spinal centre. They face the lifetime risks of both the medical problems of their uninjured peer group and the complications of their cord injury.

Spinal centres in the UK will usually try to readmit patients with complications directly attributable to their SCI, but these centres are primarily tasked with treating new injuries and do not have the capacity to admit everyone with a cord-related problem. In addition, SCI patients remain vulnerable to the illnesses of their uninjured peer group, and may require the help of the general physician for conditions unrelated to their SCI. So the general physician with little or no experience of such patients may be required to look after an SCI patient on the medical ward for either complications of cord injury or an unrelated illness.

## Recognising the level of injury

It is useful to categorise patients according to the level of their injury. The spinal level, ie C5 or T8, is the last *normal* level and provides a guide to the patient’s likely ability and vulnerability to common problems. *Paraplegic* patients have paralysis of the legs and some trunk involvement. Most younger paraplegic patients

will be fully self-caring and many will be in employment. Some fitter patients can walk in leg splints and crutches, and can even use their wheelchairs on stairs. *Tetraplegic* patients will have varying degrees of involvement of the upper limbs. Patients with T1 or C8 injuries will have impairment of fine finger control and grip, but many will still be independent. Younger patients with C6 and C7 injuries can be self-caring and transfer independently on and off their wheelchair, but the lack of grip makes self-care more difficult and most will need at least some help with daily living. Patients with injuries at C5 or above will need large amounts of daily care but can still work at white-collar jobs.

## Relationship with the spinal centre

The majority of SCI patients in the UK will be seen for regular review at their spinal centre. At the time of writing the reorganisation of the NHS in England has ensured that every major trauma centre is linked to a designated spinal centre for acute injuries, and it seems likely that each general hospital will have a nominated spinal centre for advice on established injuries. All spinal centres can provide advice on management of cord-injured patients, and most have medical and nursing liaison teams who can visit the patient at home or in the hospital. A list of centres is provided in Table 1.

## Recognition of new problems

The SCI person is as prone as his or her non-injured peers to suffer from any general medical or surgical condition. Lack of sensation below the level of injury can make it more difficult to

**Table 1. Spinal cord injury centres in the British Isles.**

Middlesbrough	Golden Jubilee Regional SCIC
Oswestry	Midland SCIC
Pinderfields	Yorkshire Regional SCIC
Salisbury	Duke of York Spinal Treatment Centre
Sheffield	Princess Royal Spinal Injuries Unit
Southport	Southport Regional Spinal Injuries Unit
Stanmore	London SCIC Stanmore
Stoke Mandeville	The National Spinal Injuries Centre
Belfast	SCIC Musgrave Park Hospital
Glasgow	The Queen Elizabeth National Spinal Injuries Unit
Cardiff	Rookwood Spinal Injuries Rehabilitation Centre
Dublin	National Rehabilitation Hospital

SCIC = spinal cord injury centre.

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localise symptoms, but many patients become expert at recognising visceral symptoms and can, for instance, distinguish between bladder and bowel discomfort. In the absence of localising symptoms there has to be more reliance on imaging and laboratory testing, and the threshold for major investigation is lower than in able-bodied individuals.

### Illness due to spinal cord injury

Every person with a cord injury is affected differently but there are common themes: the affected person will almost always have bladder and bowel dysfunction, autonomic dysfunction and insensate skin. Each of these areas can give rise to major complications long after the initial injury.

#### *Assessment and treatment in the admissions ward*

In the acute setting SCI patients require the same approach to the assessment of airway, breathing and circulation as the able-bodied patient, but the examining doctor should be aware of some common physiological issues. Airway clearance is difficult for tetraplegic patients owing to intercostal paralysis as detailed below. Chest wall movement may be poor or non-existent and chest signs more difficult to elicit, so an early chest radiograph is very useful.

Due to lack of sympathetic tone, the resting blood pressure is usually low in a tetraplegic person. Aggressive fluid resuscitation to restore a 'normal' blood pressure is unlikely to work and will lead to fluid overload. Restoration of circulation is judged best by markers of adequate organ perfusion (good renal output, warm skin, alert patient). The resting heart rate is often low owing to unopposed vagal activity. Bradycardia may require pacing at the time of the initial injury but is rarely a problem for patients with established injury. Autonomic dysreflexia (see below) causes a rise in blood pressure which might appear mild in a normotensive individual but can be spectacular for someone with tetraplegia.

Paralysed people cannot shiver and are prone to hypothermia, often exacerbated by intercurrent illness, and this can make them feel unwell without any focal symptoms.

#### *Respiratory care*

Patients with tetraplegia have paralysed intercostal muscles, which reduces static lung volumes and forced expiratory manoeuvres by around 50%. These patients have lower respiratory reserve than non-injured patients, but also suffer more subtle respiratory problems due to a lack of abdominal wall strength. Weak or absent abdominal muscles greatly reduce cough efficacy, so patients are at high risk from both ventilatory failure, due to ventilator pump problems, and gas exchange failure, due to retained secretions and/or aspiration. Recognition of this double insult is key to treating tetraplegic patients with chest disease. They require aggressive chest clearance with assisted cough techniques to clear mucus and secretions. This can be undertaken by physiotherapists, nurses or, best of all, carers who have been taught at the spinal unit. Assisted coughing devices are extremely

useful and, in the author's unit, are often prescribed on discharge to patients with high tetraplegia. If secretions are not cleared the tetraplegic patient will be at high risk of worsening respiratory failure and requiring assisted ventilation, with or without intubation. If mechanical ventilation is required then weaning is usually prolonged and tedious, but successful if the patient was breathing independently beforehand.

#### *Bladder*

Until the mid-twentieth century many SCI patients died of renal failure – inadequate bladder drainage and stasis caused ascending urinary tract infections, hydronephrosis, massive renal calculi and death. The first step in bladder care is the immediate institution of safe bladder drainage, usually by indwelling catheter. In the UK most SCI patients with good hand function drain their bladders by intermittent self-catheterisation, which has been shown to be very safe with a low frequency of infection. Many tetraplegic patients, with poor hand control, have an indwelling suprapubic catheter.

Urinary tract infections still occur in SCI patients: most are treated at home but some need to be admitted with severe systemic symptoms. The local urologists will have experience of neuropathic bladder management and can advise on best management, but most patients will be initially admitted under the general physician. After resuscitation the treating doctor should look for the common causes of the urinary infection, especially calculi. It is essential to image the renal tract to look for unexpected stones or hydronephrosis, particularly if the patient has not had renal imaging within the last few months. Ultrasound should reveal any immediate problems but CT of the kidneys, ureters and bladder (KUB) is increasingly used for diagnosis. Any significant stone needs urgent urology advice and treatment.

#### *Bowels*

After paralysis most SCI people lose spontaneous bowel control. During their time in spinal injury rehabilitation, their bowels are retrained to ensure continence and convenience in bowel emptying. On leaving the spinal unit most patients will move their bowels every day or every second day, usually at a set time. Most patients will be continent with very low risk of accidents between their regular bowel routines. The paraplegic patient with good hand function can usually manage bowel care unaided, but the tetraplegic patient with poor hand function may require help from the carers or community nurses.

Bowel routines vary: some SCI people have visceral sensation with good warning of bowel movement to allow time to get to the toilet; they can move their bowels quickly with either minimal or no laxatives. At the other end of the spectrum, some require large doses of laxatives, stool softeners, suppositories and manual evacuation from carers.

The bowel routine is a lifelong treatment and any deviation from the regular routine is likely to cause problems. Bowel care is extremely tedious for all concerned, and sometimes neglected on hospital admission when treating nurses and doctors can be

reluctant to undertake manual evacuation. The Nursing and Midwifery Council have issued guidance to their members which confirms that digital examination and manual evacuation are an essential nursing duty where required for bowel care.

Constipation causes a wide range of problems in the SCI patient that can precipitate admission to the medical wards. It lowers the threshold for muscle spasms and dysreflexia, as well as reducing any spontaneous bladder emptying and predisposing to urinary tract infections. In tetraplegic patients with borderline respiratory function, it can precipitate respiratory failure through diaphragmatic splinting. Constipation also leads to non-specific abdominal symptoms that can be difficult to distinguish from more serious bowel pathology.

The diagnosis of constipation can usually be made from taking a close history. There may have been a change of circumstance or carers a few weeks or months previously, leading to a reduction in an established bowel routine. The most reliable diagnosis is made with a trial of a high dose of a laxative such as Movicol or similar, six sachets daily for a few days. A large and sustained bowel result is both diagnostic and therapeutic.

More serious bowel disease can be difficult to diagnose in insensate patients who cannot localise symptoms. A little per rectum bleeding is often due to piles or trauma from manual evacuation, but there should be a similar threshold for endoscopy as in able-bodied patients. Weight loss and upper gastrointestinal symptoms are unusual symptoms and require further investigation.

### Spasms

SCI patients are often prone to muscle spasms. These can be uncomfortable, reduce function or upset sleep, in which case anti-spasm medications such as baclofen are helpful. Spasms rarely worsen in isolation; they are almost always a marker for more serious underlying disease such as the bowel or bladder problems detailed above.

### Autonomic dysreflexia

Autonomic dysreflexia (AD) is a strange condition unique to spinal cord injury. It is an episodic malignant hypertension that can kill by causing a stroke. The condition is usually found in tetraplegic patients but can also be found in paraplegic patients with a level down to T6. It is very rare below T6. AD appears on a spectrum from a sensation of mild head pressure, relieved immediately, for instance, by unkinking a catheter, through to spectacular persistent hypertension lasting for many days, accompanied by dreadful headaches and anxiety.

Attacks can be triggered by any unpleasant stimulus below the level of the injury. The body responds by sympathetically mediated vasoconstriction which, in able-bodied individuals, would be countered with a parasympathetic response. In the SCI patient the parasympathetic response is absent or muted below the lesion, and unopposed vasoconstriction continues with resultant hypertension. Above the lesion, the body responds by massive vasodilatation and vagally mediated bradycardia. If the

cause of AD is not addressed, the blood pressure can rise to dangerous levels within minutes (the author has seen systolic pressures >300 mmHg) and cause a stroke and death. All this can happen, and be reversed, within minutes.

All tetraplegic and high paraplegic patients and their carers will have been warned about the symptoms of AD, and most will know if they are prone to attacks. AD should be the first suspected diagnosis of any high SCI patient presenting to the GP or emergency department with a headache. The majority (>90%) of attacks are due to bladder problems, usually a blocked or kinked catheter, and are quickly spotted and relieved by the patient or carers. Other common causes include constipation and skin problems such as ingrowing toenails, which will lower the AD threshold.

### Symptoms of autonomic dysreflexia

The symptoms of AD are:

- headache
- facial pain
- nasal stuffiness
- feeling of dread.

### Signs of autonomic dysreflexia

#### Above level of injury

The signs of AD above the level of injury are:

- vasodilatation, flushed, warm
- bradycardia.

#### Below level of injury

The signs of AD below the level of injury are:

- vasoconstriction
- grey skin
- piloerection (gooseflesh)
- seminal emission.

### Treatment

The treating doctor or nurse must identify and treat the cause of the attack. Although the patient is usually insensate below the level of the injury, most can recognise the onset of an attack and some can tell whether their bladder or bowels are causing the problem. If there is no obvious bladder cause then it is sensible to undertake a full examination, especially of the genitalia and perineum to look for occult trauma or infection such as orchitis. Every conceivable medical and surgical condition has been associated with AD. Investigation can be hampered by the inability of the SCI patient to localise lesions in the insensate part of the body, and there is often recourse to abdominal CT and other advanced imaging to look for the cause. But the common causes remain the bladder, bowel and skin.

If the cause cannot be reversed quickly, the headache can be at least partly relieved by sitting the patient up in bed and giving him or her a 10 mg nifedipine capsule to chew on. If symptoms persist and the blood pressure remains high then intravenous beta blockers can be used in the high-dependency unit.

Most tetraplegic people are relatively hypotensive compared with the general population, owing to lack of sympathetic drive. Most will feel well with a systolic blood pressure of <100 mmHg. A reading of 150 mmHg, which might cause mild interest in able-bodied patients could be very high for a tetraplegic person, and the treating physician should relax only when the symptoms of dysreflexia have fully settled.

### *Skin*

Septicaemia from massive pressure sores was a common cause of death before modern SCI management, and pressure sores remain an important cause of morbidity. During rehabilitation in modern spinal centres all paralysed patients are taught how to look after their skin and, with careful attention, most patients avoid this complication. But pressure sores still occur through either negligence or carelessness on the part of the patient, the carers or hospital staff. The national burden of skin problems is high and not all patients can be accommodated through the spinal centres. When the community team is unable to provide enough care, or the GP is concerned about the patient's medical condition, many SCI patients will find themselves in their local hospitals under the care of medical or surgical consultants.

Pressure sores are caused by sustained pressure and shearing of damaged skin. The golden rule is to enforce complete bedrest and completely relieve pressure over the damaged area by regularly turning the patient. Pressure-relieving mattresses can be useful but are not a replacement for proper nursing care and do not obviate the need for turning. Patients with multiple sores may require treatment on an air-fluidised bed, which provides complete pressure relief. The patient must lie flat. Sitting in bed generates shear forces which will worsen sacral and ischial sores. Even a few minutes sitting in a chair can undo the healing of many days of bedrest. Prolonged bedrest is unbearably tedious for many patients but if they sit up their sores will rarely heal.

### *Medical management of pressure sores*

One of the most important roles of the physician is to support the nursing staff in enforcing bedrest, but the patient will often have related medical problems with malnutrition and chronic sepsis.

The vast majority of sores will heal with bedrest but a few patients will develop osteomyelitis or a fistula or sinus requiring formal surgical intervention. If the sore is faecally soiled, then a stoma can be life-saving and greatly eases the burden of nursing. Large pressure sores take months to heal and the discharge time-frame should be adjusted accordingly. Once healed, the patient should mobilise on a pressure-relieving cushion and should increase sitting time only by a few minutes daily. The local spinal injury centre can provide further advice.

### **Relationship with patients, carers and relatives**

Most people with an established cord injury will be expert in maintaining their body's functions. They, their carers and their relatives will be attuned to the way in which their body works and to the warning signs of common problems such as urinary tract infections or constipation. It may have taken the SCI person months or even years to establish a regular routine with stable bowel, bladder and skin care. The smallest disturbance might trigger bowel incontinence or a major pressure sore and, for these reasons, the SCI person is often loathe to change a routine without good reason. But SCI patients on a general ward still realise that they require help and will be very keen to explain to medical and nursing staff how their body should be handled. Their requests for specific nursing, such as bowel or skin care, should be respected by staff, because the paralysed body is extremely vulnerable to inexperienced handling.

### **Discharge**

Once the acute issue has resolved, most SCI patients will be safer at home than in hospital. Safe discharge may require reactivation of the patient's care package and should be anticipated several days or even weeks before the actual discharge date

### **Further reading**

The Clinical Standards Department of the Royal College of Physicians has produced detailed guidance on this topic. See [www.rcplondon.ac.uk/resources/concise-guidelines-chronic-spinal-cord-injury](http://www.rcplondon.ac.uk/resources/concise-guidelines-chronic-spinal-cord-injury).

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