ABC of Spinal Cord Injury

DAVID GRUNDY
ANDREW SWAIN
JOHN RUSSELL

EARLY MANAGEMENT AND COMPLICATIONS—II

The urinary tract

Encrustation of Foley catheter balloon.

After a severe spinal cord injury the bladder is initially acontractile. The volume of urine in the bladder should never be allowed to exceed 500 ml because overstretching of the detrusor muscle can delay the return of bladder function. If the patient is transferred to a spinal injuries unit within a few hours of injury it may be possible to defer catheterisation until then, but if the patient took a large volume of fluid before injury this is unwise. In these circumstances and in patients with multiple injuries the safest course is to pass a small bore (12-14 FG) 5 ml balloon latex, or preferably silicone, Foley catheter. In men this should be strapped to the anterior abdominal wall in the midline to produce a gentle curve of the urethra and thus minimise pressure on the posterior urethral wall, reducing the risk of periurethral abscess and fistula formation. In women the catheter is secured to the thigh.

A latex catheter must be changed weekly, though a silicone catheter may be left in situ for up to six weeks. A bladder washout with Suby-G solution (containing citric acid 3.23%) twice weekly is helpful in preventing stone encrustation on the balloon of the catheter. Encrustation is particularly likely to occur in the weeks after spinal cord injury because of hypercalciuria secondary to paralysis and immobility, but the small (5 ml) balloon minimises this risk. If encrustation forms on the balloon fragments tend to break off, producing "eggshell" calculi in the bladder, which may block the catheter and also predispose to urinary tract infection. With hypercalciuria bladder calculi may also occur even if an indwelling catheter is not being used. On admission to the spinal injuries unit intermittent urethral catheterisation or fine bore suprapubic catheterisation can be started.

With intermittent catheterisation the patient is normally catheterised every six hours, with a 12-14 FG Nelaton catheter, using a rigorously sterile technique. To prevent overdistension of the bladder fluids usually need to be restricted to 1500 ml in 24 hours until the patient starts voiding spontaneously. The great advantage of the suprapubic catheter is that fluid restriction is unnecessary; indeed, a high fluid intake should be maintained in an effort to reduce the incidence of infection and stone formation.

The gastrointestinal tract

The patient should receive intravenous fluids for at least the first 48 hours, as paralytic ileus usually accompanies a severe spinal injury. A nasogastric tube is not usually necessary if oral fluids are forbidden until normal bowel sounds return. If paralytic ileus becomes prolonged the abdominal distension splints the diaphragm and, particularly in the tetraplegic, this may precipitate a respiratory crisis if not relieved by nasogastric aspiration. If a tetraplegic vomits gastric contents are easily aspirated because the patient cannot cough effectively. Ileus may also be precipitated by an excessive lumbar lordosis if too bulky a lumbar pillow is used for thoracolumbar injuries.

Acute peptic ulceration, with haemorrhage or perforation, is an uncommon but dangerous complication after spinal cord injury. When it does occur perforation often presents a week after injury with referred pain to the shoulder, but during the stage of spinal shock, guarding and rigidity will be absent and tachycardia may not develop. A lateral decubitus abdominal film usually shows free gas in the peritoneal cavity.

The skin and pressure areas

Egerton-Stoke Mandeville turning bed to show mechanism for (left) supine position, (right) left lateral position.

Stryker frame.

When the patient is transferred from trolley to bed the whole of the back must be inspected for bruising, abrasions, or signs of pressure on the skin. The patient should be turned every two hours between supine and right and left lateral positions to prevent pressure sores, and the skin should be inspected at each turn. Manual turning can be achieved on a standard hospital bed, the patient being lifted by four people according to the method previously described and turned by a combination of lifting and "logrolling." Alternatively, the electrically driven Egerton-Stoke Mandeville bed can be used. Another convenient solution is the Stryker frame, in which the patient is "sandwiched" between anterior and posterior sections, which can then be turned between the supine and prone positions with the inbuilt circular turning mechanism, but tetraplegics may not tolerate the prone position.

Nursing care requires the use of pillows to separate the legs, maintain alignment of the spine, and prevent the formation of contractures. In injuries to the cervical spine a neck roll is used to maintain cervical lordosis. A lumbar pillow maintains lumbar lordosis in thoracolumbar injuries, but excessive lumbar lordosis may precipitate or aggravate paralytic ileus. Foot drop and equinus contracture are prevented by placing a vertical pillow between the foot of the bed and the soles of the feet.

Pillows:

- Protect against pressure sores
- Support the injury
- Maintain the spinal contour
- Help prevent contractures

Prophylaxis of thromboembolism

Anticoagulation

5000 Units subcutaneous heparin 8-12 hourly
and antiembolism stockings

or

Full anticoagulation with warfarin

The newly injured tetraplegic or paraplegic has a high risk of developing thromboembolic complications. The incidence of pulmonary embolism reaches a maximum in the third week after injury and is the commonest cause of death in patients who survive the period immediately following the injury.

If there are no head, chest, abdominal, or other injuries which may contraindicate anticoagulation then treatment should be started 24-36 hours after the accident. Prophylaxis of deep vein thrombosis and pulmonary embolism may be achieved either by administering 5000 units of subcutaneous heparin every 8 to 12 hours and applying antiembolism stockings or, preferably, by fully anticoagulating with warfarin.

Care of the joints and limbs

The joints must be passively moved through the full range each day to prevent stiffness in those joints which may later recover function and to prevent contractures, which may also interfere with rehabilitation. Splints to keep the tetraplegic hand in the position of function are particularly important. Early internal fixation of limb fractures is often indicated to assist nursing, particularly as pressure sores in anaesthetic areas may develop unnoticed in plaster casts.

Use of steroids and antibiotics

- Treat only established infections
- No prophylaxis except in cases of drowning
- Avoid emergence of resistant organisms particularly in respiratory and urinary tracts

When tetraplegia results from a diving accident and water has been aspirated there is a case for administering steroids and antibiotics to prevent the pulmonary complications seen after drowning. In other cases although steroids reduce spinal cord oedema, there is no evidence that they improve the neurological prognosis. Indeed, the risk of gastrointestinal stress ulceration is increased by steroid treatment. Similarly, prophylactic antibiotics are not normally indicated for the prevention of either urinary or pulmonary infection.

Transfer to a spinal injuries unit

As there are only 12 spinal injuries units in the United Kingdom, most patients will be admitted to a district general hospital for their initial treatment. As soon as spinal cord injury is diagnosed or suspected the nearest spinal injuries unit should be contacted. Immediate transfer is ideal, but this will depend on the general condition of the patient and also on the intensive care facilities available. Unfortunately, some patients will not be fit enough for immediate transfer because of multiple injuries or severe respiratory impairment. In such cases it is advisable to consult and perhaps arrange a visit by a spinal injuries consultant.

Transfer to a spinal injuries centre is most easily accomplished by means of a Stryker frame, which can be fitted with a constant tension device for skull traction. The RAF pattern turning frame is similarly equipped and has been specifically developed for use in air evacuation. Tetraplegics should be accompanied by a suitably experienced doctor, preferably an anaesthetist, who can quickly intubate the patient if severe respiratory difficulty ensues. Transfer by helicopter is often the ideal and is advisable if the patient has to travel a long distance. In Switzerland immediate helicopter transfer from the site of the injury to treatment at a national spinal injuries unit has been associated with an 80% reduction in overall mortality.

Mr D Grundy, FRCS, is consultant surgeon and Mr J Russell, FRCS, director Duke of Cornwall Spinal Treatment Centre, Odstock Hospital, Salisbury, and Mr A Swain, PHD, FRCS, is senior registrar in accident and emergency medicine, Charing Cross Hospital, London W6.

Top: this patient was transferred by helicopter to the Duke of Cornwall Spinal Treatment Centre using an RAF pattern turning frame. Below: the constant tension device.