Controversies in the management of traumatic spinal cord injury

Kate AJ Sansam

Kate AJ Sansam
MRCP, Specialist Registrar in Rehabilitation Medicine, Pinderfields General Hospital, Wakefield

This conference was held at the Royal College of Physicians on 29 November 2005 and was organised in association with the British Society of Rehabilitation Medicine

Clin Med 2006;**6**:202–4

A Royal College of Physicians (RCP) conference which makes the front page of the *Evening Standard*, with one of its key speakers (Professor Raisman) also a guest on Channel 4's *Richard & Judy* must be a success. However, the day did not only consider the potential methods to repair spinal cord injury (SCI) but also covered a variety of controversies in current practice.

Brief overview of spinal injuries

In the UK, the incidence of traumatic SCI is estimated to be 10–15 per one million people per year (data from SCI centres), with a prevalence of approximately 30,000–40,000 individuals. As SCI is a relatively rare condition and has specific medical complications, most healthcare professionals are unlikely to develop expertise in managing these patients. The UK has, therefore, developed specialised SCI centres. These provide medical care during the acute phase and offer lifelong follow-up, support and advice for patients, carers and other health professionals.

The case for surgical management in SCI

Mr Webb proposed that surgery should be performed for biomechanical reasons, ie to correct deformity and/or to stabilise an unstable injury. Surgery for unstable injuries allows early mobilisation and earlier discharge: patients with no neurological deficit can be discharged about 6 days after surgery, whereas they require several weeks of immobility if managed conservatively. For patients with a neurological deficit, there is no conclusive evidence to show that this deficit is improved by surgery. However, animal studies show that early decompression improves neurological outcome and suggest a window of opportunity in the first 4–6 hours. In the clinical setting, this is often not practical, therefore, surgery is performed at the earliest safe opportunity. Further studies in humans are required in order to establish an evidence base for the surgical management of SCI.

The case for conservative management in SCI

Mr El Masri agreed that surgery should be performed on those individuals with spinal column damage but without SCI in order to facilitate early discharge. He maintained, however, that only 10–15% of patients with SCI require surgery, and he reiterated the lack of compelling evidence that surgical intervention results in superior neurological outcome. The biomechanical instability of the spinal column can be equally well maintained by

Conference programme

- **Brief overview of spinal injuries: the nature of the beast** Mr Wagih El Masri, Midlands Centre for Spinal Injuries, Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry (conference co-organiser)
- **The case for surgical management in spinal cord injury (SCI)** Mr John Webb, University Hospital NHS Trust, Nottingham
- **The case for conservative management in SCI** Mr Wagih El Masri
- **The use of steroids for SCI** Dr Debbie Short, Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry
- **Repair of spinal cord injury by transplantation of olfactory ensheathing cells: imminent or already here?** Professor Geoffrey Raisman, Institute of Neurology, University College London
- **Do physicians miss autonomic dysreflexia?** Professor Christopher Mathias, Imperial College London
- **A framework for best practice at the interface between rehabilitation and the medico-legal process** Mr Grahame Codd, Irwin Mitchell, and Professor Michael Barnes – Interagency Working Group
- **Life expectancy should be normal in SCI** Professor Michael Barnes, Joint Specialty Committee for Rehabilitation Medicine, Royal College of Physicians (conference co-organiser)
- **Is renal failure avoidable? Bladder management in SCI** Professor Hans Frankel, National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury
- **Are pressure ulcers always preventable?** Professor Lindsay McLellan, University of Southampton

conservative measures, such as 4–6 weeks' bedrest followed by 4–6 weeks' mobilisation in a brace.

Surgery may cause hypoxia, hypotension and hypothermia, which could lead to further neurological damage. Surgery also entails additional risks such as infection and bleeding.

There is evidence to show that the majority of patients with clinically incomplete SCI managed conservatively will make a significant recovery, with 47–80% regaining the ability to walk, depending on the level and density of the lesion.[1] There is no such evidence for long-term outcome after surgical management.

The use of steroids for SCI

Some patients with acute SCI are treated with high-dose steroids in the hope that this will result in better neurological outcome. This practice was recommended by National Acute Spinal Cord Injury Studies (NASCIS) 2 and 3 and a Cochrane review performed by the lead investigator of these trials, Dr MB Bracken. However, as Dr Short explained, clinical efficacy is based only on the results of a small subgroup of patients in NASCIS 2, who received methylprednisolone within 8 hours of injury. Concerns regarding the quality of these data have been raised.

The Corticosteroid Randomisation after Significant Head Injury (CRASH) trial showed that high-dose methylprednisolone in the context of acute trauma resulted in a significant increase in mortality. Dr Short concluded that there was insufficient evidence to support the use of high-dose steroids in acute traumatic SCI and, indeed, that there was evidence that it may do harm.

Repair of SCI by transplantation of olfactory ensheathing cells: imminent or already here?

Loss of function after SCI is due almost entirely to damage to long-fibre pathways travelling between the brain and the spinal cord. When nerve fibres are cut they try to regenerate, but they require a glial pathway along which to grow. Transplantation of olfactory ensheathing cells (OECs) provides the fibres with such a pathway. These glial cells make up the pathway along which the olfactory nerve fibres travel through the skull floor and into the olfactory bulbs. When transplanted autologously 2 months after complete unilateral lesions of the upper cervical corticospinal tract in adult rats, these cells encourage the growth of the cut nerve fibres, suppress excessive neuromatous branching and act as a bridge between the cut ends of the tract. In the same way that OECs allow olfactory nerve fibres to enter the olfactory bulb, these cells, when transplanted, allow the regenerating nerve fibres to re-enter the spinal cord and to continue along the corticospinal tract. This results in restoration of climbing and respiratory function in the animals.

This method also has the potential to treat damage to spinal roots, auditory and optic nerves, and forms of stroke where loss of function is due principally to nerve fibre damage. Professor Raisman and his colleagues are hoping to commence human trials in this area of study in the near future.

Autonomic dysreflexia

Autonomic dysreflexia (AD) occurs in people with a SCI at or above T6 and results in hypertension, bradycardia and varied symptoms such as profuse sweating and headache. It can be triggered by stimuli to the viscera (eg urinary system, uterus), skeletal muscle (eg spasms) and skin (eg pressure ulcers) and by other miscellaneous stimuli, including bone fractures and surgery. With such a variety of causes, it may present to any health professional.

The exact mechanism of AD is unclear, but it is likely to involve multiple factors, including changes in the spinal reflex arc, lack of supraspinal control and increased responsiveness of organs to catecholamines after SCI. The observation that this response is not seen in people with SCI below T6 may be related to the large sympathetic outflow at T5/6.

AD is an important condition. Missing it can be devastating, as it can result in arrhythmias, myocardial failure, seizures, visual deficits, cerebral infarcts and haemorrhages and, potentially, death. The hypertension related to AD may contribute to the high rates of cardiovascular and cerebrovascular deaths seen in people with SCI.

The crucial component in treatment of AD is its recognition by patients and health professionals. Once recognised, a cause should be sought and rectified. This is most commonly related to the urinary tract, eg a blocked catheter. Drugs can be used if required, such as lidocaine to block the afferent signal, spinal anaesthetics, particularly during labour or surgery, or antihypertensive agents such as sublingual nifedipine or glyceryl trinitrate (GTN). Patients should be aware of the potential for medication to cause marked hypotension.

Most physicians are probably aware of AD, but some cases may be missed. As AD is a potentially fatal condition that can present to any specialty, it is important that patients and all health professionals, including nurses, therapists and complementary medical practitioners, are aware of it.

A framework for best practice at the interface between rehabilitation and the medico-legal process

Individuals who have sustained a traumatic injury such as SCI often seek some form of financial recompense. This may involve rehabilitation of professionals in the medico-legal process. A framework for best practice regarding this process is nearing completion. Its aim is to facilitate more open communication between rehabilitation professionals, lawyers and insurers. When finalised, this framework will provide a protocol of best practice to guide these inter-professional relationships, with the common objectives of optimising recovery, restoring quality of life and acting in the best interests of the claimant.

Life expectancy should be normal in SCI

Life expectancy after SCI has improved greatly in recent decades. This increase is due mainly to improvements in initial and first-

year survival, with less improvement in long-term survival. For patients living more than 18 months, predicted life expectancy is 70% of that of the background population in people with complete tetraplegia and 84% in those with complete paraplegia.[2]

Five years after SCI, the mortality rates from septicaemia, pneumonia, pulmonary embolus and heart disease are, respectively over 40, 13, eight and three times those of the background population.[3] Urinary problems, which previously were the leading cause of death in people with SCI, are now declining, but there is still a nine fold excess mortality. Worryingly, the incidence of suicide is twice as common in people with SCI compared with the general population and is increasing. All the major causes of death after longstanding SCI are, to some extent, preventable.

We should be aiming for life expectancy in people with SCI to approach that of the general population. This requires long-term review of individuals with ongoing therapy, medical and nursing support. Carers and professionals should be trained to be aware of potential physical and psychological problems in order that these may be treated early. Economic factors also need to be addressed, as people with low incomes (<$25,000 (equivalent to £14,500)) are nearly five times more likely to die than their better-off peers with SCI.[4]

Is renal failure avoidable? Bladder management in SCI

Renal failure used to be the leading cause of death (22.4%) in those individuals with SCI who survived the first 12 months.[5] In half of these deaths, amyloidosis was involved. This was attributed to chronic septic pressure ulcers with underlying osteomyelitis. Recently, deaths due to renal failure have more than halved (9.3%).[5] This reduction is likely to be due to a combination of factors:

- improved early management in specialised SCI centres in order to avoid formation of pressure ulcers and amyloidosis
- increased use of antibiotics and better catheters
- improved long-term bladder management, usually provided in the same SCI centre
- regular renal surveillance.

Various methods of bladder management are used in different centres. All aim to minimise infections and high bladder pressures. Surveillance methods vary, but all aim to detect and treat problems early, before the development of renal failure. Optimal surveillance methods and frequency have yet to be established.

With improved patient education, easy access to a SCI centre and appropriate surveillance, it may be possible to reduce renal failure further.

Are pressure ulcers always preventable?

Pressure ulcers are considered by some as a side effect of healthcare or specific conditions, but they are rarely inevitable. Most pressure ulcers are due to a deterioration in the individual's condition or to a situation change such as the use of an inappropriate mattress. Patients and their carers may not be aware that they are at increased risk in these circumstances. A pressure ulcer may be inevitable or excusable in the following circumstances:

- a patient who is terminally ill and is distressed by preventive measures
- unavoidable events during initial medical stabilisation
- sudden deterioration within the community before help is called
- a severely emaciated or obese patient
- the patient's beliefs and behaviours, precluding implementation of a prevention programme.

When a pressure ulcer is detected, the cause should be sought and rectified and provision made for prevention of ulcers in the future. Care pathways should identify patients at risk, and preventive guidelines, including patient and carer education, should be followed and audited.

Pressure ulcers generally are preventable. There are occasions when they are excusable because of overriding priorities. The development of a pressure ulcer may justify a legal claim of 'failure of care' if deemed avoidable. All SCI centres should already have preventive measures instituted and should audit these regularly in order to minimise pressure ulcer formation.

Conclusion

Individuals with SCI have specific medical needs, both acute and long-term. Although life expectancy has improved greatly in patients with SCI, there is still further room for improvement. Almost every aspect of the management of SCI is controversial, due in part to a lack of good-quality evidence. Further research is ongoing and, together with increased awareness and education of patients, carers and professionals, will enable us to improve life expectancy still further.

References

1 Figures from Mr El Masri based on Frankel HL, Hancock DO, Hyslop G, Melzak J *et al.* The value of postural reduction in initial management of closed injuries of the spine with paraplegia and tetraplegia. *Paraplegia* 1969;**7**:179–92.

2 Yeo JD, Walsh J, Rutkowski S, Soden R *et al.* Mortality following spinal cord injury. *Spinal Cord* 1998;**36**:329–36.

3 DeVivo MJ, Black KJ, Stover SL. Causes of death during the first 12 years after spinal cord injury. *Arch Phys Med Rehabil* 1993;**74**:248–54.

4 Krause JS. Accuracy of life expectancy estimates in life care plans: consideration of nonbiographical and noninjury factors. *Top Spinal Cord Inj Rehabil* 2002;**7**:59–68.

5 Frankel HL, Coll JR, Charlifue SW, Whiteneck GG *et al.* Long-term survival in spinal cord injury: a fifty year investigation. *Spinal Cord* 1998; **36**:266–74.