COMPLICATIONS

The only postoperative complication in this series was leakage of cerebrospinal fluid along the implanted cables to the receiver site on the chest wall. This occurred in two patients, and both were managed conservatively and successfully by rest, flat in bed, for two weeks.

Discussion

Six of the 12 patients were able to use the sacral anterior root stimulator to defecate without needing self stimulation of the rectum or manual evacuation. For all patients the time spent defecating each week fell significantly and, perhaps more importantly, constipation, which is common after spinal injury, was eradicated.

Patients with supraconal spinal cord lesions have an intact conus medullaris and cauda equina and hence normal sacral spinal reflexes. Consequently, these patients not only retain reflex erectile and detrusor activity but also can defecate reflexly by rectal stimulation with suppositories or stimulant solutions. Deafferentation of the sacral roots is done during implantation of the stimulator to treat urinary incontinence, and patients are no longer able to defecate reflexly and therefore have to perform manual evacuation. The sacral anterior root stimulator seems to deliver faeces to the rectum and patients who cannot defecate using the implant alone find manual evacuation more acceptable because it is usually both quicker and more controllable than the reflex method of evacuation.

The porridge stool test predicted most of the patients who would be able to defecate using the stimulator with chosen parameters and allowed final adjustments of the parameters to be made so that the chance of future defecation was optimised. Unfortunately, however, a positive test result was not a guarantee of successful defecation: three patients who evacuated the artificial stool were later unable to repeat this with normal faeces.

We found that setting the sacral anterior root stimulator for effective defecation is not simply a matter of using a standard set of parameters as has been

suggested.⁸ Recordings of lower colonic and anorectal pressures showed that responses to stimulation of both single and combinations of nerve roots vary. This agrees with the results of Varma *et al*⁸ and emphasises the importance of manometric recording during stimulation to optimise the possibility of future defecation.

We used an 18 cm manometry tube to measure anorectal and colonic pressure at six sites. In the future we plan to simplify this technique by using an 8 cm tube with one anal and one rectal pressure channel. If the results are acceptable it will be easy to modify our existing cystometry equipment so that bladder and bowel functions can be programmed at the same time. The ability of the sacral anterior root stimulator to produce defecation together with its effect on bladder and erectile function can considerably improve the quality of life for patients with spinal injuries.

The study was funded by the Medical Research Council.

- 1 Lapidus J, Dionko A, Silbert S. Clean intermittent self catheterisation in the treatment of urinary tract disease. *J Urol* 1972;49:523-6.
- 2 Brindley GS. Emptying the bladder by stimulating sacral ventral roots. *J Physiol (Paris)* 1973;237:15-6.
- 3 Brindley GS, Polkey CE, Rushton DN. Sacral anterior root stimulation for bladder control in paraplegics. *Paraplegia* 1982;20:365-81.
- 4 Cardozo L, Krishnan KR, Polkey CE, Rushton DN, Brindley GS. Urodynamic observations on patients with sacral anterior root stimulators. *Paraplegia* 1984;22:201-9.
- 5 Brindley GS. An implant to empty the bladder and close the urethra. *J Neurol Neurosurg Psychiatry* 1977;40:358-69.
- 6 Varma JS, Binnie NR, Smith AN, Creasy G, Edmond P. Differential effects of sacral anterior root stimulation on anal sphincter and colorectal motility in spinally injured man. *Br J Surg* 1986;73:478-82.
- 7 Brindley GS. The actions of the parasympathetic and sympathetic nerves in human micturition, erection and seminal emission and their restoration in paraplegic patients by implanted electrical stimulators: the Ferrier lecture 1986. *Proc R Soc Lond [Biol]* 1988;235:111-20.
- 8 Brindley GS, Polkey CE, Rushton DN. *The Finetech-Brindley bladder controller: notes for surgeons and physicians*. London: Maudsley Hospital, 1988.
- 9 Donaldson PEK. The Cooper cable: an implantable multiconductor cable for neurological prostheses. *Med Biol Eng Comput* 1983;21:371-4.
- 10 Brindley GS. Transmission of electrical stimuli along many independent channels through a fairly small area of intact skin. *J Physiol (Paris)* 1964;177:44-6.
- 11 Ivall T. Radioactivated implant for bladder control. *Wireless World* 1984;Jan:61-4.
- 12 Sun WM, Read NW, Donnelly TC. Impaired internal anal sphincter in a subgroup of patients with idiopathic fecal incontinence. *Gastroenterology* 1989;97:130-5.

(Accepted 3 April 1990)

Survey of patients taking topical medication at their first presentation to eye casualty

Sally A Buckley

Royal Berkshire Hospital,
Reading
Sally A Buckley, FCOPTH,
senior house officer

Br Med J 1990;300:1497-8

A large proportion of patients taking topical medication at their first presentation to eye casualty at the Royal Berkshire Hospital seemed to be suffering from adverse reactions to their drops. To assess the size of the problem I performed a prospective study.

Patients, methods, and results

From 15 November 1988 to 15 February 1989, 2186 new patients attended the eye casualty department, of whom 145 were already taking topical medication. These patients were asked to complete a questionnaire designed (on a yes/no basis) to elicit the original symptoms, the symptoms on presentation to the casualty department, eye medication, and length of treatment. When they had completed the questionnaire the casualty officer assessed the presenting complaint.

The table shows that toxic and allergic reactions to eye drops comprised the largest group of diagnoses (40)

among the 145 patients taking drops at presentation. Toxic reactions were characterised by persistent or worsening follicular conjunctivitis and corneal punctate epitheliopathy. Allergic reactions were mainly due to type IV hypersensitivity reactions—that is, contact dermatitis—characterised by pruritus with red puffy lids and conjunctival papillary reaction. A trial of 48 hours without treatment produced considerable symptomatic improvement in both groups.

Fifteen different drops were implicated, chloram-

Diagnoses made in eye casualty department in patients already taking eye drops, showing numbers of patients in each group and numbers using chloramphenicol on presentation

Diagnosis	No of patients	No taking chloramphenicol
Drop related toxic and allergic conjunctivitis	40	26
Iritis	17	10
Corneal abrasions and foreign bodies	14	9
Proved infective conjunctivitis	11	7
Blepharitis, chalazions, and styes	10	5
Episcleritis	10	7
Dendritic ulcers	8	6
Corneal ulcers and abscesses	7	5
Allergic/atopic conjunctivitis	5	1
Dry eyes	5	3
Others	18	13
Total	145	92

phenicol and gentamicin being the most common. The preservative benzalkonium chloride was present in many of these. Patients had been taking their medication for an average of nearly three weeks.

In 87 patients the original symptoms were characteristic of the diagnosis reached in the casualty department. General practitioners had tended to overdiagnose microbial conjunctivitis.

Comment

Forty patients (1.8%) seen over three months in an eye casualty department were suffering reactions to the drops prescribed for their original complaint. Nearly half these patients (and two thirds of the 145 taking drops on presentation to the casualty department) were taking chloramphenicol. This blanket use of chloramphenicol has been found by others^{1,2}: overall it is used in 55% of all red eyes seen by general practitioners.³

Simple examination techniques such as lid eversion, measurement of visual acuity, fluorescein staining, and assessment of pupillary reactions would aid differential diagnosis in most cases of red eye, but many general practitioners never use such techniques.¹ In this survey none of the eight dendritic ulcers and only half of the corneal abrasions were correctly identified, though fluorescein staining would have indicated the diagnosis.

Steroids should also be prescribed with caution for

red eyes. Two cases of dendritic ulcers had been diagnosed as iritis, a potentially serious mistake. Another patient presented with corneal abscess secondary to steroid treatment of a contact lens ulcer. Since a wrong diagnosis is made in 43% of patients for whom general practitioners prescribe steroids¹ these patients should be reviewed by an ophthalmologist before treatment is started.

Untreated simple bacterial conjunctivitis is a self limiting disease that resolves in about 10-14 days. Chloramphenicol controls up to 94% of ocular pathogens,⁴ so persistent symptoms should suggest an alternative diagnosis. Chloramphenicol itself distorts corneal epithelial microvilli, and benzalkonium chloride, present as a preservative in many eye drops, causes death and desquamation of the top layer of corneal cells,⁵ so toxic conjunctivitis must be considered in the differential diagnosis of non-resolving red eyes.

1 Wilson A. The red eye: a general practice survey. *J R Coll Gen Pract* 1987;37:62-4.

2 McDonnell PJ. How do general practitioners manage eye disease in the community? *Br J Ophthalmol* 1988;72:733-6.

3 Lavin MJ, Rose GE. Use of steroid eye drops in general practice. *Br Med J* 1986;292:1448-50.

4 Seal DV, Barrett SP, McGill JJ. Aetiology and treatment of acute bacterial infection of the external eye. *Br J Ophthalmol* 1982;66:357-60.

5 Pfister R, Burstein N. The effects of ophthalmic drugs, vehicles and preservatives on corneal epithelium; a scanning electron microscope study. *Invest Ophthalmol Vis Sci* 1976;15:246-59.

(Accepted 6 March 1990)

Respiratory problems of air travel in patients with spinal cord injuries

J M Armitage, A Pyne, S J Williams, H Frankel

ventilated for seven days. Subsequent rehabilitation was uneventful.

Cases 2-5—The table shows details of four other patients transferred to our unit by aeroplane who also developed respiratory problems soon after arrival.

Comment

The air in the cabins of aeroplanes is obtained from outside, where the water content is negligible because of the altitude and temperature. This dry air is completely changed about 20 times an hour in a modern aeroplane. Although the air mixes with the moist air exhaled by passengers, the water content is still very low. Humidification systems may not be used continuously during flights as the amount of water required is considerable and the added weight reduces the aeroplane's efficiency. Normally, inspired air is warmed and humidified by the nose and oropharynx, but in patients with a tracheostomy or endotracheal tube this mechanism is bypassed. In none of the cases we report were special arrangements made to humidify inspired air.

Prolonged inspiration of dry air thickens bronchial secretions and impairs ciliary function. Inspissation may lead to obstruction and pulmonary collapse if secretions are not cleared. In patients with cervical and high thoracic spinal lesions the abdominal and intercostal muscles are paralysed and the ability to cough and clear secretions is impaired.²

The minimum barometric pressure in commercial

Department of Chest Medicine, Stoke Mandeville Hospital, Aylesbury, Buckinghamshire HP21 8AL

J M Armitage, MRCP, registrar

A Pyne, MB, senior house officer

S J Williams, FRCP, consultant physician

National Spinal Injuries Centre, Stoke Mandeville Hospital
H Frankel, FRCP, consultant in spinal injuries

Correspondence to: Dr S J Williams.

Br Med J 1990;300:1498-9

Patients with cervical spinal cord injuries have severely reduced lung function.¹ These patients are often transferred shortly after injury to specialised centres for further management. This may entail journeys by aeroplane if they are injured abroad. We report on one patient and give details of four others with high spinal injuries recently admitted to this hospital who developed severe respiratory complications during or shortly after transfer by aeroplane.

Case reports

Case 1—A 42 year old man sustained a C6 lesion in a road traffic accident in Greece. Spontaneous respiration was adequate for 15 days. He then developed respiratory difficulties, and a tracheostomy was performed. The next day he was flown to England breathing spontaneously. On arrival in London he was severely dyspnoeic and had a respiratory arrest. He was ventilated and transferred to our unit. He required tracheal suction and physiotherapy to remove copious tenacious mucous plugs from his airway and was

Details of four patients with spinal injuries who experienced respiratory problems after transfer in aeroplane

Case No	Age (years)	Level of lesion	Flight time (h)	Ventilation during flight	Time after injury	Comments
2	65	C4	26	Intermittent positive pressure ventilation through tracheostomy	5 Months	On arrival was cyanosed and needed high inflation pressures. Thick mucous plugs removed. Rapid recovery
3	24	C4	5	Spontaneous respiration	2 Days	Severe dyspnoea and hypoxia on arrival, needing intermittent positive pressure ventilation. Lobar collapse owing to thick secretions
4	54	T7	3	Spontaneous respiration through tracheostomy	7 Months	Was hypoxic and unwell on arrival. Intensive physiotherapy and intermittent positive pressure ventilation for 5 days needed
5	69	T5	4	Spontaneous respiration through tracheostomy	6 Weeks	Had multiple injuries with flail chest. Was hypoxic with collapsed left lung on arrival, needing intermittent positive pressure ventilation for 7 days