or alternative non-steroidal anti-inflammatory drugs seems to be indicated.

- 1 Clive DM, Stoff JS. Renal syndromes associated with nonsteroidal anti-inflammatory drugs. *N Engl J Med* 1984;**310**:563-72.
- 2 Tan SY, Shapiro R, Franco R, Stockard H, Mulrow PJ. Indomethacin-induced prostaglandin inhibition with hyperkalemia. *Ann Intern Med* 1979;**90**:783-5.
- 3 Beroniade V, Corneille L, Haraoui B. Indomethacin induced inhibition of prostaglandins with hyperkalemia. *Ann Intern Med* 1979;**91**:499-500.
- 4 Goldszer RC, Coodley EL, Rosner MJ, Simons WM, Schwartz AB. Hyperkalemia associated with indomethacin. *Arch Intern Med* 1981;**141**:802-4.
- 5 Ciabattini G, Cinotti GA, Pierucci A, et al. Effects of sulindac and ibuprofen in patients with chronic glomerular disease. Evidence for the dependence of renal function on prostacyclin. *N Engl J Med* 1984;**310**:279-83.

(Accepted 29 March 1985)

Department of Medicine and Nephrology Service, Shaare Zedek Medical Center, Jerusalem, Israel

A ZIMRAN, MD, resident in medicine
M KRAMER, MD, resident in medicine
M PLASKIN, MD, consultant nephrologist
C HERSHKO, MD, professor of medicine

Correspondence to: Dr Hershko.

Chronic subdural haematoma: possible association with chronic granulocytic leukaemia in lymphoid transformation

Chronic subdural haematoma is a recognised complication of childhood acute lymphatic leukaemia.¹ We report on two adults with chronic granulocytic leukaemia who developed chronic subdural haematoma. Both were receiving maintenance treatment for acute lymphatic leukaemia, having previously undergone lymphoid transformation.

Case reports

Case 1—A 58 year old man presented in February 1983 with a four week history of vomiting, headaches, and focal epilepsy affecting the right side. Chronic granulocytic leukaemia with presence of the Philadelphia chromosome had been diagnosed in 1973. Lymphoid transformation had been diagnosed in 1978 and successfully treated with standard treatment for acute lymphatic leukaemia. In August 1982 he had developed a relapse in the central nervous system and was given treatment to induce remission of the acute lymphatic leukaemia, intrathecal methotrexate, and radiotherapy to the cranium (24 Gy (2400 rad)) and spine (12 Gy (1200 rad)). Maintenance treatment for acute lymphatic leukaemia had been restarted in November 1982. Computed tomography in February 1983 showed bilateral subdural haematomas overlying both cerebral hemispheres, the larger being on the left side. The left sided haematoma was surgically drained. He recovered completely and continued to receive maintenance treatment for acute lymphatic leukaemia.

Case 2—A 72 year old man presented in June 1984 with a six week history of headache and focal epilepsy affecting the left face and arm. Chronic granulocytic leukaemia with presence of the Philadelphia chromosome had been diagnosed in November 1982. He had developed lymphoid transformation in October 1983, and remission of acute lymphatic leukaemia had been successfully induced. Maintenance treatment had been started in January 1984. Prophylactic cranial radiotherapy (24 Gy (2400 rad)) and intrathecal methotrexate had been given in March 1984. Computed tomography in June 1984 showed small bilateral subdural haematomas. Subsequent scans showed gradual resolution, and surgical intervention was not necessary. He remained well and continued with maintenance treatment for acute lymphatic leukaemia.

Comment

Chronic subdural haematoma is a recognised complication of leukaemia and thrombocytopenia.² A particular association with childhood acute lymphatic leukaemia has been reported.¹ Our experience suggests that adults with acute lymphatic leukaemia or chronic granulocytic leukaemia in lymphoid transformation may also be at particular risk. The pathogenesis of this complication is probably multifactorial. Both of our patients had recently completed cranial or craniospinal radiotherapy with intrathecal methotrexate. Both had recently experienced prolonged periods of thrombocytopenia (two to four months) during the phase of treatment to induce remission of

their acute lymphatic leukaemia, though neither gave a history of head injury. Neither patient had abnormalities on computed tomography other than subdural haemorrhage, though a variety of abnormalities, some of which may predispose to chronic subdural haematoma, have been reported in children with acute lymphatic leukaemia who have completed prophylactic treatment of the central nervous system.³ Neither patient had evidence of leukaemia of the central nervous system at the time of presentation with chronic subdural haematoma, though one had previously been treated for disease of the central nervous system.

Lymphoid transformation in chronic granulocytic leukaemia has a more favourable outcome than myeloid or mixed cell transformation.⁴ Our patients also recovered completely from chronic subdural haematoma. Lumbar puncture is a dangerous investigation in patients with chronic subdural haematoma but was undertaken in both our patients at presentation because of clinical suspicion of infection of the central nervous system or leukaemic infiltration. We recommend that computed tomography should precede lumbar puncture in the investigation of neurological symptoms in patients with leukaemia who have previously undergone cranial radiotherapy.

- 1 Pitner SE, Johnson WW. Chronic subdural haematoma in childhood acute leukemia. *Cancer* 1973;**32**:185-90.
- 2 Brocklehurst G. Subdural haematoma. *Br J Hosp Med* 1982;**27**:170-4.
- 3 Peylan-Ramu N, Poplack DG, Pizzo PA, Adornato BT, Dichiro G. Abnormal CT scans of the brain in asymptomatic children with acute lymphoblastic leukemia after prophylactic treatment of the central nervous system with radiation and intrathecal chemotherapy. *N Engl J Med* 1978;**298**:815-8.
- 4 Muehleleck SD, McKenna RW, Arthur DC, Parkin JL, Brunning RD. Transformation of chronic myelogenous leukemia: clinical, morphologic and cytogenetic features. *Am J Clin Pathol* 1984;**82**:1-14.

(Accepted 12 April 1985)

Department of Haematology, North Middlesex Hospital, London N18 1QX

A B MEHTA, MRCP, MRCPATH, senior registrar
A RAHEMTULLA, MRCP, senior house officer
T O KUMARAN, MRCP, MRCPATH, consultant haematologist
G W MARSH, MD, FRCPATH, consultant haematologist

Correspondence to: Dr Mehta, Department of Haematology, Royal Postgraduate Medical School, Hammersmith Hospital, London W12 0HS.

Rejection of catheters

Although long term urinary catheterisation should be regarded as a last resort in the management of urinary incontinence, it is fairly common among elderly patients. Leakage, bypassing, and infection are common reasons for changing catheters.^{1,2} Rejection of the catheter, whereby it is apparently pulled out by the patient, has received little attention. We examined this problem.

Patients, methods, and results

We studied all long stay patients in seven wards of our geriatric unit who had had a catheter in place for more than three months. Each patient was assessed for degree of immobility, and mental function was tested using a 10 point memory questionnaire. Details about the catheter were recorded every two weeks for 16 weeks by interviewing ward staff and scrutinising nursing and medical records. Twenty five patients (21 women, four men; mean age 81.4 years) were studied. Nineteen were chairbound, and 22 scored less than five out of 10 on the memory questionnaire, indicating appreciable cognitive impairment.

During the study 181 catheters were changed. The mean number of changes per patient was 7.4 (range 2-17), and the average life of a catheter was only 16.2 days (range 7-60 days). Of the catheters changed, 100 were removed by nursing staff and 81 were rejected by the patients. Only four patients did not reject their catheters at all.

The 81 episodes of rejection could be divided into three groups. In 29 cases the catheter was found in the patient's hand or in an unusual place such as the bedside locker or under the pillow, suggesting that the patient had pulled it out. In 32 cases the catheter came out spontaneously, often while the patient was sitting on the commode, transferring position, or bathing. In some cases nurses observed the catheter being expelled with force from the patient's urogenital tract. In 20 cases the catheter was simply found in the patient's bed and the cause of rejection was undetermined.

Though catheters with small and large retaining balloons (range 5-30 ml) were rejected, rejection was particularly common in those with 5-10 ml balloon volumes, accounting for 56% of changes of catheters with balloons of this size. Most catheters with big balloons (20-30 ml) were changed for reasons such as leakage or blockage (71% of changes of catheters with balloons of this size). No relation between the diameter of the catheter (median 16, range 12-30 French gauge) and rejection was observed.

After eight episodes of rejection urethral bleeding occurred; in one case the associated septicaemia resulted in death.

Comment

Rejection of catheters is generally thought to be due to patients pulling out their catheters, but we found circumstantial evidence for this in only one third of cases. Some catheters with smaller balloons drop out spontaneously, perhaps owing to laxity of the pelvic floor or urethral dilatation caused by repeated catheterisation, and others are expelled forcibly, presumably owing to uninhibited contractions of the bladder. Urinary catheters may therefore drop out, be pushed out, or be pulled out.

The life expectancy of catheters in this group of patients suggests the type of catheter that should be used. We recommend cheaper latex catheters and think that expensive "long life" silicon catheters are inappropriate in most long stay patients.

Rejection of catheters is common in poorly mobile old people with cognitive impairment. It is associated with urethral trauma and may result in septicaemia. Long term catheterisation should therefore be considered only when other methods to promote continence and provide comfort have failed.³ Further work is needed to determine why some patients pull out their catheters and whether bladder stabilising drugs might reduce episodes of spontaneous rejection of catheters.

We thank Miss D Wood for help in preparing the manuscript.

- 1 Ferrie BJ, Glen ES, Hunter B. Long-term urethral catheter drainage. *Br Med J* 1979;ii:1046-7.
- 2 Brocklehurst JC, Brocklehurst S. The management of indwelling catheters. *Br J Urol* 1978;50:102-5.
- 3 Castleden CM, Duffin HM. Guidelines for controlling urinary incontinence without drugs or catheters. *Age Ageing* 1981;10:186-90.

(Accepted 29 April 1985)

Department of Medicine (Elderly), St James's University Hospital, Leeds LS9 7TF

P W BELFIELD, MRCP, tutor

J B YOUNG, MRCP, senior registrar

G P MULLEY, MRCP, consultant physician

Correspondence to: Dr P W Belfield.

Effects of aerobic exercise on depression: a controlled study

The purpose of the present study was to assess the antidepressive effect of systematic aerobic exercise in psychiatric patients in hospital.

Patients, methods, and results

We studied 43 patients with depression of both sexes, aged 17-60 (mean 40). They satisfied the criteria of the Diagnostic and Statistical Manual of Mental Disorders for major depression (single episode and recurrent). Psychotic patients and those with physical contraindications to exercise were excluded. All patients were receiving individual psychotherapy and occupational therapy and were in hospital throughout the study. Fourteen in the control group and nine in the training group were taking tricyclic antidepressants.

Patients were randomly allocated to a training group and a control group by block randomisation with respect to sex. For nine weeks the training group underwent a programme of systematic aerobic exercise consisting of one hour of training with an instructor three times a week at 50-70% of maximum aerobic capacity. The control group attended occupational therapy while the training group exercised, but otherwise the programme of treatment for the two groups was as similar as possible.

The effect variables (depression and physical condition) were registered at entry into the study and after three, six, and nine weeks. Depression was assessed with the Beck depression inventory¹ and the comprehensive psychopathological rating scale depression subscale² using a 10 cm visual analogue scale. Physical condition was assessed by ergometer bicycle testing, measuring maximum oxygen uptake according to Astrand's indirect method.³ A one sided Wilcoxon's rank sum test was used in the statistical analysis of mean differences between the groups. For patients who stopped treatment between weeks 6 and 9 their score at week 9 was taken as being the same as their score at week 6. The efficacy of treatment was regarded as the difference in variables at entry to the trial and at nine weeks.

Six patients dropped out of the study (four in the training group and two in the control group), but the withdrawals were not related to treatment. Thus 43 patients completed the study (24 in the training group and 19 in the control group). There were no significant differences between the groups in any of the variables at inclusion in the study. Mean reductions in the comprehensive psychopathological rating scale and Beck scores were significantly larger in the training group (both $p < 0.05$), and mean maximum oxygen uptake was significantly increased in the training group ($p < 0.001$). For all the items measured with the comprehensive psychopathological rating scale the mean reductions were larger in the training group.

For patients in the training group with a small increase in maximum oxygen uptake ($< 15\%$) the antidepressive effect was similar to that in the control group. Patients with a moderate (15-30%) or large ($> 30\%$) increase in maximum oxygen uptake experienced similar, larger antidepressive effects.

Mean Beck score and maximum oxygen uptake, with 95% confidence intervals.

Comment

The reduction in depression scores and the increase in maximum oxygen uptake were significantly larger in the training group. This corresponds with findings in mildly depressed patients who are not in hospital.^{4,5}

The scores at nine weeks were missing in only four patients (two in each treatment group), and thus taking the score at nine weeks to be the same as that at six weeks in these patients did not affect the results of this trial. The study suggests that a moderate increase in maximum oxygen uptake (15-30%) was sufficient to obtain an antidepressive effect from the training programme.

As studies on exercise and depression cannot be performed blind factors other than exercise might have contributed to the different results in the two groups. Such factors might be extra attention and the enthusiasm of the coach. We still conclude, however, that a training programme has a substantial antidepressive effect in psychiatric patients up to 60 years old in hospital.

This study was supported by CIBA-Geigy Pharma A/S, Norway.

- 1 Beck AT, Ward CH, Mendelson M, Mock J, Erbauch H. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;561-71.
- 2 Asberg M, Perris C, Schalling D, Sedvall G. The CPRS—development and applications of a psychiatric rating scale. *Acta Psychiatr Scand* 1978;suppl 271:1-27.
- 3 Astrand PO, Rodal K. *Textbook of work physiology*. New York: McGraw Hill, 1977.
- 4 Greist JH, Klein MH, Eischens RR, Faris J, Gurman AS, Morgan WP. Running as treatment of depression. *Compr Psychiatry* 1979;20:41-54.
- 5 Brown RS, Ramirez DE, Taub JM. The prescription of exercise for depression. *Physician and Sports Medicine* 1978 Dec;35-45.

(Accepted 4 April 1985)

Modum Bads Nervesanatorium, 3370 Vikersund, Norway

EGIL W MARTINSEN, MD, psychiatrist

A MEDHUS, MD, psychiatrist

L SANDVIK, MSC, statistician

Correspondence to: Dr Martinsen.