Clinical implications

- Indirect evidence has previously been available implicating enteroviruses in the aetiology of motor neurone disease
- Nucleic acid sequences specific for enterovirus were detected in the spinal cords of eight of 11 cases of sporadic motor neurone disease and one of two cases of putative familial motor neurone disease
- Sequences show a close relation to coxsackievirus B sequences
- No sequences were detected in samples from six matched controls
- Sequences derived from different parts of the spinal cord of the same subject were identical but they differ between individual subjects

Enterovirus sequences were not detected in control patients of a similar age and sex distribution to some motor neurone disease cases and from the same geographical area (or in one patient with antecedent poliomyelitis), although the prevalence of enterovirus infection would predict that these patients would have been infected with enteroviruses in the past. We conclude that detection of these enterovirus 5' untranslated region sequences in patients with motor neurone disease is evidence of persisting enterovirus infection in spinal cord tissue. The absence of infectious virus and the presumed long term infection suggests viral genomes in a state of restricted replication analogous to measles virus in subacute sclerosing panencephalitis.²³ Further characterisation of these sequences and possible pathogenic mechanisms are currently under investigation.

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Distal forearm fracture as risk factor for vertebral osteoporosis

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Fractures of the vertebral body and of the distal forearm are typical manifestations of type I or postmenopausal osteoporosis,¹ but the association between the two fractures in individual women is not clear. In type I osteoporosis vertebral fractures are associated with low bone mineral density of the lumbar spine, and the risk of vertebral fracture increases two to three times with each standard deviation decrease in bone mineral density.² We aimed to determine whether a fracture of the distal forearm in postmenopausal women indicated an increased risk of vertebral osteoporosis.

Patients, methods, and results

We identified 127 women aged 50 to 82 (mean 64.7 years) from records in the radiology department and

fracture clinic who had a fracture of the distal forearm within the previous three years (62% uptake); 375 women aged 50 to 85 years (mean 64.6 years) were randomly selected from three general practice populations in Sheffield (55% uptake). Twelve women with previous fractures of their distal forearm were excluded from the population based group. Bone mineral density of the lumbar spine was measured using dual energy x ray absorptiometry (Lunar DPX, Lunar Corporation, Madison, WI). Each subject gave informed consent and the study was approved by the ethics committee of this hospital. Differences in the bone mineral density of the lumbar spine were examined by comparing Z scores (normalised for age and weight and expressed as units of standard deviation from the expected value) using analysis of variance with Bonferroni correction. The slopes and intercepts of regression lines were compared using dummy variables according to the method of Kleinbaum and Kupper.³

We found no difference between the women with distal forearm fracture and the population based group with respect to age (mean 64.7 v 64.6 years), time since the menopause (17.0 v 17.9 years), height (mean 1.580 v 1.585 m), or weight (mean 65.3 v 66.0 kg). Bone

mineral density in the women with distal forearm fractures was lower after correction for age and weight than that in the population based controls (mean Z score -0.46 (95% confidence interval of the difference -0.63 to -0.29)). Bone mineral density in younger women with distal forearm fractures was lower than that in older women (ages 50 to 59, mean Z score -0.72 (-1.0 to -0.45); ages 60 to 69, -0.48 (-0.78 to -0.19); ages ≥ 70 , -0.11 (-0.41 to 0.9)). The figure shows the relation between bone mineral density and age in women with distal forearm fractures and the population based group. The intercepts ($P=0.001$) and slopes ($P=0.006$) of the regression lines were different.

Relation between bone mineral density of lumbar spine and age in women with fractures of distal forearm (■, ---; $r=0.04$, NS) and population based controls (○, —; $r=-0.24$, $P<0.0001$)

Comment

We found decreased bone mineral density of the lumbar spine in a group of women with fracture of the distal forearm, indicating an increased risk of vertebral fracture. This decrease was significant only in the younger women with distal forearm fracture. It was

notable that in the women with distal forearm fractures bone mineral density of the lumbar spine did not decrease with aging. This cross sectional design does not allow us to determine whether these subjects had low peak bone mass or had undergone accelerated bone loss.

The type I-type II classification of osteoporosis proposes that distal forearm fracture is a type I fracture. This may be an oversimplification. We found that in women under 60 distal forearm fracture is strongly associated with low bone mineral density of the lumbar spine, and in this case it may be appropriate to consider it a type I fracture. Owen *et al* found no association between distal forearm fracture in women under 60 and subsequent hip fracture, a classic type II fracture.⁴ We found that in older women, however, distal forearm fracture did not predict low bone mineral density of the lumbar spine, and Owen *et al* showed that the risk of hip fracture is doubled in women who sustain a distal forearm fracture after the age of 70. In older women distal forearm fracture may therefore be considered a type II fracture.

We concluded that it may be worth while to measure bone density in women with distal forearm fracture in the sixth decade since they seem to be at high risk of vertebral fracture.

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New method for measuring compliance with long term oxygen treatment

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Long term oxygen treatment used for at least 15 hours a day improves survival in patients with chronic obstructive lung disease and respiratory failure.^{1,2} In 1989 prescriptions for oxygen for use at home, particularly oxygen concentrators, cost the NHS £18 million, and the number of such prescriptions has been increasing.³ There has never, however, been a completely reliable method for measuring compliance with domiciliary oxygen treatment. The most common method uses a clock incorporated into the oxygen concentrator, but patients may take off their nasal cannulas, and leaving the concentrator and clock running, or they may run the machine without wearing the delivery system.

We developed a method to assess compliance that uses plastic electrodes connected to a small ($14.3 \times 9.0 \times 3.3$ cm), battery operated timing device. This "electrode timer" records the length of time that the nasal cannulas are in contact with the skin (figure); it contains a non-volatile memory that enables recording for up to three weeks. The aims of the present study

Electrode timer worn by patient receiving oxygen treatment. Plastic electrodes make contact with the patient's skin and connect to a portable recording device, which stores the data and cannot be read by the patient (published with permission)