The BMJ welcomes grand rounds from other hospitals.

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- 3 Derouin F, Devergie A, Auber P, Gluckman E, Bervais B, Garin YJF, et al. Toxoplasmosis in bone-marrow transplant recipients—report of seven cases and review. *Clin Infect Dis* 1992;15:267-70.
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- 7 Reece DE, Frei-Lahr DA, Sheperd JD, Dorvini-Zis K, Gascoyne RD, Graeb DA. Neurologic complications in allogeneic bone marrow transplant patients receiving cyclosporin. *Bone Marrow Transplant* 1991;8:393-401.
- 8 Apperley JF, Rice SJ, Hewitt P, Rhombos Y, Barbara J, Gabriel FG, et al. HIV infection due to a platelet transfusion after allogeneic bone marrow transplantation. *Eur J Haematol* 1987;39:185-9.
- 9 Gibson PE, Knowles WA, Hand JF, Bower DWG. Detection of JC virus DNA in the cerebrospinal fluid of patients with progressive multifocal leukoencephalopathy. *J Med Virol* 1993;39:278-81.

Lesson of the Week

Spontaneous fractures in children and adolescents with cerebral palsy

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Children and adolescents with cerebral palsy have a tendency to sustain spontaneous fractures

Children and adolescents with cerebral palsy, in addition to the motor disability, have other, associated disabilities: hearing and visual impairment, learning disabilities, failure to thrive in infancy and poor growth in childhood, and scoliosis. They are prone to dislocations, particularly dislocation of the hips. They also develop other contractures and deformities, which may need surgery.

We report on five children and adolescents who developed spontaneous fractures of long bones, an association which, as far as we are aware, is not recognised.

Subjects

The five subjects, aged 10 to 19 years (four male and one female) with various types of cerebral palsy, were resident pupils at Meldreth Manor School, run by the Spastics Society. All the subjects received regular physiotherapy at school and were looked after by trained and experienced care staff. The overall management is multidisciplinary. The subjects were all severely disabled, with little or no voluntary movement, and the four boys were severely hypertonic.

The care staff, nurses, and physiotherapists observed a change in the behaviour of these subjects, and during examination fracture was suspected. The fractures were confirmed radiologically in each case. The table shows the details of the subjects and the sites of the fractures. None of the subjects had a spiral fracture.

All the subjects were managed with plastering and immobilisation. The fractures healed rather quickly. Radiographs of other long bones did not show any

other fractures in any of the subjects; they showed generalised demineralisation and thinning of the bones and did not show rickets. Rickets due to a biochemical imbalance was ruled out in three subjects in whom concentrations of calcium, phosphorus, and alkaline phosphatase were determined.

Discussion

Spontaneous fractures are seen in children and adolescents with osteogenesis imperfecta, which is a disorder of bone formation, but are not common in those with Marfan's syndrome or other collagen disorders. Fractures are associated with osteoporosis because of fragile bones and with rickets and osteomalacia because of softening of the bones. We do not understand the mechanism of the fracture and quick healing of bones in children and adolescents with cerebral palsy. In our five subjects the bone matrix showed demineralisation in the x ray films, indicating osteoporosis. Osteoporosis is possibly due to the lack of strain on the bones because of the lack of physical activity. It is also interesting that children and adolescents with osteogenesis imperfecta do not fracture the long bone of their arms as they have some useful hand movements and are generally able to ride their own wheelchair and use computer switches.

In addition, children and adolescents with cerebral palsy have deficient muscle bulk and tend to develop contractures. They are also fairly immobile. Some have increased tone in some groups of muscles, and some have involuntary extensor spasms, which can also cause excessive muscle pull to some bones. We believe that spontaneous fractures are perhaps due to poor muscle support to the long bones and to the stresses on these bones. Bone requires appropriate strain for optimal maintenance of strength (strain is the slight deformation of a solid material in response to applied force).¹

It is important to recognise that children and adolescents with cerebral palsy have a tendency to sustain spontaneous fractures, particularly as such fractures may be confused with non-accidental injury or traumatic fractures. Particularly because failure to thrive is also common in children and adolescents with cerebral palsy the cause of a fracture should not always be attributed to injury.

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Details of five subjects* with cerebral palsy who sustained spontaneous fracture; site of fracture; and time taken for fracture to heal

Subject No	Age at fracture (years)	Type of cerebral palsy and associated disability	Site of fracture	Time taken for fracture to heal (weeks)
1	15	Athetoid dystonia	Femur, tibia, fibula	3
2	17	Spastic tetraplegia; visual impairment	Femur	3
3	16	Spastic tetraplegia, scoliosis, athetosis, dystonia	Femur	4
4	10	Spastic tetraplegia	Femur	4
5	19	Spastic tetraplegia	Femur	Not known

*All male except subject 1.

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