adrenoreceptors as its action can readily be reversed with conventional β blockers. Utilisation of a lipophilic domain in the area around the β receptor may lead to exoreceptor binding, which would then localise the drug near β adrenoreceptors.³⁰

We conclude that inhaled salmeterol is an effective treatment for nocturnal asthma at both 50 and 100 μ g twice daily, and that the 50 μ g dose also significantly improves objective sleep quality. Comparison of the efficacies of salmeterol and theophylline in treating nocturnal asthma is an important next step in determining the optimal treatment for asthmatic patients.

We thank Glaxo Group Research Limited for financial assistance; Miss Aileen Stuart, clinical research scientist, Glaxo Group Research Limited, for technical help; and Dr James Palmer, director of respiratory division, Glaxo Group Research Limited, for comments on the manuscript.

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(Accepted 1 November 1990)

"Vanishing" of vertebra in a patient with sickle cell haemoglobinopathy

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Br Med J 1990;301:1368-9

Sickle cell haemoglobinopathy is common in Nigeria, affecting 2-3% of children.^{1,2} There have been extensive reviews of radiology in patients with sickle cell haemoglobinopathy in Nigeria.³ Common radiological features in the spine include osteoporosis, osteolytic foci, biconvexity of the intervertebral disc spaces, and flattening of the vertebral bodies. To our knowledge the "vanishing" of a vertebral body has not been reported before in such patients.

Case report

A 15 year old Nigerian boy presented in July 1990 with a two year history of a swelling in the lower back. He had had several episodes of recurring ill health consisting of fever, bone pains, and occasional jaundice. He had also felt a mass in the left upper quadrant for more than 10 years. Two years earlier he had developed a painful swelling in the lower back, which increased in size over several weeks. This was associated with constipation and total loss of power in both legs. He had received orthodox medical and traditional medical consultations and had been bedridden for three

months. After admission to hospital, and treatment with oral paracetamol, pethidine injections, oral haematinics, and topical massages with methyl salicylate and other antirheumatic liniments he had gradually recovered use of both legs. There was no history of contact with a patient with tuberculosis, and he had no other features referable to tuberculosis; he had never been treated with antituberculous drugs.

On physical examination at presentation the patient was pale and mildly jaundiced with prognathism and prominent maxillary bones. His anterior abdominal wall showed numerous scarification marks. There was hepatosplenomegaly. The spine showed prominent gibbous at L3 level, with a slight tilt to the right. At this level there was a non-tender bony mass of 5 cm $\times$ 3 cm in the midline. The overlying skin showed three healed pressure ulcers, the right leg was weak (power 4/5), and his gait indicated slight scoliosis to the right and a slight limp of the right foot. The result of the straight leg raising test was positive for the right leg at 60°. The right hamstring muscles were tender to palpation. Sensation to touch and pain was intact. There was a left lateral malleolar ulcer, which was healing with paper thin re-epithelialisation.

Laboratory investigations disclosed anaemia (haemoglobin 87 g/l), an erythrocyte sedimentation rate of 113 mm in the first hour, genotype SS, and a Mantoux test result of 10 mm. Results of liver function tests and serum electrolyte, urea, and creatinine concentrations were normal. Chest and skull radiographs were normal except for coarse trabeculation of the ribs. Plain abdominal radiographs showed multiple faceted gall stones. Spinal radiographs showed diffusely generalised osteoporosis, trabeculation, and pencil

Left: Oblique view of lumbar spine showing L1, L2, L4, and L5 vertebrae with vestiges of posterior elements of L3 (arrowed). Note codfish appearance of L2, L4, and L5. Right: lateral view of lumbar spine showing narrowing of disc spaces of T12 and L1 and kyphosis between L2 and L4, pseudo-Schmorl's nodes at upper and lower surfaces of T12, and bridging antero-lateral osteophytes between L2 and L4. Only vestiges of posterior elements of L3 body are present (arrowed)

thinning of vertebrae. There was anterior wedging of the L2; narrowing of T12-L1, L1-L2, and L5-S1 disc spaces; and codfish appearance of L2, L4, and L5. Pseudo-Schmorl's nodes were seen in T11 and both upper and lower surfaces of T12. Bridging anterolateral osteophytes were seen between L2 and L4. Most impressively, there was a complete effacement of L3, with only vestiges of the posterior elements remaining (figure).

The patient, who presented with mild painful crisis, received analgesics and antimalarial drugs and was discharged taking folic acid, multivitamins, and malarial prophylactic drugs. Surgical opinion on the gall stones favoured non-intervention as they were not causing symptoms. He was referred back to the consultant medical outpatient clinic.

Comment

To our knowledge our patient is the first patient with sickle cell haemoglobinopathy with such ubiquity and range of radiological changes. The pathology of the radiological features is based on infarction after anoxia, with or without secondary infection, giving osteomyelitis and marrow hyperplasia after recurrent haemolysis and the resulting anaemia.^{3,4} As our patient recovered from his paraplegia after receiving only analgesics, haematinics, and antirheumatic treatment and without antituberculous treatment, it is unlikely that he had had tuberculosis of the spine. The vanishing of the vertebra, spondylitis, pseudo-Schmorl's nodes, and narrowed disc spaces may possibly be explained on the basis of vasco-occlusive infarction, secondary infection, compressive forces along the spine, and reactive bone responses.

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(Accepted 27 September 1990)

Colour coded duplex sonography in suspected deep vein thrombosis of the leg

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Br Med J 1990;301:1369-70

Clinical diagnosis of deep vein thrombosis of the leg is inaccurate.^{1,2} Venography is the most reliable method of diagnosis, but it has several disadvantages in that it is invasive, painful, and expensive; may induce phlebitis, thrombosis, and allergic reactions; and cannot be done in patients with severe heart or renal failure or in pregnant women.³ Many non-invasive diagnostic methods have therefore been developed in the past decade. Of these only duplex sonography has comparable accuracy.

We report the results of a prospective study in patients with suspected deep vein thrombosis evaluated by both colour coded Doppler sonography and venography.

Patients, methods, and results

We studied 97 inpatients and outpatients (mean (SD) age 68 (17) years) with clinically suspected deep vein thrombosis. Twelve postoperative inpatients had been given anticoagulant drugs for one to six days. The other 85 patients had started receiving intravenous heparin after admission. In all patients colour coded duplex sonography and venography were performed

within 24 hours. Sonography was performed with a 5 MHz phased array transducer. The femoral and popliteal veins were examined with the patient in a supine position. The calf veins were not investigated.

We assessed the compressibility of the vein by pressing the transducer on it in a transverse section; the phasicity of flow during deep inspiration and expiration; and whether there was an echogenic thrombus. Five patients underwent both procedures on both legs. Sonography and venography were performed and the results interpreted independently by different investigators in the cardiovascular and radiology units respectively. For sonography the diagnostic criteria for deep vein thrombosis were incompressibility of the vein, absence of flow phasicity, and presence of an echogenic thrombus. Venography was performed and interpreted according to Rabinov and Paulin.⁴

The table gives the results. In addition, eight patients were diagnosed as having isolated calf vein thrombosis on venography. In one of these there was absent flow phasicity in the popliteal vein, but in the remaining seven the diagnosis could not be made on sonography.

Comment

As deep vein thrombosis cannot be diagnosed accurately by clinical examination alone and venography is invasive and sometimes contraindicated a reliable non-invasive method is needed to confirm the diagnosis and indicate treatment with oral anticoagulant or even thrombolytic drugs. A recently developed technique, colour coded duplex sonography,