"normal cycling." The other injuries followed various stunts, including cycling up ramps (three) or performing specific BMX tricks such as "aerials," "jumps," "American bunny hops," "endos," "wheelies," and so on. No biker had received any supervised training in BMX riding or the correct performance of stunts. Only one boy was known to be wearing any protective clothing (a helmet and elbow pads) and he was riding his bike on a recognised BMX track. No injuries occurred as a result of mechanical failure of a bicycle.

Comment

BMX biking has been made popular by television, and many children in the United Kingdom now possess these bikes. Nevertheless, our small survey suggests that few wear or possess the correct safety equipment. The handlebars of a BMX bike are free to rotate through 360° so that when the front wheel hits an obstruction the rider may be projected forwards and upwards and this may lead to scrotal and perineal injuries.[1 2] The most serious injury we have seen (trauma to the liver) was caused by the rider being thrown up and landing on the handlebars.

By chance, we saw no serious injuries during the course of our survey, but in the next two weeks three boys were admitted with facial lacerations for suture under general anaesthetic after BMX trauma and one child suffered a fractured tibia and ipsilateral displaced epiphyseal ankle fracture.

We believe that the epidemic of BMX bike injuries has been underreported. Both parents and children appear to be unaware of the potential dangers and are ignoring reasonable safety measures.

1 Sparnon T, Moretti K, Sach RP. BMX handlebar—a threat to manhood? *Med J Aust* 1982;2:587-8.
2 Burke AM. A serious BMX bike injury. *Med J Aust* 1982;2:263.

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Increased storage of iron and anaemia in rheumatoid arthritis: usefulness of desferrioxamine

Hyposideraemic anaemia is a common symptom of rheumatoid arthritis[1 2] similar to iron deficiency anaemia, with normal or low iron binding capacity and increased stores of iron. Iron accumulates in the reticuloendothelial system as Fe^{+++} bound to ferritin and is therefore not available for erythropoiesis.[3]

The aim of this study was to ascertain whether the hyposideraemia in patients with rheumatoid arthritis is related to increased stores of iron and whether the depletion of stored iron that results from treatment with desferrioxamine restores the iron available for erythropoiesis.

Patients, methods, and results

We studied 63 patients (56 women, seven men) aged 23-74 with classic rheumatoid arthritis. All were being treated with non-steroidal anti-inflammatory drugs and gold salts. Twenty two were normosideraemic and 41 hyposideraemic; age distributions in the two groups were similar.

We tested 21 hyposideraemic and 20 normosideraemic patients with an intramuscular injection of desferrioxamine 1 g. The erythrocyte count, mean corpuscular volume, haemoglobin and serum iron and ferritin concentrations, unsaturated iron binding capacity, and urinary iron excretion were assessed before and 24 hours and 14 days after the test. The erythrocyte count, mean corpuscular volume, and haemoglobin concentration were also measured after seven days. The table compares the results.

Before the test serum iron concentrations and unsaturated iron binding capacity were significantly lower ($p < 0.01$) in hyposideraemic patients. Serum ferritin concentrations were above the normal range in eight (38%) of hyposideraemic and four (20%) normosideraemic patients, although the difference was not significant. Haemoglobin concentrations were significantly higher ($p < 0.05$) and the erythrocyte sedimentation rate significantly lower ($p < 0.01$) in normosideraemic than hyposideraemic patients.

In hyposideraemic patients serum ferritin concentrations had fallen significantly and serum iron concentrations and urinary iron excretion had risen significantly 24 hours after administration of the drug. Unsaturated iron binding capacity did not change appreciably, and haemoglobin concentration showed an increase only seven days after the desferrioxamine load in hyposideraemic patients, with no further change after 14 days. The total erythrocyte count remained unchanged, but the mean corpuscular volume increased significantly in hyposideraemic patients. The erythrocyte sedimentation rate did not decrease significantly in hyposideraemic or normosideraemic subjects after the desferrioxamine load. Urinary iron was increased in normosideraemic patients and significantly increased in hyposideraemic patients after the test.

Comment

Of our patients with rheumatoid arthritis, 65% (41/63) were hyposideraemic. The pattern of anaemia consisted of low haemoglobin and serum iron concentrations and unsaturated iron binding capacity and high serum ferritin concentrations. Erythrocyte sedimentation rates were significantly higher in patients who had anaemia. The rise in serum ferritin concentration in these patients suggests that the accumulation of iron in the reticuloendothelial system may play a part in determining the hyposideraemic anaemia. This finding does not necessarily reflect raised stores of iron in tissue as ferritin is an acute phase reactant related to the activity of rheumatoid arthritis.[4] The increased urinary iron after a single dose of desferrioxamine, however, confirmed an increased storage of iron in normosideraemic and, particularly, hyposideraemic patients with rheumatoid arthritis. The desferrioxamine test showed that iron is released from its storage and haemoglobin and serum iron concentrations increase significantly.

These findings seem to confirm that an increased uptake and a decreased release of iron from the inflamed synovial membrane may contribute to the occurrence of anaemia in patients with rheumatoid arthritis and suggest that treatment with iron may increase its storage and make the inflammation worse.[4] Iron deposits in synovial membrane may promote damage, probably through the production of oxygen free radicals and the release of lysosomal enzymes.[5] Our preliminary data suggest the possible usefulness of desferrioxamine to treat rheumatoid arthritis by removing iron from synovial membrane, decreasing synovial inflammation, restoring stores in bone marrow, and lessening anaemia.

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Mean (SEM) haematological variables in hyposideraemic and normosideraemic patients with rheumatoid arthritis before and after testing with a desferrioxamine load and 14 days later

	Hyposideraemic patients (n = 21)			Normosideraemic patients (n = 20)		
	Before load	After load	After 14 days	Before load	After load	After 14 days
Erythrocytes ($\times 10^{12}$/l)	3·6 (0·8)	3·7 (0·5)	3·8 (0·4)	4·3 (1·1)	4·6 (0·9)	4·8 (1·2)
Mean corpuscular volume (fl)	71 (6)	79 (8)†	81 (11)*	85 (5)	84 (9)†	85 (7)
Haemoglobin (g/dl)	10·9 (1·2)	12·9 (1·18)†	12·7 (1·5)*	12·2 (1·5)	12·5 (2)†	12·7 (1·9)
Serum iron (μmol/l)	6·12 (0·34)	10·54 (0·87)***	10·92 (1·06)***	13·96 (2·15)	14·66 (2·51)	14·14 (1·86)
Serum ferritin (μg/l)	1·84 (0·32)	0·96 (0·17)***	0·88 (0·15)***	0·94 (0·99)	0·90 (0·86)	0·83 (0·74)
Unsaturated iron binding capacity (μmol/l)	48·9 (2·6)	51·8 (2·7)	50·3 (3·7)	50·7 (2·9)	51·9 (2·3)	52·8 (4·7)
Urinary iron (μg/24 h)	29·7	596·8**		41	302·5**	
Range	10-160	60-1224		10-160	60-520	
Erythrocyte sedimentation rate (mm in 1st h)	60 (23)	55 (12)	56 (11)	32 (20)	30 (14·2)	27 (13·5)

*p = 0·05, **p = 0·02, ***p = 0·01. All other values not significant.
†Values obtained after seven days.
Conversion: SI to traditional units—Iron and unsaturated iron binding capacity: 1 μmol/l ≈ 0·18 μg/100 ml.

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Thrombocytopenia induced by nalidixic acid

Over the years the Netherlands Centre for Monitoring of Adverse Reactions to Drugs has received six case reports on patients with profound but transient thrombocytopenia probably induced by nalidixic acid (Negram, Mictral). The table gives the details of these patients.

Cases

Characteristically thrombocytopenia developed within 10 to 15 days of treatment with nalidixic acid, 4 g daily, and rapidly recovered after stopping the drug (table). All patients had platelet counts below 30×10^9/l and serious impairment of blood coagulation, haemorrhagic symptoms being recorded in five. In one case immediate relapse of thrombocytopenia on rechallenge with a single dose of 1 g nalidixic acid provided the proof for a causal relation. One patient concomitantly had a generalised rash. The bone marrow was studied in two patients and showed active megakaryopoiesis.

Comment

Case observations on patients with thrombocytopenia induced by nalidixic acid do not appear to have been described. The rare occurrence of thrombocytopenia is, however, briefly mentioned in the data sheet on Negram (in the Netherlands, but not in Britain) and in the sixth edition of *The Pharmacological Basis of Therapeutics*.[1] According to a report from the Australian Drug Evaluation Committee three cases of thrombocytopenia suspected to be induced by nalidixic acid were reported there during 1964-71.[2] The Committee on the Safety of Medicines has been notified of eight similar cases (J C P Weber, personal communication, 1984).

Apart from the positive result on rechallenge in one patient, several observations suggest a causal relation with nalidixic acid—in particular the rapid and complete recovery when the drug was discontinued. In two patients underlying disturbances of haematopoieses were excluded by examination of bone marrow. Urinary tract infections are not known to be associated with thrombocytopenia. No other suspected drugs than nalidixic acid were known to have been used. Although no specific tests were done, the induction time of 10 to 15 days, the rapid recovery, the active bone marrow, and the concomitant rash in one patient are consistent with an allergic reaction resulting in peripheral destruction of platelets. Nalidixic acid is excreted mainly by the kidneys, and it may be relevant that five of these patients were over 65 and that two of them had clearly impaired renal function.

It is concluded that the use of nalidixic acid is associated with the risk of developing sudden and severe thrombocytopenia. Although this reaction seems to be rare, there may have been considerable underreporting. The notification of similar occurrences to national drug authorities is recommended.

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Early onset scoliosis: a call for awareness

School screening programmes, carried out routinely in the United States and established in a few centres in the United Kingdom,[2] have identified many children with spinal deformities. These deformities, however, are generally mild curves, and controversy exists about the need for their detection. A report by the British Orthopaedic Association and the British Scoliosis Society concluded that more data are required before school screening throughout the United Kingdom can be recommended.[3] If school screening is to be adopted children at special risk need to be identified. I therefore reviewed all patients with infantile idiopathic scoliosis or congenital scoliosis who had attended a regional scoliosis service to see whether diagnosis had been delayed and the appropriate advice or treatment offered.

Patients, methods, and results

I reviewed the case records and radiographs of 139 patients seen during 1976-83. Thirty nine had progressive infantile idiopathic curves and 100 congenital curves, representing 8% and 21% respectively of all new referrals. Ages at diagnosis, at referral for specialist advice, and at referral to the scoliosis clinic were recorded. The circumstances of diagnosis and subsequent management were noted. The severity of curvature was measured from the first available radiograph and from radiographs taken at the initial visit to the scoliosis clinic.

The table shows the results. In both groups a delay of over five years occurred between initial diagnosis and referral to the scoliosis service. Accepting that informed advice is needed when a curve is 40° or more in a child aged over 2, then in 21 children with idiopathic curves the delay was excessive. In 16 of these the diagnosis was made by a parent, in three by a

Details of patients with reactions to nalidixic acid

Case No	Age and sex	Daily dose of nalidixic acid (g)	Other drugs	Platelet count ($\times 10^9$/l)	Complications	Time relation*		Other factors
						Interval	Course	
1	53 F	4	Sodium bicarbonate	16	Petechiae, epistaxis, vaginal bleeding	10 days	5 days	Impaired renal function, serum creatinine 370 μmol/l (4·2 mg/100 ml)
2	91 M	4		6	Bleeding time over 15 minutes	14 days	5 days	Renal insufficiency, serum creatinine 625 μmol/l (7·1 mg/100 ml), rash
3	75 F	4	Digoxin	27	Petechiae	15 days	About 6 days	Treated with prednisolone; sternum puncture: active megakaryopoiesis
4	66 F	4		7	Ecchymosis	3 days	1 week	Relapse of thrombocytopenia 32×10^9/l on rechallenge with 1 g nalidixic acid
5	73 F	4	Insulin	9	Purpura	12 days	5 days	
6	81 F	4		6	Ecchymosis	12 days	4 days	Sternum puncture: active megakaryopoiesis, increased number of plasma cells. After recovery: normal bone marrow

*Interval = interval between starting nalidixic acid and development or discovery of thrombocytopenia. Course = interval between stopping nalidixic acid and recovery of thrombocytopenia.