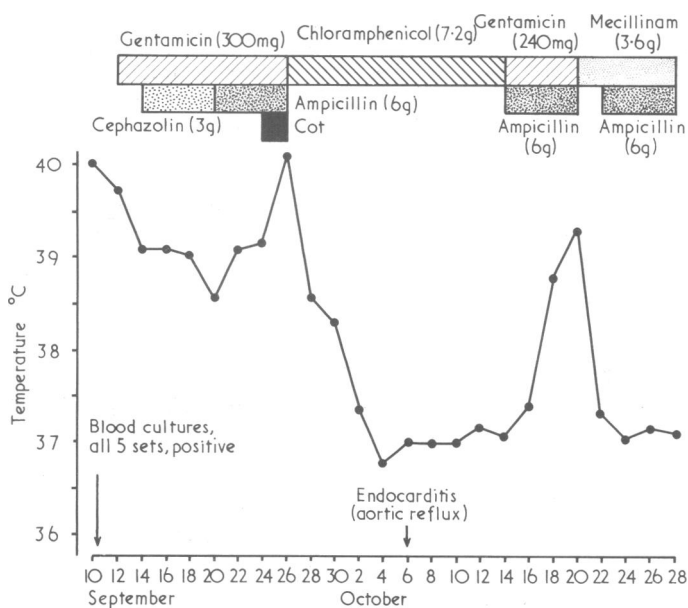


"normal." No murmurs were heard and there was no clubbing, splinter haemorrhages or splenomegaly. Thus, at this stage there was no clear evidence that the heart was infected. The haemoglobin on admission was 12.5 g/dl, WBC $5.9 \cdot 10^9/l$ (5500/mm³), ESR 68 mm in the first hour, and blood urea 5.6 mmol/l (34 mg/100 ml). Blood, faeces, and urine cultures all yielded a growth of *S. enteritidis* sensitive to cephalosporins, ampicillin, tetracycline, gentamicin, trimethoprim, sulphonamides, chloramphenicol, and, on later testing, mecillinam (FL 1060).

Many antibiotics were given without clinical response (see figure). As his general condition was worsening chloramphenicol was started. This was followed by a prompt clinical improvement and he became afebrile. Nevertheless, an early diastolic murmur was noted on 3 October and signs of rapidly increasing aortic reflux appeared over the next few days. Endocarditis was now diagnosed. Replacement of the prosthetic valve was considered necessary, but surgery postponed because the patient developed bone marrow depression with a low platelet count. Chloramphenicol was stopped; blood and platelet transfusions were given. The fever recurred and mecillinam was started on 21 October. This was followed by a fall in the temperature.



Effects of antibiotics on the course of *Salmonella enteritidis* infection. Cot Cotrimoxazole, four tablets daily. Figures in parentheses indicate intravenous daily dosage of the drug, changes of which are explained in the text.

Ampicillin was added two days later as there was in-vitro evidence of synergy between mecillinam and ampicillin against the salmonella. On this combination of antibiotics the patient remained afebrile, the bone marrow depression gradually resolved, and open heart surgery was performed on 28 October.

At operation infected granulations were observed on the struts and sewing ring of the Starr-Edwards valve. A large false aneurysm was also present posterior to the prosthetic valve suture line and this contained a mass of infected clot. The valve and clot were removed and an aortic Björk-Shiley valve inserted; but the patient died without regaining consciousness. The excised Starr-Edwards valve was cultured in nutrient broth containing serum and *S. enteritidis* was isolated.

Comment

There are only two reports, both from America, of *S. enteritidis* endocarditis. The first is mentioned in a review of 7779 patients with salmonella infection.¹ The second describes "probable" salmonella endocarditis affecting a prosthetic mitral valve.² In our case *S. enteritidis* was isolated from the prosthetic valve and so endocarditis due to this organism was proved. The source was clearly food poisoning.

Salmonella endocarditis is difficult to treat successfully with antibiotics alone, and there is a high mortality rate. The only antibiotics associated with a clinical improvement in our case were chloramphenicol and mecillinam. Chloramphenicol may improve the patient's general condition but it cannot be expected to cure endocarditis since it is only bacteriostatic. Furthermore, it may cause bone marrow depression and thus make surgery difficult.

Mecillinam is a new beta-lactam antibiotic with great anti-salmonella activity.³ Before our case it had not been used in treating salmonella endocarditis and it clearly requires further evaluation. Although our patient died, we conclude that a combination of mecillinam and ampicillin and removal of the infected valve should be considered very early in the disease.

¹ Saphra, I, and Winter, J W, *New England Journal of Medicine*, 1957, **256**, 1128.

² Yamamoto, N, et al, *Surgery*, 1974, **76**, 678.

³ Reeves, D S, Wise, R, and Bywater, M J, *Journal of Antimicrobial Chemotherapy*, 1975, **1**, 337.

⁴ Williams, J D, et al, *Journal of Antimicrobial Chemotherapy*, 1976, **2**, 61.

(Accepted 12 November 1976)

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Bicycle injuries in children

In the mid nineteen-sixties a new type of children's bicycle was introduced in the United States. This high rise bicycle with a smaller front wheel than back, high wide handlebars, and a long seat was immediately popular. This popularity was repeated when high rise bicycles were introduced into Great Britain somewhat later. In 1968 Howell¹ expressed doubt whether these bicycles were as safe as the ordinary type; nevertheless, Waller² did not find any difference in the accident rate between them. Craft³ found that abrasions, fractures, and head injuries were significantly more common with high rise bicycles. Because of this conflicting evidence we undertook a study comparing the pattern of bicycle ownership in (a) children who were admitted to hospital or died; and (b) the community.

Methods and results

We obtained information on children from the ages of 5 to 12 years who were admitted to hospital or died in South Glamorgan after bicycle accidents over the period May 1974-April 1975. We asked the children's parents the type of bicycle involved, if it was borrowed or not, and how long it had been owned. We also noted the type of injury sustained and any sequelae. We estimated the pattern of bicycle ownership among children in South Glamorgan by visiting infant, junior, and comprehensive schools, in representative areas in the county. Children were visited in the classroom, and, if they owned a bicycle, were asked whether it had equal size wheels or not.

Fifty-six children (41 boys and 15 girls) were admitted after bicycle injuries in the period in question. In addition two boys were killed (who were riding ordinary bicycles). The data on these children and the controls are shown in the table.

Of the injured children, 45% were riding high rise cycles compared with 25% of controls. This difference is significant ($P < 0.003$) and remains so after adjustment for age and sex differences ($P < 0.03$). Injuries were commoner in boys than girls ($P < 0.02$) and in younger children than older children (NS). High rise cycles were used more often by boys ($P < 0.001$), and by older children (NS, $0.05 < P < 0.1$). Most of the children (21 on ordinary bicycles, 24 on high rise) were admitted with head injuries and concussion. All but three had facial abrasions, and 26 had body abrasions in

Bicycle injuries in children

	Injuries		Controls	
	Ordinary	High rise	Ordinary	High rise
Boys 5-8	12	9	94	36
9-12	12	10	131	73
Girls 5-8	5	3	112	21
9-12	3	4	106	20
Total	32	26	443	150

addition. Seven of the nine fractures were sustained on high rise cycles. This proportion does not differ significantly from the proportion in the rest of the injured series ($0.05 < P < 0.1$) but does differ from the proportion in controls ($P < 0.002$). Four children had genital injuries, four had significant dental injuries, and two had splenic injuries.

Of the 58 accidents, 24 took place on borrowed bicycles, six on bicycles owned less than three months and 28 on bicycles owned more than three months. The proportion of ordinary to high rise bicycles in these groups did not differ significantly.

Discussion

Our study seems to reinforce the view that high rise bicycles are less safe than those of the conventional design. Nevertheless, clearly other factors are implicated in bicycle accidents in children. Unfamiliarity with the machine seems to be important, as over half the accidents occurred on bicycles which had been either borrowed or owned less than three months. As in other studies, many more boys than girls were affected, and this suggests that personality and patterns of play may be important.

The two children who died were both riding machines of conventional design and were in collision with lorries. Craft³ suggested that high rise machines are no more liable to accidents involving another vehicle than conventional bicycles. The Consumers' Association⁴ commented that in general high rise machines tipped over twice as easily as other bicycles. Nevertheless, recently there have been modifications to the design of one of the commonly available high rise machines, bringing the centre of gravity further forward. Moreover, bicycles with the same general style as high rise machines but with equal size wheels are now being made and advertised.

We are grateful to Sister G Smith and her staff at Coronation Ward, Cardiff Royal Infirmary. We thank the Education Department of the South Glamorgan County Council, the individual head teachers, and Mr W T Adams, HM Coroner for South Glamorgan, for their help in this study.

¹ Howell, T R, *Pediatrics*, 1968, **42**, 214.

² Waller, J A, *Pediatrics*, 1971, **47**, 1042.

³ Craft, A W, Shaw, P A, and Carlidge, N E F, *British Medical Journal*, 1973, **3**, 146.

⁴ Consumers' Association, *Which*, February 1972, p 32.

(Accepted 24 November 1976)

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Splenic suppressor cells in hypogammaglobulinaemia

Immune processes may be controlled by a population of immunoregulatory lymphocytes known as suppressor cells. We have been able to find such cells in the spleen¹ and thymus² but not in lymph nodes or peripheral blood. Some patients, however, with common variable hypogammaglobulinaemia have circulating T lymphocytes able to depress immunoglobulin synthesis in normal B lymphocytes.³ A woman who came under our care for recurrent respiratory infections was found to have hypogammaglobulinaemia, and this prompted a study of her peripheral blood lymphocytes.

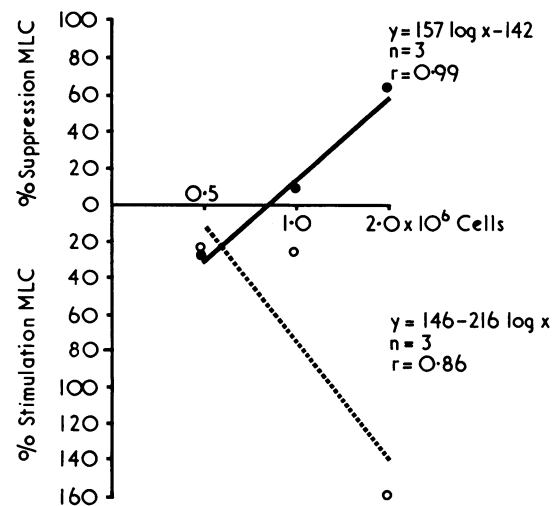
Patient, methods, and results

A 22-year-old woman with known bronchiectasis presented with recurrent respiratory infection. Physical examination showed scattered rhonchi at both lung bases and pronounced dyspnoea. Her spleen was palpable 4.5 cm below the left costal margin. A chest x-ray picture showed patchy infiltrates consistent with bronchiectasis. Protein electrophoresis unexpectedly gave the

following values: albumin 44 g/l, α_1 -globulin 3 g/l, α_2 -globulin 8 g/l, β -globulin 9 g/l, γ -globulin 2 g/l (normal range 5-16 g/l), and total protein 66 g/l. Quantitative immunoglobulin analysis showed IgG 0.14 g/l (normal range 8-18 g/l), IgA < 0.05 g/l (normal range 0.9-4.5 g/l), and IgM 0.04 g/l (normal range 0.7-2.8 g/l). The α_1 -antitrypsin concentration, total complement, and relative proportion of T and B lymphocytes in the peripheral blood were normal. In-vitro responses to the mitogens phytohaemagglutinin, concanavalin A, and pokeweed were normal.

Hypogammaglobulinaemia was diagnosed and a search for peripheral blood suppressor cells undertaken.^{1,2} In previous assays suspensions of spleen lymphocytes were incubated for three days; added to a mixed lymphocyte culture (MLC) in varying doses; and the percentage depression of counts from tritiated thymidine taken up by the culture was calculated. In the present case a suspension of peripheral blood lymphocytes was prepared by layering on a Ficol-Hypaque gradient, and these cells were added to an MLC from normal subjects. As a control, peripheral blood lymphocytes from a normal volunteer were added to similar cultures.

The results are shown in the figure. In our patient low doses of cells produced some stimulation of the MLC, but as the added dose of peripheral lymphocytes was increased the degree of suppression of the MLC increased. An excellent correlation between the log of the dose and the degree of suppression was seen ($r = 0.99$). In contrast, peripheral blood lymphocytes from a normal volunteer stimulated the MLC, and again a correlation with the log of the cell dose was seen ($r = 0.94$). The patient's dose-response curve was similar to one found previously when splenic lymphocytes were used.¹



Dose-response curves for suppression of mixed leucocyte culture (MLC) by peripheral lymphocytes in patient with hypogammaglobulinaemia (solid line), and stimulation of MLC by normal peripheral lymphocytes (dashed line). Standard deviation for each point was about 10%. Each point is mean of three observations.

Comment

Our patient clearly had circulating peripheral lymphocytes able to inhibit an MLC. Moreover, the quantitative pattern of inhibition was identical with the one that we have observed in splenic lymphocytes. The results suggest that the patient's peripheral suppressive lymphocytes may have been of splenic origin and support the hypothesis that some types of hypogammaglobulinaemia may be due to excessive suppressor-cell activity.

¹ Sampson, D, Grotelueschen, C, and Kauffman, H M, *Transplantation*, 1975, **20**, 362.

² Sampson, D, et al, *Surgery*, 1976, **79**, 393.

³ Waldmann, T A, et al, *Lancet*, 1974, **2**, 609.

(Accepted 17 November 1976)

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