contribute to the inequalities among men, as the regional heart study of 24 towns showed a correlation between smoking and the prevalence of ischaemic heart disease.¹⁶ Information about women is lacking, except that throughout England and Wales mortality from ischaemic heart disease correlates negatively with mortality from lung cancer, an indicator of cigarette smoking.¹⁷ In the three towns in our study the small differences in cigarette smoking among men did not correspond with the differences in ischaemic heart disease, but the highest proportion of smokers among women was in Wakefield. The regional heart study has not found alcohol consumption to be an important determinant of variations in cardiovascular mortality.⁹ In the three towns the proportion of heavy drinkers was, however, lowest in Ipswich.

Socioeconomic conditions are better in Ipswich than in the other two towns (table I). It might be expected that a more affluent town would tend to have higher rather than lower intakes of fat and other components of a Western diet. It is also consistent that it had higher rates of breast cancer, colonic cancer, and gall stones (table II), all of which are more common in affluent countries. The low mortality from ischaemic heart disease is paradoxical. The results of this study are in keeping with recent findings which suggest that the explanation may lie more in the better development and health of children in Ipswich in the past than in a more healthy diet among adults at present.^{17 18}

We are grateful to the subjects in the three towns who took part in this study, to their general practitioners, and to the local interviewers Jane Whitehead, Lesley Raper, and Sylvia Kirkham. We also thank our colleagues in the MRC Environmental Epidemiology Unit, in particular Dr Michael Nelson, who advised on dietary methods, and Mr Paul Winter, who helped with computing.

References

- 1 Ministry of Agriculture, Fisheries and Food. *Household food consumption and expenditure survey, 1985*. London: HMSO, 1987.
- 2 Barker DJP, Gardner MJ, Power C, Hutt MSR. Prevalence of gall stones at necropsy in nine British towns: a collaborative study. *Br Med J* 1979;ii:1389-92.
- 3 Office of Population Censuses and Surveys. *Small area statistics. Census 1981*. London: HMSO, 1982.
- 4 Office of Population Censuses and Surveys. *Area mortality decennial supplement 1969-73, England and Wales*. London: HMSO, 1981. (Series DS, No 4.)
- 5 Cole T, Black A. Statistical aspects in the design of dietary surveys. In: *Dietary assessment of populations*. Southampton: Medical Research Council Environmental Epidemiology Unit, 1984. (Scientific report No 4.)
- 6 Bingham S, McNeil NI, Cummings JH. The diet of individuals: a study of a randomly-chosen cross section of British adults in a Cambridgeshire village. *Br J Nutr* 1981;45:23-35.
- 7 Thomson M, Logan RL, Sharman M, Lockerbie L, Riemersma RA, Oliver MF. Dietary survey in 40-year old Edinburgh men. *Hum Nutr Appl Nutr* 1982;36A:272-80.
- 8 Yarnell JWG, Fehily AM, Milbank JE, Sweetnam PM, Walker CL. A short dietary questionnaire for use in an epidemiological survey: comparison with weighed dietary records. *Hum Nutr Appl Nutr* 1983;37A:103-12.
- 9 Shaper AG, Phillips AN, Pocock SJ, Walker M. Alcohol and ischaemic heart disease in middle-aged British men. *Br Med J* 1987;294:733-7.
- 10 Paul AA, Southgate DAT. *McCance and Widdowson's the composition of foods*. 4th ed. London: HMSO, 1978.
- 11 Paul AA, Southgate DAT, Russel J. *First supplement to McCance and Widdowson's the composition of foods*. London: HMSO, 1980.
- 12 Wiles SJ, Nettleton PA, Black AE, Paul AA. The nutrient composition of some cooked dishes eaten in Britain: a supplementary food composition table. *Journal of Human Nutrition* 1980;34:189-223.
- 13 Baker RJ, Nelder JA. *GLIM (generalised linear interactive modelling), release 3*. Oxford: Numerical Algorithms Group, 1978.
- 14 Barker DJP, Godfrey KM. Geographical variations in the incidence of colorectal cancer in Britain. *Br J Cancer* 1984;50:693-8.
- 15 Morris J, Barker DJP, Nelson M. Diet, infection and acute appendicitis in Britain and Ireland. *J Epidemiol Community Health* 1987;41:44-9.
- 16 Shaper AG. Geographic variations in cardiovascular mortality in Great Britain. *Br Med Bull* 1984;40:366-73.
- 17 Barker DJP, Osmond C. Infant mortality, childhood nutrition and ischaemic heart disease in England and Wales. *Lancet* 1986;i:1077-81.
- 18 Barker DJP, Osmond C. Inequalities in health in Britain: specific explanations in three Lancashire towns. *Br Med J* 1987;294:749-52.

(Accepted 18 January 1988)

SHORT REPORTS

High dose intravenous gammaglobulin in chronic systemic juvenile arthritis

The effect of high dose intravenous gammaglobulin has been described in several immunological disorders including idiopathic thrombocytopenic purpura,¹ autoimmune neutropenia,² and myasthenia gravis.³ We report a case of severe chronic systemic juvenile arthritis with a remarkable response to high dose intravenous gammaglobulin.

Case report

A 6 year old boy was admitted in October 1983 with a history of polyarthritis, rash, and high spiking fever. These symptoms persisted, and he developed pleurisy and myocarditis. He was treated with prednisolone for three years, this being the only drug that reduced the symptoms. Salicylates, though slightly effective, caused intolerable tinnitus and hearing loss; no response was observed to other non-steroidal anti-inflammatory drugs. Hydroxychloroquine sulphate caused retinopathy, penicillamine induced a severe allergic reaction, and cytotoxic drugs (azathioprine, methotrexate, and cyclophosphamide) had no beneficial effect.

Unfortunately, prednisolone caused severe osteoporosis, which resulted in three fractured vertebrae. In December 1986 treatment was changed to high dose intravenous gammaglobulin. A daily dose of 400 mg/kg body weight was given for five days, followed by a single dose of 800 mg/kg once every fortnight. The fever, rash, and arthritis resolved within 24 hours and did not recur for two weeks. Morning stiffness was considerably reduced, and the patient felt well. Subsequently short episodes of fever and inflammation of three joints recurred at the end of January 1987. A high dose regimen of 400 mg/kg daily for five days every three weeks was started. Six courses were given, and during this time the patient developed fever, rash, and polyarthritis for several days on three occasions. These symptoms resolved after the first day of the next course.

The polyarthritis and systemic symptoms recurred in October, four months after gammaglobulin was stopped. Treatment was restarted in November with 400 mg/kg daily for five days followed by courses of 1000 mg/kg over two days every three weeks. The systemic symptoms and arthritis were again reduced, but only after two and a half weeks. This regimen was continued, and during December 1987 the fever, rash, and arthritis did not recur.

During the three weeks after high dose intravenous gammaglobulin was first

Clinical course of disease as indicated by C reactive protein and Clq binding concentrations, mean body temperature, and quality of life according to Karnofsky scale (10% = very ill and wholly dependent on outside help, 80% = only few interferences with activities of daily living) during treatment with gammaglobulin from October 1986 to June 1987. ▼ = 60 g in five days; ▽ = 24 g in one day.

given the haemoglobin concentration rose from 85 g/l to 103 g/l, and total serum IgG concentration from 21.0 g/l to 32.6 g/l.

The figure summarises the clinical course, showing the considerable rise in Clq binding (representing circulating immune complexes) and the fall in C reactive protein concentration. IgM rheumatoid factor rose from 12.5 to 200 immunising units/ml.

Comment

Our patient showed a remarkable initial response to high dose intravenous gammaglobulin. The effect on his arthritis was transient, but most of the systemic symptoms were appreciably reduced or absent during the first six months of treatment. A relapse occurred four months after gammaglobulin was stopped, but renewed administration induced the same beneficial effects as before.

The mechanism of action is uncertain. Reactions between idiotypes and anti-idiotypes or blockade of the Fc receptors of the macrophages by the gammaglobulin could explain the increased circulating concentration of immune complexes.⁴ We cannot explain the temporarily increased IgM rheumatoid factor concentration.

High dose intravenous gammaglobulin may be useful in treating severe chronic systemic juvenile arthritis. We recommend that a double blind, randomised prospective trial of its effects should be performed.

- 1 Imbach P, Barandín S, d'Apurizo V, *et al*. High-dose intravenous gammaglobulin for idiopathic thrombocytopenic purpura in childhood. *Lancet* 1981;ii:1228-31.
- 2 Pallack S, Cunningham-Rundles C, Barandín S, Good RA. High-dose intravenous gammaglobulin for auto-immune neutropenia. *N Engl J Med* 1982;307:253.
- 3 Fateh-Moghadam A, Wick M, Besinger U, Geursen RG. High-dose intravenous gammaglobulin for myasthenia gravis. *Lancet* 1984;i:848-9.
- 4 Fehr J, Hofman V, Kappeler U. Transient reversal of thrombocytopenia in idiopathic thrombocytopenic purpura by high-dose intravenous gammaglobulin. *N Engl J Med* 1982;306:1254-8.

(Accepted 26 January 1988)

Emma Kinderziekenhuis, 1018 HJ Amsterdam, The Netherlands

J W GROOTHOFF, MD, assistant
E F VAN LEEUWEN, MD, PHD, paediatrician

Correspondence to: Dr Groothoff.

Value of a negative cervical smear

When the cost of clinical activity is calculated negative results of investigations (normal results) are usually assumed to be of no value. I tested this assumption for cervical cytology, in which ascribing a zero value to negative smears puts the cost of saving one life at £300 000.¹

Patients, methods, and results

The names and addresses of 100 consecutive women who had recently had a cervical smear reported as being normal were obtained from the computer in the cytology laboratory in Blackburn. Each woman was sent a questionnaire, which first stated that the smear was normal and then asked the following questions: "As the smear turned out to be negative was it a waste of time?" "Do you regard the news that the smear was negative of being of value to you in any way?" "Although there is no question of you being charged for the smear, if you feel that the negative smear was of value to you I would like you to try to express this in terms of money" (choices of 50p, £1, £2, £5, £10, and £20 were given). Questions concerning occupation and age were also asked.

Eighty four replies were received, the women's ages ranging from 17 to 75. Nine women of working age were from social classes I and II, 15 from class III, and 44 from classes IV and V. Eight women could not be classified and eight were retired. Eleven respondents who valued knowing that the smear was negative did not say how much they would be prepared to pay for it. A further four wrote that they would pay "any amount." Of the remaining 69, two valued it at 50p, five at £1, 13 at £2, 24 at £5, six at £10, and 19 at £20. For the 69 women who would have been prepared to pay for the negative smear this gave a mean value of £8.25.

Comment

In evaluating the outcome of medical care a reduction in mortality is measured most easily, but most clinical activity does not prolong life: it is concerned either with giving people information about the state of their health or with interpreting their symptoms. This is sometimes called reassurance. The objective of cervical cytology has been to prevent death from invasive cancer, but publicity about smear testing has made women afraid of the disease. Promotion of health inevitably results in awareness of sickness.

It has been estimated that 40 000 smears are necessary to save one life; this has been called "a grievously poor cost benefit ratio" if 39 999 smears are assumed to have no value.² If each smear costs £5 then the cost of smears alone is £200 000 for each life saved. To this must be added the cost of 200 cone biopsies at about £500 each, bringing the total to £300 000 per life

saved.¹ But if we evaluate cervical screening from the point of view of the woman who is screened then the assumption that a negative smear has no value can be seen to be erroneous. If every negative smear were to have a value greater than £5 (that is, greater than its cost) then the smear that results in a life saved would not have to carry the cost of the 39 999 others but only its own cost of £5. In my study women gave a negative smear a mean value of £8.25, so this criterion has been fulfilled. The service can therefore be considered to be cost effective as its value exceeds its cost.

The one life saved must still carry the cost of 200 cone biopsies, but the cost of this life can now be calculated as £100 005 rather than £300 000. This cost will be reduced further as colposcopy and laser treatment take the place of cone biopsies.

- 1 Roberts CJ, Farrow SC, Charney MC. Cost of saving a life by cervical screening. *Lancet* 1985;iii:950.
- 2 Anonymous. Cancer of the cervix: death by incompetence [Editorial]. *Lancet* 1985;iii:363-4.

(Accepted 2 February 1987)

Queens Park Hospital, Blackburn, Lancashire BB2 3HH

DAVID S GRIMES, FRCP, consultant physician

Correspondence to: Postgraduate Medical Centre, Royal Infirmary, Blackburn, Lancashire BB2 3LR.

Which patients with suspected appendicitis should undergo laparoscopy?

Acute appendicitis is difficult to diagnose, and up to 30% of appendicectomies are unnecessary.¹ Laparoscopy is being used increasingly in general surgery, but although it has been used in patients with "questionable appendicitis,"² it is seldom used before appendicectomy. In this study we tried to define the role of laparoscopy in patients with suspected appendicitis.

Patients, methods, and results

All adults admitted to our unit with acute abdominal pain are classified by the admitting surgical registrar as needing an operation, not needing an operation, or "need for an operation uncertain." All patients in whom the need for an operation is uncertain have a laparoscopy after the registrar has decided whether the patient would usually be observed or have an operation if laparoscopy was not available.

We studied all those patients who either underwent appendicectomy or would have done had laparoscopy not been available. We did not include patients correctly classified as not requiring an operation and those who would have been observed if laparoscopy had not been available as these groups do not influence the number of unnecessary appendicectomies. Laparoscopy under general anaesthesia is a routine procedure performed by all the registrars in our unit. The results were analysed by a one or two tailed χ^2 test.

During 30 months 90 patients were admitted with suspected appendicitis. Of these, 50 (28 men and 22 women) had appendicectomies after the initial assessment. The remaining 40 patients (13 men and 27 women) had laparoscopies. There was no significant difference in the incidence of acute appendicitis between the two groups. After laparoscopy, however, only three patients (7.5%) had an unnecessary appendicectomy, compared with 11 (22%) of the patients sent straight to operation; this difference was significant ($p=0.05$). Laparoscopy reduced the number of unnecessary appendicectomies in the 40 patients in whom the diagnosis was in doubt to three (this being the number of operations that would have been performed if laparoscopy had not been available) from a potential figure of 14 ($p<0.01$). The total number of unnecessary operations was reduced to 14 from a potential figure of 25 ($p<0.05$). The diagnostic problem was greater in women: the potential rate of unnecessary appendicectomy (without laparoscopy) was 19/49 (39%) in women compared with 6/41 (15%) in men ($p<0.02$). The three unnecessary appendicectomies after laparoscopy occurred because of a technical failure in one case and because the appendix could not be seen in two cases. If the appendix cannot be seen and no other cause for the symptoms can be identified we proceed to appendicectomy. We do not know of any patient who had only laparoscopy and subsequently needed an appendicectomy.

Comment

The similar incidence of appendicitis in the groups in which the diagnosis was thought to be certain and uncertain shows the diagnostic difficulty. If laparoscopy had not been available in our unit the incidence of unnecessary appendicectomies would have been 28% (25/90), which is within the reported range.¹ Selective use of laparoscopy reduced this to 16% (14/90),