Renal Calculi and Poliomyelitis

Though vaccination against poliomyelitis has almost eliminated the disease in this country in the last decade, the aftermath of the 1940s and the 1950s is still with us. An estimated 12,000 patients were still disabled by the disease in 1965,1 and since most were young the number has probably changed little in the interim. One of the hazards they face is the development of renal calculi, which affected up to 80% of patients with respiratory failure in the great North American epidemics.2-4 Several features of the disease have been suggested as causes of this high incidence of renal calculi, including hypercalcemia, hyperphosphaturia, raised urinary pH, and infection.

Calcium is lost from the bones whenever they are relieved of the pull of muscular activity and the push of weight-bearing. It happens to astronauts in space and to patients during recumbency6 and after fractures9 or any form of muscle paralytic disease. Notably spine injuries and poliomyelitis.6-10 Calcium excretion rises to about twice normal over the first month after injury and then remains at a plateau for weeks or months, the duration reflecting the extent of paralyis.8,9 Restoration of normal calcium balance often coincides with ambulation,9 but early mobilization of paralysed patients does not regularly reverse the hypercalcicuria.8 If a high concentration of urinary calcium were the main cause of calculous disease after poliomyelitis we would expect the majority of stones to consist of calcium oxalate, yet, though oxalate stones do occur, they are uncommon.6

A brisk phosphaturia appears in the first fortnight after the onset of paralysis and has been attributed to dissolution of neutral tissue,9 though atrophy of muscle is a more plausible explanation. It subsides long before the peak incidence of calculi but could play a part in the formation of nuclei for the stones.

Most of the calculi found after poliomyelitis consist of phosphates of calcium and magnesium. Such stones are classically associated with urine made alkaline by urea-splitting organisms like proteus, since the solubility of calcium phosphate rapidly falls as pH rises. A high urinary pH is found after poliomyelitis even in the absence of infection. Its origin is uncertain but probably not renal, since urine is normally acidified after an acid load.9

However, most authors have concluded that urinary infection is the most important factor in the calculous disease that follows poliomyelitis or spinal injury. Many of the infectants are not urea-splitters and they presumably initiate calculi by providing a nucleus in a urine already supersaturated with calcium phosphate. Careful control of infection has greatly reduced the incidence of calculi in paraplegics.10,11

Recently P. A. Poole-Wilson has studied 61 patients who survive with the aid of long-term respiratory support, about a quarter or more of the estimated number in Great Britain.12 A surprising finding was that renal calculi were much commoner in patients supported by the tank respirator or cuirass than in those treated by intermittent positive-pressure ventilation. Most of these calculi developed in the first five years after paralysis, so the presumably longer duration of the illness in those treated by the tank does not explain the difference. Neither was there any obvious difference in severity of paralysis or in the regimen of physiotherapy or turning. However, patients on intermittent positive-pressure ventilation (I.P.P.V.) had plasma bicarbonate levels (14-18 mEq/l.) lower than those on the tank or cuirass (19-27 mEq/l.). Poole-Wilson attributed this difference to hyperventilation produced by I.P.P.V., though a non-respiratory acidosis in these patients could not be excluded on the data supplied. This distinction could be made without arterial puncture, which he was naturally reluctant to use in patients with atrophic arteries.

If hyperventilation is the cause of these low bicarbonate levels, how does it protect the patient against calculous disease? Acute hyperventilation in normal persons causes a rise in urinary pH,13 which would be expected to increase the chance of calculous disease, and this change persists for several weeks in the dog.14

However, the long-term effects of hyperventilation on renal function in man are largely unexplored and J. S. Elliot and H. E. Todd15 were unable to raise the already high urinary pH of patients with poliomyelitis by inducing hyperventilation. The long-term effects of ventilation on urinary pH and excretion of calcium, phosphate, citrate, and magnesium would appear to deserve study. The difficulties of unravelling this story in a disappearing disease so long after the initiating events in the surviving patients are obvious, but the effort would be worthwhile. The mechanisms are probably very similar after spinal injury, and that disease is likely to stay
with us long after the fuel crisis has replaced the motor-car by the bicycle and the horse.

7 Freeman, L. W., \textit{Annals of Surgery}, 1949, 129, 177.
8 Dunning, M. F., and Plum, F., \textit{Archives of Internal Medicine}, 1957, 99, 716.

\section*{N.H.S. Economies}

The full implications of Mr. Barber's anti Christmas present—his £1,200 m. cut in the planned programme of public expenditure in the United Kingdom—are not yet clear, but they will certainly be unpleasant for those running and using the N.H.S. The situation is depressingly familiar. Once again the country's hopes of a period of sustained economic growth have collapsed; and once more plans based on over-optimistic assumptions have had to be modified. Because they are under Treasury control the public services are invariably the first targets in these circumstances. The scale of the cuts is due partly to the severity of the threatening economic crisis and partly, I am sure, to the Government's policy decision to concentrate retrenchment on public rather than private spending.

In this general financial massacre how has the National Health Service fared? Overall £111 m. has been taken off the planned budget of £3,378 m. for the health and personal social services.\(^1\) This represents a cut of 3.3\(\%\), as against reductions of 4.3\(\%\) for education, 5.2\(\%\) for defence, and 13\(\%\) for roads and transport. So the health and personal social services are by no means the worst sufferers: in effect their planned expenditure in the coming financial year, instead of rising, will be held back to the present level. Figures like these do not give an accurate picture of the likely or possible impact, however. By far the biggest item in the health and personal social services budget is salaries and wages, and these will not be touched by the cuts—even though they may be affected by other factors, like incomes policy. Consequently the economies are being concentrated on the capital building programme (£69 m.) and on supplies and services (£42 m.). This means firstly, that a number of building projects—hospitals, health centres and homes for the elderly or others—will not be started in 1974-5; and, secondly, that since medicines, dressings, and food for patients are to be exempt there will have to be niggling economies all round on such items as maintenance, transport, and decoration.

In apportioning the cuts the Government has maintained its policy of giving priority to the development of the personal social services. The capital budget of these services has been cut by only 14\(\%\) (£11 m.), as against a 21\(\%\) (£58 m.) reduction in the health service allocation. This is very much in line with recent trends. Between 1968-9 and 1973-4 capital expenditure, in constant terms after making allowances for inflation, has gone up by 41\(\%\) for hospitals, 95\(\%\) for personal social services, and 104\(\%\) for local authority health services. The emphasis on local authority services can be justified on the grounds that they relieve the pressure on the N.H.S., apart from being intrinsically desirable. But it is by no means clear that the Department of Health is in a position to make sure that extra resources are, in fact, used to this end; indeed, one reason for the faster expansion of the local authority sector may be precisely that the Department cannot control council spending as tightly as it can the N.H.S. budget.

Two points need stressing if the cuts are to be seen in perspective. They have taken place—as the recent trends in expenditure show—against a background of steadily rising spending in real terms. This does not make the cuts any the less distressing, since the N.H.S. is only now getting used to having some capital to spend on new buildings after two decades of watching other services, like education, getting priority. Rising expectations inevitably mean that setbacks are felt more bitterly. But it does mean that the reductions should be seen as postponing hopes of improving standards, rather than as implying an actual reduction in present standards. The other perhaps more important point is that these hopes of improving standards may to some degree have been illusory anyway. They rested on the Government's published spending plans. But these plans tend to be unreliable, as well as vulnerable; for building programmes depend on the availability of manpower and other resources. If these are not available, then hospitals and health centres will not be built—whatever official policy may be.

Last year the all-party Expenditure Committee of the House of Commons reported\(^2\) scathingly on the gap between spending aspirations and expenditure realities. In 1972-3 the Government had under-spent by £600 m. and much the same pattern could be expected in 1973-4 because of “severe shortages of labour and materials”—a prediction borne out by the expenditure White Paper. The committee's report concluded that “it is only possible to be precise about the impact of policy changes if it is known accurately what would happen if they had not been made. The evidence we have taken suggests that present techniques do not provide this information.”

It may be little comfort to those wondering about the effects of the cuts on the N.H.S. to know that the Treasury is probably almost as much in the dark as they are. But to the extent that the cuts are a symbolic gesture—designed to impress on the world the Government's determination to deal with an economic crisis—so their impact could turn out to be rather less than the drama of their presentation might suggest. Equally it is worth remembering that spending policies tend to change rapidly in line with alterations in economic circumstances. In 1970 the Conservatives, soon after coming into office, announced\(^3\) sweeping expenditure cuts. Just over a year later, faced with the need to give a stimulant to the economy, they announced\(^4\) equally sweeping increases. Such policy changes can make surprisingly little difference to underlying long-term trends in public spending, but they cause an altogether disproportionate amount of disturbance and anxiety to those responsible for actually running complex services like the N.H.S.

\section*{Notes}