

Three years' experience with an intestinal failure unit

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Summary

The work of a purpose-built unit for the treatment of intestinal failure is described. In the 3 years following its opening the 4-bed unit treated 83 patients who were admitted for a mean of 35 days.

Major indications for admission were difficult cases of Crohn's disease, intestinal fistulae and short bowel syndrome. Since the unit opened the mortality rate in this type of patient has fallen from 42% to 20%.

The principal treatment used was total parenteral nutrition (TPN) although 52 of the 83 patients also required major surgery. Repeated experience with the same type of clinical problem has led to more efficient patient management and has reduced the complication rate associated with TPN.

The unit has acted as a centre for the management of patients needing Home Parenteral Nutrition and has an active role in training nursing and medical staff in intravenous therapy.

A plea is made for the establishment of regional intestinal failure units.

Introduction

Acute and chronic renal failure are well-recognised clinical entities. Although the initial management of renal failure can be safely carried out in the general wards of a district hospital, it is now accepted that when haemodialysis is required treatment is better undertaken in renal units. Repeated experience with the same clinical problem and familiarity with the technical side of the treatment reduces complications and gives increased confidence both to patients and staff (1).

Although malnutrition and the many other problems associated with critical gastrointestinal illnesses such as the short bowel syndrome, advanced Crohn's disease and post-operative fistulae have been recognised for a long time their unification into the concept of 'intestinal failure' is relatively new. Intestinal failure has been described as the reduction in functioning gut mass below the minimal amount necessary for adequate digestion and absorption of nutrients (2). It may be acute, and potentially reversible, or it may be chronic and permanent. Where only a segment of the intestine has been lost or is grossly diseased then intestinal failure may be partial. Thus absence of the terminal ileum leads to failure of absorption of vitamin B₁₂ in which case

regular replacement therapy by injection of the vitamin suffices. At the other extreme, where all the small bowel has been resected, intestinal failure is complete and total nutrient provision is required.

The analogy between renal failure and intestinal failure is therefore apt. In both acute renal and intestinal failure correct management will be followed by restoration of near normal function after relatively short-term treatment.

Similarly, just as chronic renal failure requires long-term treatment by ambulatory peritoneal or home haemodialysis so chronic intestinal failure requires long-term parenteral nutrition which can also be undertaken at home. The difference is that the need for dialysis may be terminated by a kidney transplant whereas human intestinal transplantation is not yet feasible (3).

The demonstration by groups in North America that it is possible to carry out effective, complication-free prolonged parenteral nutrition was a principal factor stimulating the formation of the Hope Hospital Nutrition Unit dedicated to the management of intestinal failure. This paper describes our experience with the work of the unit since its opening.

BACKGROUND

In 1978, 4 years after the commencement of the University Department of Surgery at Hope Hospital, a case was presented to the Regional Health Authority for special funding of the work being undertaken in the care of patients referred to the Department for the management of complicated postoperative problems and difficult gastroenterological disorders. The submission recorded the details of 33 patients with intestinal fistulae and other critical gastrointestinal problems treated by the Department in the 4 years up to 1978. Many of these patients required extensive and repeated surgical operation, but the factor common to all of them was the need for prolonged parenteral nutrition. It was during this time that our first attempts at Home Parenteral Nutrition were made (4).

Nineteen of the first 33 patients were cured, that is they were able to resume a normal oral intake and maintain their nutrition. This was a reasonable success rate considering the complexity of their problems. The mean time in hospital for these patients was 30 days. In addition to being expensive in terms of time required in hospital the patients were also expensive in their demands upon nursing care and in their need for parenteral nutrition, stoma bags, etc.

The Regional Health Authority accepted the case for

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special funding and began discussions on how it should be applied. It was decided to build a small dedicated unit as an annexe to a general surgical ward. The 4-bedded unit with its own laboratory, offices and nursing staff was opened by Sir David Cuthbertson in July 1980, and received its first patient in September 1980.

THE ORGANISATION OF THE NUTRITION UNIT

The unit has 3 beds in a small ward, one of the three beds being separated from the other two by a partition with a window in it (Fig.). The window is curtained and thus this bed can be screened off when patients of mixed sexes are in the unit. There is also a single-bedded room for disturbed or very sick patients. No attempt is made to separate septic patients for nearly all patients admitted to the unit have some degree of infection. The 3 beds can all be seen from an observation bay which functions as a combined office and nurse station.

The unit has its own laboratory for the preparation and storage of body fluids. A two-door refrigerator communicates with the laboratory from the lavatory so that samples of faeces and urine in disposable containers can be put directly into cold storage until they are processed. There is also a shower room which is big enough to allow patients in a wheelchair to be taken directly in and washed whilst still in the chair.

The nursing staff of the unit consists of a sister who has overall charge, 2 staff nurses, 1 senior enrolled nurse, 7 enrolled nurses and 3 auxiliaries who between them staff the unit day and night throughout the week. In addition to looking after the patients in the unit the nurses also supervise parenteral nutrition and intravenous catheters in the remainder of the hospital, other than in the intensive care unit. Stoma care nurses attend regularly to assist in the management of stomas and fistulae.

Other unit staff consist of a pharmacist and a dietician, and a physiotherapist who sees the patients daily. A biochemist and an MLSO supervise the biochemical measurements made on the patients.

The unit is under the overall direction of the Professor of Surgery and 2 of his junior staff. The latter, in addition to

supervising the day-to-day care of the patients, also work on related research projects. A physician specialising in gastroenterology from the University Department of Medicine supervises the medical care of the patients.

The senior medical, nursing and paramedical staff constitute the Nutrition Team who meet in a formal session every Wednesday afternoon to discuss the patients and review their progress.

Admission to the unit is agreed with the consultant in charge but patients remain under the care of their own consultant. The unit medical staff advise on the nutritional management of the patients and it is a condition of admission that unit protocols for parenteral nutrition are strictly followed.

Results

In the period 1st July 1980 to 31st July 1983, 83 patients were admitted to the unit. Not all patients referred for management could be admitted to this small unit but they were still accepted and treated on the general wards with the assistance of the unit staff. These patients, not admitted to the unit, are excluded from this analysis. Where there were more patients than could be accommodated on the unit admission was governed by the severity of their problems. Thus, by and large, good prognosis low output enterocutaneous fistulae were managed on the general wards.

Of the 83 patients, 36 were male and 46 female. The mean age of those admitted was 44.47 years, the range being 14–79 years.

The majority of the patients admitted were referred directly to the unit by their consultants. Most patients came from within the North Western Regional Health Authority but almost a quarter were referred and accepted from other regions. Naturally any patient in the Salford Health Authority who needed prolonged parenteral nutrition was usually admitted to the unit but those needing only short courses of treatment were managed on the general wards.

Many of the patients referred to the unit with intestinal failure had a clearly identifiable problem such as extensive uncontrollable small bowel Crohn's disease or a short bowel following a mesenteric vascular occlusion. The majority,



FIG. View of Nutrition Unit showing 3-bed ward with partitioning of one of the beds.

however, had multiple severe problems. A typical patient would have a gastric fistula following a difficult gastrectomy occasioned by recurrence of haemorrhage after emergency vagotomy and pyloroplasty for a bleeding duodenal ulcer. On referral to the unit the patient would also be found to have a subphrenic abscess and possibly acute pancreatitis with extensive pancreatic necrosis. For the purposes of this paper such a patient would be classified simply as a 'gastric fistula' but the whole situation is obviously more complex than this label implies. The Table therefore reflects only the principal diagnosis and does not indicate the overlap of complications between cases which was a feature in the majority of the patients.

TABLE *Primary diagnosis in patients admitted to Nutrition Unit*

<i>Diagnosis</i>	<i>n</i>	<i>Deaths</i>
Crohn's disease and its complications excluding fistula	17	
Crohn's disease—fistulae	17	1
Short bowel syndrome	5	2
Pancreatic abscess	5	3
Postoperative fistulae		
Gastroduodenal	9	5
Small bowel	8	1
Colonic	7	1
Gastrointestinal malignancy	4	2
Malignant vipomas	3	2
Miscellaneous	8	—
Total	83	17

This Table reveals that the principal indication for admission to the unit was Crohn's disease. However, only those patients with manifest intestinal failure associated with their Crohn's disease were admitted to the unit. The majority of patients with Crohn's disease were managed on the ordinary general surgical and medical wards.

Postoperative intestinal fistulae were a major cause for admission to the unit. Gastric, duodenal and high small bowel fistulae are well recognised as causing major nutritional and electrolyte problems, and one would expect a number of these to be referred to a unit such as ours. On the other hand, low small bowel and colonic fistulae are usually easy to manage. Those patients with colonic fistulae referred to our unit were mainly malnourished because of gross associated sepsis and the principal problem in these cases was to deal with the sepsis rather than the fistula.

As would be expected severe pancreatitis and pancreatic abscesses, conditions which pose major nutritional problems, found their way to the unit as did the occasional case of malignant disease in which there was severe malnutrition without evidence of metastasis.

Under the 'miscellaneous' category are included patients with small bowel motility disorders such as pseudo-obstruction and scleroderma and a case of laxative-induced diarrhoea which led to uncontrollable dehydration and weight loss.

The management of patients on the unit followed a set pattern. On admission the patient was clinically assessed in the usual manner following which a nutritional assessment was carried out. Most patients manifestly needed parenteral nutrition and within 24 hours of admission a silastic catheter was inserted into a major vein and tunnelled subcutaneously to emerge on the anterior chest wall. Patients with catheters already in position usually had them replaced as they were frequently infected. Where it was anticipated that parenteral nutrition would be required for a prolonged time a Broviac or Hickman catheter was inserted by direct cut down on the cephalic or external jugular vein. Parenteral nutrition would be started immediately afterwards. The patient would then

undergo an extensive series of investigations to define the nature of the problem. In particular urgent efforts would be made to detect and localise abscesses so that they could be drained. The aim of treatment was to restore the patient's nutrition whilst the bowel recovered its normal function to a point where it would allow resumption of enteral feeding.

Parenteral nutrition was usually only administered at night, the silastic catheter being filled with heparin during the day, a so-called 'heparin lock'. This allowed the patients maximum mobility and, where possible, participation in exercise programmes in the gymnasium. The more mobile patients were encouraged to dress in their ordinary clothes and go out of the unit during the day.

In patients where fistulae closed spontaneously, or adaptation of the bowel occurred, enteral nutrition was gradually resumed and parenteral nutrition was phased out. In those cases where fistulae remained open, or there was abscess formation, surgical procedures were undertaken to drain the abscesses or close the fistulae. Fifty-two of the 83 patients underwent operation for these reasons.

DEATHS

Seventeen of the 83 patients died, a 21% mortality which compares favourably with the 42% mortality experienced during the first 4 years of our experience. The primary diagnosis of the 17 patients who died is shown in the Table. The mean age of the patients who died was 55.5 years, significantly greater than the mean age of the group as a whole.

Apart from the 2 patients with malignant disease, and the 2 with short bowel following mesenteric vascular occlusion who died from their underlying disease, the remaining deaths were the result of uncontrolled sepsis and our inability to close high output gastro-duodenal fistulae. Unfortunately a number of these deaths occurred in patients who in our opinion were referred too late. Had they been referred earlier a different outcome might have been achieved.

INTRAVENOUS CATHETER MANAGEMENT

Much of the success of our unit revolves around the ability of the staff to maintain infection-free parenteral nutrition. Following the development by the nursing staff of strict catheter care protocols we consider infection of an intravenous feeding line to be no longer acceptable. Since the unit opened only three intravenous catheters have been removed on suspicion that septicaemia might be the result of catheter infection. In no instance did removal cure the septicaemia, and in all instances the patients died soon afterwards from their serious underlying disease.

Thus, in the 3 years since the unit opened we can claim not to have had a single case of septicaemia due to catheter infection. On the other hand, blockage of the catheters has remained a significant though diminishing problem. This has, to a large extent, been overcome by the use of constant volume infusion pumps to administer the parenteral nutrition. However, we still have cases in which gradual occlusion of the catheter occurs due to the accumulation of fibrin or lipid emulsion within the lumen. It is noteworthy that this tendency is less in patients on Home Parenteral Nutrition who have the larger lumen Broviac and Hickman catheters in position.

LENGTH OF STAY

Patients with intestinal failure, like those with renal failure, have a problem that is slow to reverse, and in some cases does not reverse at all. Thus, as expected patients tended to be on the unit a long time. The mean length of stay on the unit was 35.2 days with a range of 1 to 303. The patient staying only 1 day being one who, on initial assessment was found to be so ill, as to require intensive care and currently is still on the intensive care unit.

HOME PARENTERAL NUTRITION

In some patients it becomes apparent that fistula closure or adaptation of the bowel is only going to occur slowly. In these patients, as in those who have lost nearly all their small bowel, it is our policy to train the patients to administer their own parenteral nutrition. In the 5 years up to July 1983 the Department of Surgery has trained 25 patients in home parenteral nutrition. Seventeen of these patients have been trained by the unit, since its opening 3 years ago. The unit staff have at their disposal specialised teaching facilities such as tape slide programmes, video tapes and patient instruction manuals. There is also the advantage that being staffed day and night by staff with expert knowledge of parenteral nutrition, the unit can be contacted at any time by the patient, his relatives or his medical advisors. Staff of the unit visit the homes of HPN patients and keep in regular contact to provide support and advice.

Discussion

Intestinal failure is an undoubted clinical entity. In those instances where it is partial or of short duration it can be managed without difficulty in the wards of any district general hospital. There are, however, occasional patients where intestinal failure is almost complete and where recovery will be prolonged or even unattainable. It is these few cases that present major problems and for whom the provision of special facilities is justified.

Because parenteral nutrition is widely used in intensive care units patients with intestinal failure are often passed to such units for treatment. This is totally inappropriate for most patients with intestinal failure, even those with high output fistulae, do not have cardiorespiratory problems and thus do not need the life support systems and monitoring facilities of an intensive care unit. Indeed such patients find the intensive care unit an unpleasant environment for whilst they feel reasonably well, their companions are usually critically ill, many being unconscious and receiving ventilation. In addition the staff of the intensive care unit do not welcome the stomas, fistulae and infected wounds that are part and parcel of intestinal failure.

The atmosphere and aims of an intestinal failure unit are different. Although many patients with postoperative intestinal failure will need the services of an intensive care unit to overcome cardiorespiratory problems early in the course of their illness, once these have passed the management of their intestinal failure is designed to restrict as little as possible an active programme of rehabilitation. Providing they do not become weak from malnutrition, patients with intestinal failure can remain mobile and be encouraged to take physical exercise.

The separation of patients with advanced and difficult intestinal failure into a separate unit is justified by the need for effective and trouble-free prolonged parenteral nutrition.

Despite the evidence in the literature that parenteral nutrition can be undertaken without the risk of catheter infection, sepsis remains a frequent and serious life threatening problem in hospitals that only use the treatment occasionally.

The concentration of these cases into a unit means that both doctors and nurses become skilled in the administration of the treatment and the surgeons involved gain experience in the management of the difficult surgical problems that present. Additionally the availability of a large number of similar cases provides ideal opportunities for education and research. We have used this opportunity to study the starving and septic patients under our care. These studies have resulted in the development of a scoring system for sepsis (5) and have altered long held views about the substrates used by the septic patient (6).

Although the specialty of the consultant in charge of the unit is irrelevant—his main requirement being an interest in the problem—there is an undoubted need for an experienced gastroenterological surgeon to be closely involved in the care of these patients.

We consider that the results we have achieved in the management of these difficult patients warrant the creation of a number of intestinal failure units throughout the country which can deal with those few cases that need their specialised services and which can act as Regional Centres for patients needing home parenteral nutrition.

We would like to thank Dr A J Lane, Regional Medical Officer of the NWRHA, for his enthusiastic support of this project. Without his influence and efforts on our behalf the unit would not have been established. We acknowledge the considerable help received from all the officers of the Salford Health Authority. The smooth running of the unit has been entirely due to the dedication of the nursing staff to whom we offer our thanks.

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