TOTAL PARENTERAL NUTRITION IN CRITICALLY ILL SURGICAL PATIENTS

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SUMMARY

Over a four year period 45 surgical patients received total parenteral nutrition (TPN) either as a sole therapy or as an adjunct to surgery. Males were three times the number of females with a mean age of 31 and 27 years respectively. The main indications were intestinal failure, burns or preoperative build up in wasted patients. The central line was the preferred route with a mean duration of 22 days. Septic complications were the most common, causing death of two patients.

INTRODUCTION

Parenteral nutrition involves continuous infusion of hyperosmolar solutions containing carbohydrates, proteins, fats and other necessary nutrients through an indwelling catheter into SVC or right atrium. Parenteral nutrition is widely used to support the treatment of severe sepsis, trauma and gastrotintestinal malignancy and has an established role in the intestinal failure.[1-7] Complications of parenteral nutrition are uncommon but may be significant in patients on long term nutritional support.[8] To reduce these complications and to effectively deliver the nutrition, specialized centres have been established in various hospitals in the developed countries. Catheter related sepsis remains the most common complication in patients. outside specialized centres

The purpose of this study was to evaluate the role of TPN in critically ill surgical patients.

MATERIAL AND METHODS

During the period July 92 to June 96, 45 patients who received TPN for various indications were studied. The selection of site depended upon the anticipated duration of parenteral nutrition, (If it was less then 6 days then peripheral, otherwise either Subclavian or Jugular was used). The catheterisation was done by senior medical officer or senior registrar using 8" or 12", 16 guage radio-opaque in operation theater. The position of the tip being checked afterwards by a chest X-ray. The nutrients were started on the 2nd day, less concentrated being replaced gradually by more concentrated solutions. The patients were monitored for under and over hydration. Biochemical monitoring included 6 hourly urine sugar, daily blood urea, sugar and electrolytes. Liver function test were done every 4 to 7 days. The patients were also closely monitored for septic complications. The insertion site was cleaned and the dressing changed regularly. The intravenous infusion tubing set was changed every 4 to 5 days. Upon removal of the catheter, the tip was sent for culture.

RESULTS

During the 4 year period (July 92 to June 96) 45 patients received TPN for various indications. The male to female ratio was 3.1:1. Mean age in the males and females was 31(15-56) and 27 years (18-52) respectively (Table I). The indications were

TABLE – I

AGE AND SEX DISTRIBUTION

n=45

AGE	MALE	FEMALE	TOTAL
< 20 Yrs	8(18%)	4(9%)	12(27%)
21-24 Yrs	17(38%)	5(11%)	22(49%)
> 40 Yrs	9(20%)	2(4%)	11(24%)
	34(76%)	11(24%)	45
Mean age	31 yrs (15-56)	27 yrs (18-52)	
Male to Female ratio	3.1:1		

decided into three main groups (Table II). In first group patients GIT could not be used (Intestinal failure). The second included hypermetabolic states (burns, septicaemia) and the third group included malnourished patients requiring preop buildup. The major indication was Intestinal failure (80%). In these, all except one had a fistula in which TPN was used either as a sole therapy or as an adjunct to surgery. The underlying causes of the fistulae are shown in Table III. 74% (26 of 35) were small bowel fistulae. Enteric perforation was the underlying pathology in majority (65%) of small bowel fistulae, after primary anastomosis or surgically created (loop ileostomy). 9 patients out of 13 who leaked after primary anastomosis, 4 closed spontaneously and 9 required resurgery. Table IV shows the duration of parenteral nutrition used in peripheral as well as central line patients. The longest duration of TPN was 52 days in a young patient with recurrent spontaneous ileal perforations It needed repeated resections and resulted in short small bowel. The patient was discharged after 2 months after starting modified enteral diet. 5 patients needed more than 4 weeks of TPN, 2 had pancreatic fistula following drainage of pancreatic cyst/ abscess, 2 had gastric fistula following fire arm injury. and one had duodenal fistula following repair of perforated duodenal ulcer. There was significant morbidity with some complication in 13 patients (29%), majority being septic (Table V). Some had more than one complications. TPN had to be terminated in 6 patients either because of development of jaundice or septic complications and blocked catheter. The eventual outcome is shown in Table VI. Mortality directly attributable to TPN occured in 2 patients (4%). In the remaining 5 patients the cause of death was the underlying pathology; 3 were burns victim, 1 post oesophegectomy oesophegeal fistula, and 1 post doudenal ulcer repair duodenal fistula.

TABLE – II

INDICATIONS FOR TPN

	n=45
Gut not usable (Intestinal failure)	36(80%)
Fistula	35(78%)
Post op*	1(2%)
Hypermetabolism	
Burns	5(11%)
Pre-op build up	4(9%)
Ca oesphagus	2
Ca stomach	2

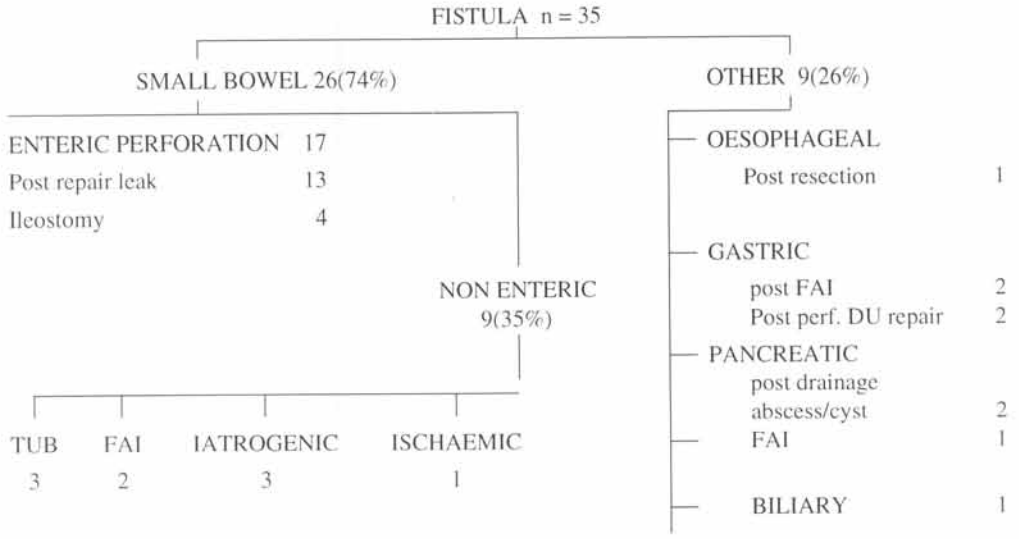
* Gastrojejunostomy with prolonged ileus.

DISCUSSION

Reports that upto 50% of selected surgical population may manifest evidence of protien calorie malnutrition underscores the importance of identifying patients at increased risk from nutritional morbidity. Stresses and natural history of the disease in combination with nutritional assessment remains the cornerstone in identifying patients who are in need of nutritional support. Whenever possible enteral route should be used.[9] Fistula was the main indication for TPN in this study with full recovery in majority of patients, either spontaneously or by surgical intervention. It

TABLE – III

CAUSES OF FISTULA



has been shown that TPN as an adjunct to the management of fistula increases closure rate and decreases mortality rate[1,2] with best results in duodenal and jejunal fistula.[1] In this study majority received TPN for less then 4 weeks, although it is recommended that surgery should be deferred beyond 6 weeks after fistula onset.[1] Conflicting reports suggest that although with TPN, patients are enabled to be operated in a better condition yet no significant improvement in mortality rate or spontaneous closure has occurred as compared to years without TPN.[10] It can be argued that this might be due to the increased frequency of complicated fistulae as a result of modern surgery. Another principle indication recommended for TPN is malignant disease and it has been reported that one third of patients on TPN have carcinoma.[6] In our study only 6 patients on TPN had malignant disease, amongst these 4 had TPN for preop build-up. It has been shown that patients without wt. loss survive longer then those with> 5% wt loss.[3,4,5,6] TPN however does not reverse the hypoalbuminemia associated with malignancy.[11] Five of the study patients were

TABLE –IV

VENOUS ACCESS USED AND DURATION OF TPN

CENTRAL	41(91%)
< 2 weeks	17(38%)8
2-4 weeks	18(40%)
> 4 weeks	6(13%)
Average 22 days	(7-52)
PERIPHERAL	4(9%)
Average 4.5 days	(2-6)

TABLE –V

MORBIDITY OF PTS ON TPN

n = 45

INSERTION PROBLEM	3 pts
pneumothorax	2
Subclavian art. puncture	1
INFECTIVE	8 pts
BLOCKED CATHETER	5 pts
requiring reinsertion	3
JAUNDICE	2 pts

TABLE – VI

MORTALITY OF PTS ON TPN

DUE TO CENTRAL LINE		2
possible haemothorax	1	
septicaemia	1	
DUE TO UNDERLYING CAUSE		5
burns	3	
duodenal fistula	1	
oesophageal fistula	1	

burns victim. The outcome was disappointing because of the degree and area involved. Hyperalimentation has been shown to promote healing and increase survival in selected burns patients.[7] Although TPN was used in pancreatic fistula patients in this study it has been suggested that enteral nutrition gives similar results.[12]

Central line is usually inserted in subclavian vein directly (as in the study patients) however peripherally inserted central catheters (PICC) provide a reasonable and safe alternative and is convenient to maintain.[13] Thrombophlebitis is a common complication if hyperosmolar solutions are used in peripheral vein but fine bore peripheral lines have been reported to have decreased incidence of this complication.[14]

A caloric-nitrogen ratio of 150-200:1 is to be maintained when calculating the requirements for TPN and patients on long term TPN should have supplemental vitamins, minerals, fatty acids and trace elements to avoid various deficiency syndromes.[15,18] Volume restricted TPN (TPN-VR) should be used in patients who cannot tolerate volume overload.[19]

Outside specialist centres, the septic complications remain the most common (as was in this study), the reported rate being 3 to 14%.[8] The only way to establish the cause of sepsis being the catheter, short of removing and subjecting it for culture, is a 5 times growth of the same organism from the simultaneous blood sample drawn from the catheter as is grown from the peripheral blood sample.[8] TPN was terminated in 2 patients in this study because of the development of jaundice. It has been suggested that TPN is not a crucial causative factor, other factors also play a part,[20] while others mainly incriminate TPN.[21] Moreover manipulating the fat source can prevent TPN induced hepatic dysfunction.[22] As TPN is now being used for longer and longer periods, there has been increasing awareness of the catheter related complications, like central venous thrombosis, endocarditis and intra cardiac thrombus besides others.[8] Regular echocardiography is recommended for the patients on long term TPN,[8] and soft silicone or polyurethane catheters have been recommended especially for prolonged use.[23,24]

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