INTRAVENOUS NUTRITION AND THE BATTLE CASUALTY

A Case Report and Discussion

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SUMMARY: A case is reported of severe abdominal wounding by a low velocity bullet in the management of which intravenous nutrition played a vital role.

The case is briefly discussed and the conclusion drawn that suitable intravenous solutions should be available in small quantity well forward in the battle area at least at the point where major surgery is first performed on the battle casualty.

Introduction

Many patients with abdominal wounds have to cease normal oral nutrition to avoid dilation of an inactive gut or to promote healing of an anastomosis. It is just at this time that a severe catabolic phase is induced by the trauma and subsequent surgery. A combination of starvation and catabolism can lead to delayed healing, gross emaciation and poor resistance to infection. The answer for these patients lies in the early institution of intravenous nutrition. In the following case report this was not done leading to the aforementioned results. Fortunately even the late commencement of intravenous feeding just saved the day for this patient.

Case report

A 25 year old policeman of slim build was hit by a low velocity bullet in the upper outer right thigh. On arrival at a local hospital he was resuscitated, X-rayed and taken to theatre for an exploratory laparotomy. This showed that the bullet had passed deep to the right inguinal ligament and lateral to the right femoral vessels passing into the abdominal cavity. Here it had gone through the caecum, divided the right ureter and then torn some lumbar veins to set up a large retroperitoneal haemorrhage. A caecostomy was performed, relative haemostasis was secured and a catheter placed in the proximal end of the divided ureter and brought out through a stab wound in the right iliac fossa.

There was a stormy postoperative course complicated by a deep venous thrombosis in the calf veins for which he received anticoagulants; he was on a drip continuously for the 25 days before transfer to the Military Wing, Musgrave Park Hospital, Belfast. Apart from the calories contained in the glucose 5 per cent solutions he had received to keep him in fluid balance (200 Cals/Litre) he had received small amounts of casein hydrolysate 5 per cent solution ('Amigen'), fructose 40 per cent and fat emulsion (Intralipid 20 per cent) to a total of about 7,500 Calories during this twenty-five day period, plus blood as necessary and intermittent light diet when he could manage it.

On admission he presented the picture of severe starvation and protein depletion. His wounds had broken down; the lower part of the laparotomy and the caecostomy

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wounds were draining faeces and urine. Although intermittently haemorrhaging also from these wounds it was obvious that his general condition was so poor that he would not tolerate surgery. The priorities were correction of hypovolaemia with immediate, simultaneous institution of intravenous nutrition.

A plastic catheter was introduced via the right subclavian vein into the superior vena cava by Yoffa's method (Yoffa 1965) and its position checked radiologically (Fig. 1). All the accessible limb veins had long since been thrombosed and in any case a

Fig. 1.
Central venous catheter in position.

central catheter reduces the incidence of thrombo-phlebitis known to complicate the infusion of intravenous nutritive agents; at the same time because of the continuing and often large haemorrhages it would prove extremely useful to monitor the central venous pressure.

During the next twenty days of solely intravenous nutrition, he received a total of 31,910 Cals (or approximately 1,500 Calories a day) made up as in Table I. Twelve days after commencement he became a fair surgical risk when viewed against the bleak prospects of his intermittent but continuing haemorrhage. Accordingly an exploratory laparotomy was performed. Further caecal holes were found and there were numerous bleeding points from the region of inferior vena cava and lumbar veins. A right hemicolectomy with end-to-end anastomosis of the ileum to the transverse colon was performed. The bleeding was stopped as well as possible and since the patient was by now in a very poor state, the right ureter was identified and, as the lumen of the portion

Table I
Solutions used and their calorific value

Solution	Cals/litre	Litres given	Amino acids	Cals given
Intralipid				
10 per cent (emulsified soya bean oil)	1,100	6.5	—	7,150
20 per cent	2,000	6.5	—	13,000
Sorbitol				
30 per cent (hexahydric alcoholic sugar)	1,200	6.0	—	7,200
Aminosol				
10 per cent (casein hydrolysate)	300	15.5	Contains 100 g/litre therefore 1,550 g given	4,560
Total calories given				31,910

distal to the laceration appeared to have been completely obliterated by scar tissue, the proximal end was simply ligated, in order to terminate the operation quickly.

Intravenous nutrition was continued for 8 days postoperatively at the end of which time he was able to take a light diet.

During the 20 days of intravenous nutrition he received in addition sufficient electrolytes, blood and other fluids to keep the constantly monitored central venous pressure and haematological values as near the normal range as possible. Oft repeated searches for a haematological cause for the repeated haemorrhages were consistently negative. On days when he haemorrhaged badly the available 'drip-time' would be taken up with giving blood and no nutritional agents would be given. The right subclavian catheter was re-introduced on the opposite side half way through the twenty day period.

He subsequently made a good recovery, though developing an urinary fistula which had to be treated by right nephrectomy.

Discussion

An excellent review of the indications and current practice for parenteral nutrition for the surgical patient has recently been published (Irving 1971). It is not claimed that the number of calories we managed to give were really adequate, only that they prevented the bad situation from deteriorating. Normal metabolic needs are 30 Cals/kg/day increasing to 45 Cals/kg/day in hypercatabolic state. We barely achieved the first figure, and this illustrates the difficulties presented if the patient has once got into an emaciated state.

With amino acids we did rather better, providing 1.5g/kg/day, sufficient for the hypercatabolic state, and it is probably to this part of the nutritional replacement that the patient owes his recovery when one remembers the vital role of the amino acids in wound healing, antibody production etc.

This patient was a thin man before he was shot but there is no evidence to support the view that the obese are better off. In starvation liver glycogen stores become exhausted

within twenty-four hours and as a result, protein breakdown to amino acids and subsequently carbohydrates residues becomes the main source of carbohydrate intermediates, because the fatty acids are unable to fulfil this function (Kinny 1960).

Once the patient in whom oral feeding is impossible has got into a severe negative nutritional balance, it is virtually impossible to put him into positive balance.

In those patients in whom difficulty in restoring oral feeding is foreseen at operation, intravenous feeding should be commenced immediately postoperatively (Irving 1971).

Conclusion

Abdominal wounds are usually held if at all possible at the site of initial surgery since experience has shown that they stand travel badly; on the other hand these are the cases likely to run into nutritional problems.

At all locations where abdominal surgery is undertaken in battle, intravenous nutritional fluids should be available, since delay in starting them in some cases will jeopardise recovery.

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