TOTAL PARENTERAL NUTRITION IN ANIMALS

Anna Cordina Zammit

Total Parenteral Nutrition (TPN) is used to provide adequate nutrition by intravenous administration in cases where feeding via the gastrointestinal tract is impractical, inadequate, impossible or contraindicated.

Study 1

The aim of this study is to investigate the use of TPN in veterinary clinics in Malta.

There are nine veterinary clinics locally, employing a total of twelve veterinarians. The majority have both large and small animal patients, i.e. farm animals and pets.

Questionnaires were sent to all clinicians. Four replied. 75% cater for intensive care and all routinely administer I.V. solutions to both large and small animals. TPN is considered in cases of gastritis, vomiting, gastro-enteritis, poisoning, dehydration, certain surgical cases, nephritis, infectious disease and prolonged anorexia. All practices use saline, dextrose, ringer lactate and plasma expanders. All practices use ready mixed TPN solutions and all routinely mix ingredients prior to use, according to the case involved.

All clinicians use subcutaneous and peripheral routes for administration: 5% also use central vein, 75% use the intraperitoneal route. Hospitalization of Intensive Care patients requiring IV therapy is not routinely practiced in Malta (only one clinic hospitalizes small pets). Animals are subjected to IV therapy (normally in the clinic) for a variable period of time, usually from 0.5 - 3 hours per session.

If required for longer periods, the small animal may be discharged home for further infusion. In these cases, client selection is very stringent. (Ideally, clients chosen to supervise IV therapy in the animal's home environment, should be of a paramedical orientation.) It is important to note that no chemical restrain is used in all four practices involved, many times IC cases are too weak to resist.

Patient and owner compliance varies from good to poor (25% poor patient compliance; 25% good patient compliance; 50% very good patient compliance). Rate of infusion is monitored and the duration varies from a few hours to over one week (few hours 100%; 75% of clinics a few days; 25% over a week).

One clinic has no technical, septic or biochemical problems associated with TPN/PPN. 75% however reported technical difficulties, including dislodgement of the IV catheter and perivascular infusion. One client had septic problems during TPN/PPN. 50% were monitored regularly before, 50% during and after infusion, 75% during infusion and 75% after infusion.

The parameters monitored in all four practices were: temperature, pulse, respiration. Other factors monitored are CBC (50%), nervous system (50%) and microbiology (25%). All clinics routinely add drug/medication to the infusion regimen. These included antibiotics, vitamins, myorelants/spasmolytics, tranquillizers/anaesthetics. All four clinics keep patient records.

Study 2

Study 2 is a comparative study of the use of TPN in Malta and the U.S.A.

Four clinics in Malta, 2 clinics, 2 veterinary hospitals and 3 veterinary teaching hospitals (i.e. university affiliated) in the U.S.A. were investigated. The practice of IV therapy in animals in Malta as seen in Study 1 and the U.S. is very similar in many respects as can be seen from the following.

In Malta, clinicians routinely use TPN/PPN. Enteral nutrition is not practiced. In the U.S. where the techniques are indicated there is a 50% chance of either TPN or Enteral Nutrition being performed on an animal.

All U.S. clinics and hospitals investigated catered for Intensive Care and consider this an integral part of their practice. All establishments see small animals: 3 also see large animal patients. Clinicians in U.S.A. use IV therapy in routine surgical cases even when the patient is not a surgical risk. Blood (freshly collected or banked) is routinely used, as indicated, in all U.S. institutions being reviewed. Flow pumps are used in all veterinary hospitals and in 1 clinic.

In U.S. veterinary hospitals and clinics, IV therapy is instituted within the confines of the veterinary ward. On the other hand, in a large animal situation (farm animals and horses), the owners are more conversant with such sophisticated methods and may be encouraged to take over the IV therapy of their animal.

Patient compliance and client compliance was satisfactory to very good. All institutions have more comprehensive monitoring systems than local clinics. Biochemistry and CBC profiles are performed on all patients, at all stages of the IV therapy. Blood pressure measurements (CVPO are taken in 65% of cases - large or small animals).

Study 3

32 TPN cases were followed in a local clinic from October 1990 to January 1992. These included 40% dogs, 36.7% cats, 16.7% horses, 5.5% sheep, 0.1% avian.

TPN was administered in the following clinical situations:

Post-operative patients:	5%
Gastrointestinal diseases (Parvo Virus Infections):	48.7%
equine colics:	16.7%
Acute pancreatitis:	2.2%
Multiple injuries:	3.4%
Major sepsis:	3%
Severe cases of dehydration:	10%
Poisoning:	17%
Renal Failure:	3%
Metabolic Disorders (Hypoclemia):	2%

Aseptic technique for compound solution and catheter insertion was employed in all cases (0% septic problems), the cephalic vein was used in 90% of small animals; the jugular vein was used in 100% of large animals and in 10% of small animals. IV catheters were of the "over-the-needle" type. microbiological tests were carried out on the TPN solution before and after infusion and IV catheter after removal from the vein. No microbiological contamination was reported.

6% of cases were given IV therapy for a few hours (i.e. usually one session), 24% of the cases were infused for a period of 3-4 days, 60% for 5-6 days and 10% for > 1 week.

TPN regimes were tailored for each individual and each species.

Study 4

The following experiments were carried out to determine the stability of a Total Parenteral Nutrition (TPN) regime. Exp 1. TPN regime without lipids at different temperatures. Exp 2 with the same regime as Exp 1 but with lipids and Exp 3 without lipids but with a higher phosphate concentration.

The analysis carried out on this experiment were of three types:

1. Microbiological with thioglycolate media and blood agars.

2. Physical: Visual observation of particles, creaming and colour changes.

3. Chemical: By means of U.V. spectrophotometer to calculate 5 HMF and related substances.

From the results obtained it was concluded that such TPN mixtures are very unstable, the ideal storage condition would be at 4°C in the dark for fifteen days. Also, as soon as the mixture is placed at room temperature for infusion its stability decreases to three days.

By comparing the results obtained, it was concluded that, ideally the mixture should not contain any lipids and phosphate when stored so that its shelf-life is increased.

The Arrhenius plot was used to obtain the expiry date of the TPN mixture. In doing so one is assuming that the same order of reaction is being followed at the higher and the lower temperatures, otherwise the Arrhenius plot will not be a straight line.

Pharmacist's Role

The pharmacist is responsible for aseptically compounding the solutions and monitoring stability of the preparations. The pharmacist is also responsible for labelling correctly the mixture, stating contents, expiry date and storage conditions. The pharmacist may also be involved in disease prevention. As a respected member of the community, the pharmacist is in the unique position to provide advice to the public, i.e. basic features of animal care.

Nevertheless, OTC drugs should not be dispensed nonchalantly as their pharmacology may be quite different to ours. Referral is the text policy.

The pharmacist can give moral support to the owner of an Intensive Care pet, struggling to save the life of a loved pet. In this situation, the pharmacist can provide technical assistance in the use of the therapy and administration of drugs prescribed by the veterinarian.

The pharmacist may also devise a computer programme to create the TPN regime required by a patient according to the particular blood profile and disease condition.