Approach to Parenteral Nutrition

Module 9.1

Indications and Contradictions for Parenteral Nutrition

Learning Objectives

• To identify indications for parenteral nutrition;
• To know the basis of recommendations for parenteral nutrition;
• To understand the role of parenteral nutrition in clinical outcome.

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Key Messages

• Parenteral nutrition is indicated when nutritional support is required but EN is not feasible for any reason;
• The indications for PN depend partly on the availability of an expert nutrition team, as in inexpert hands the results can be poor and the complication rate high;
• In a limited number of conditions e.g. radiation enteritis, PN, though not necessarily mandatory, can provide a useful period of bowel rest while the underlying problem subsides. This may be termed “elective PN”.

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1. Introduction

The indications for nutritional support and parenteral versus enteral nutrition in clinical practice have been subject of many original studies, systematic reviews \(1, 3, 7, 8, 9, 12, 13, 15\), meta-analyses \(4, 6, 10, 14, 16, 17\), and guidelines from scientific societies \(2, 5, 11, 18, 19, 20, 21, 22\).

This presentation will focus mainly on evidence-based recommendations matching each type of patient’s management to results derived from a comparable group of patients. In the absence of clear evidence from controlled studies, decisions may have to be made from clinical experience and from an understanding of the underlying pathophysiology: for example, for obvious reasons, there have been no controlled trials of PN in prolonged GI failure. Since starvation for long periods is associated with a high morbidity and inevitable death after 2-3 months even in previously healthy individuals, it could be construed as negligent to fail to provide artificial nutrition in such a situation.

2. Indications for PN

The indications for parenteral nutrition can be considered under 3 headings.

2.1 PN as Replacement Therapy in GI Failure

This includes all conditions, transient or permanent, causing intestinal failure as mentioned above. If PN has to be used as a sole means of nutritional support, this has been termed Total Parenteral Nutrition (TPN). In most cases, however of chronic disease the GI failure is partial or relative, allowing a portion of the nutritional requirements to be given enterally and in this case we speak of PN rather than TPN. PN for GI failure cannot be validated through RCTs because the only alternative to PN is allowing the patient to starve to death. It is therefore ethically unacceptable to have a “non-fed” control group.

This type of nutritional support is capable of maintaining life in the patient with intestinal failure for as long as required, unless the underlying disease is progressive and fatal. Even then it may provide a reasonable quality of life even when the prognosis is only a few months.

Short bowel syndrome represents the major “benign” indication for PN and, in some countries (sub)-obstruction due to peritoneal carcinomatosis is the most frequent “malignant” indication. The evidence for the efficiency of PN as replacement therapy in GI failure relies on historical comparisons.

The main problems in Home Parenteral Nutrition (HPN) for benign conditions relate:
- To the safety of administration, i.e. avoidance or treatment of mechanical, infectious and thrombotic complications;
- To maintaining nutritional balance of both macro- and micro-nutrients;
- The prevention of bone and liver disease.

The major problems of HPN in malignant diseases are:
- The unpredictability of the life expectancy of the patients from primary tumour; this makes it difficult to judge the likely benefit or burden to the patient and whether the prognosis from the tumour will allow the patient to derive significant benefit in terms of longevity and quality of life, bearing in mind that without PN the patient will perish from malnutrition in 2-3 months at the most;
- It may be quite difficult to estimate whether and for how long HPN will maintain an acceptable quality of life. This may involve a trial of treatment for a period of time agreed with the patient and family and withdrawal of PN if it proves to be more of a burden than a benefit.

Both these issues are the subject of continuing clinical investigation.

2.2 PN versus EN

This consideration usually arises when short-term nutritional support can be provided through both routes but, due to limited GI tolerance, it is not possible to give sufficient EN to meet the patient’s total nutritional requirements.

Under these circumstances it has been possible to carry out some controlled trials and it is therefore to give some evidence-based guidelines. Also in many cases of chronic GI failure, part at least of the patient’s nourishment can be given orally. In both situations PN can be seen as supplement to EN and the two modalities are therefore complementary rather than competitive.
In the majority of studies, in critically ill, surgical GI, and oncological patients, better results have been obtained with EN alone or PN plus EN than with PN alone.

As a consequence, PN should only be given on its own when enteral nutrition is impossible and used as a supplement when EN is not tolerated in sufficient amounts to meet requirements. Apart from greater clinical efficacy, possibly related to maintenance of gut mucosal integrity and gut associated lymphoid tissue (GALT), EN is also cheaper and less risky, particularly in the absence of an expert nutrition team.

2.3 Elective PN for Bowel Rest
In a limited number of conditions e.g. radiation enteritis and other acute bowel problems it may be desirable, if not always essential, to rest the bowel temporarily using PN electively until the underlying problem improves

2.4 Comparing different intravenous substrates
Much discussion and research continues concerning the optimal formulae for PN feeds and the ideal formula in different clinical situations e.g. fat vs. glucose, LCT vs. MCT, N-3 vs. N-6 PUFA, and amino acid substrates (standard admixtures vs. those enriched in BCAA, glutamine, arginine, etc.). These questions are described more detailed in other modules.

The end-points of many investigations are often metabolic/nutritional surrogates rather than the more important goal of clinical outcome. Such studies are therefore of limited value in terms of developing guidelines, although they help to increase our understanding of the metabolic processes involved.

The carrying out of further well designed studies with relevant clinical endpoints represents a major challenge in clinical nutrition. In this respect, the heterogeneity of the patient population, the complexity of the underlying clinical problems, and the recruitment of adequate numbers make it difficult, though not impossible for any one centre to conduct studies of adequate size to achieve significance. This emphasise the need for multicentre collaborative studies, if the funding can be found for them.

3. Summary
The rationale for providing parenteral nutrition in different pathologies is discussed, emphasising the importance of evidence-based recommendations.

PN is indicated when nutritional support is required but, for any reason, nutritional requirements cannot be met entirely by the enteral route. PN can be used to meet the patient’s entire nutritional requirements (TPN) or used as a supplement to EN when this cannot be tolerated in sufficient amount to meet full requirements. The two modalities are therefore complementary rather than competitive. EN, even partial EN has a particular role supporting gut integrity and GALT. Dosage is limited by GI tolerance which is some protection against administering excess nutrients e.g. glucose or excessive salt and water, both of which may impair outcome. PN, on the other hand is a very efficient way of administering large volumes of fluid and nutrients. It is only too easy therefore to administer excess nutrients and fluid causing, for example, hyperglycaemia and salt and water overload. This may explain some of the adverse effects of PN reported in the literature, e.g. the veteran’s administration trial and indeed some of the adverse comparisons with EN. In expert hands, accurately and precisely targeted PN is safe and effective when the right indications are present.

In a few conditions (severe enteritis, radiation enteropathy, high output GI fistulas, etc.), using PN as a means of temporarily resting the bowel may be helpful.

Further clinical studies are desirable to establish the ideal feed formula for different clinical situations.

References
2. ASPEN Board of Directors. Guidelines for the use of parenteral and enteral nutrition in adult and paediatric patients. JPEN 2002:26 (Suppl 1)

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Further Readings