Learning Objectives

- To know the most frequent indications for artificial nutrition;
- To know the techniques and outcome;
- To know the indications and results in specific clinical situations;
- To understand the need for ethical elements alongside the medical ones in deciding upon starting an older patient on artificial nutrition.

Contents

1. Introduction
2. Choice of nutritional support technique
   2.1 General considerations
   2.2 Decision on percutaneous endoscopic gastrostomy
3. Age-related issues
   3.1 Route
   3.2 Outcomes
      3.2.1 Complications
      3.2.2 Survival
      3.2.3 Nutritional status
      3.2.4 Function and quality of life
   3.3 A specific formula for older patients?
   3.4 Disease
      3.4.1 Hip fracture
      3.4.2 Neurological dysphagia
      3.4.3 Dementia
      3.4.4 Pressure sores
4. Ethical issues
5. Summary
6. References

Key Messages

- Most indications are ideally addressed with enteral nutrition, rarely parenteral nutrition;
- Indications, products and techniques do not differ from younger adults, but the outcome is worse;
- Prolonged artificial nutrition can be performed at home or in an institution;
- Most demented patients will not benefit from artificial nutrition.
1. Introduction

The mean age of patients receiving artificial nutrition is steadily increasing along with life expectancy; patients over the age of 65 already represent 34.5% of home enteral nutrition patients (1) and those over 60 account for 28% of home parenteral nutrition patients (2) in Europe. Consequently, some aspects of artificial nutrition (such as the span of its complications) do not differ from what is described in younger adult patients (see LLL Topics 8 and 9). However, there are some marked differences, including the metabolic response to refeeding, specific indications or contra-indications and outcomes. Anorexia in the older adult will also lead to longer refeeding periods, along with more frequent institutionalization.

While reducing morbidity and mortality is a priority in younger patients, artificial nutrition in the older patient aims more at improving function, wellbeing and/or quality of life, taking into account the change in living situation (e.g. institution vs. home) that it may imply, along with improving outcome and/or accelerating recovery from a given condition.

Last, the anticipated benefits need to outweigh the potential risks.

2. Choice of Nutritional Support Technique

2.1 General Considerations

Artificial nutrition should be considered after oral supplements have failed (due to insufficient intake) (see LLL Module 36.2) or in a severely malnourished patient in whom there is a need for fast weight gain. The flow chart in older patients is the same as the one we refer to in younger adults (Fig. 1). Namely, enteral nutrition (EN) should always be considered first in a patient with a functioning gastrointestinal tract (3), and parenteral nutrition (PN) should only be considered when PN is contra-indicated or not tolerated, thus preventing patients from meeting their nutritional requirements. Enteral nutrition will be started during a hospital stay of at least a few days, in order to place the feeding tube, evaluate tolerance and to train the patient and/or relatives. It will then be continued at home or in an institution.
2.2 Decision on Percutaneous Endoscopic Gastrostomy

As EN is preferred to PN and EN is often prolonged due to persistent anorexia or dysphagia, percutaneous endoscopic gastrostomy (PEG) will often be the route of choice for artificial nutrition in the older patient. Three groups of patients can be identified (Fig. 2):

- Those who will need prolonged home EN, probably due to persistent dysphagia after a resolving disease. Prolonged nutritional support may ensure a prolonged survival;
- Those who will get a short-term benefit before resuming oral nutrition, such as those with secondary anorexia after stress; survival is better in these patients than in those dependent on home EN (5);
- Those who will die while on home EN, due to their primary disease; in these patients, EN can be considered as palliative care and it needs then to improve their quality of life.
Fig. 2 Flow chart for percutaneous endoscopic gastrostomy decision-making in the older patient with dysphagia. Adapted from (4).

3. Age-related Issues

3.1 Route

Long-term EN and PN in adult patients who are involved in sports (e.g. swimming) will often be provided through convenient “motion-friendly” gut/venous access devices, namely PEG buttons and implantable venous access ports. These may not be needed in house-bound or institutionalized older patients.

Hypodermoclysis is a method of infusing fluid into subcutaneous tissue that requires only minimal equipment. It can be helpful in older patients when the indication of artificial nutrition is mostly based on hydration needs; it may also be a convenient way to administer amino acids, with the aim of not worsening (rather than healing) malnutrition in these patients (6). Table 1 shows the main indications and contra-indications for this method.
Table 1
Indications and contra-indications for hypodermoclysis

<table>
<thead>
<tr>
<th>Indications</th>
<th>Contra-indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention / treatment of moderate dehydration</td>
<td>Shock, severe dehydration</td>
</tr>
<tr>
<td>(NaCl ± glucose)</td>
<td>(Na &gt; 150 mmol/L)</td>
</tr>
<tr>
<td>Dysphagia for liquids</td>
<td>Major coagulation disorders</td>
</tr>
<tr>
<td>Confusion, dementia</td>
<td>Severe heart failure</td>
</tr>
<tr>
<td>Fever, heat-wave</td>
<td>Severe malnutrition</td>
</tr>
<tr>
<td>Difficulties in enteral/venous access</td>
<td></td>
</tr>
<tr>
<td>Prevention of malnutrition worsening</td>
<td></td>
</tr>
<tr>
<td>(amino acids)</td>
<td></td>
</tr>
<tr>
<td>Transient insufficient oral intake</td>
<td></td>
</tr>
<tr>
<td>Contra-indication to enteral nutrition</td>
<td></td>
</tr>
<tr>
<td>Terminal patients</td>
<td></td>
</tr>
<tr>
<td>Prevention of dehydration</td>
<td></td>
</tr>
<tr>
<td>Infusion of analgesic/anti-anxiety</td>
<td></td>
</tr>
<tr>
<td>drugs</td>
<td></td>
</tr>
</tbody>
</table>

EN may be delivered continuously or cyclically, with similar nutritional results (7, 8). However, only cyclical nocturnal nutrition allows the patient to have physical activity in the daytime and to eat normally at meal times.
PN can be administered both centrally and peripherally, with in the latter case an osmolarity not exceeding 850 mOsm/L (9).

3.2 Outcomes

3.2.1 Complications

Complications of HEN and HPN are similar to those observed in other age groups. They include tube complications (obstruction, removal) and diarrhoea/constipation for enterally fed patients and catheter-related complications (infections, thrombosis, obstruction) for parenterally fed patients. Specifically, advanced age has been associated with a higher risk for hyperglycaemia and central catheter vascular erosion, but not for bloodstream infections (10).

3.2.2 Survival

As would be expected, life expectancy on nutritional support is lower in older patients than in younger ones (11). This is true for survival in home EN patients (Fig. 3) (5). This is also true after procedures such as percutaneous endoscopic gastrostomy (PEG), where age is an independent factor associated with complications and mortality (12). However, an Italian study of 482 nursing home residents receiving EN reported a median survival of 13.7 months, with a median duration of EN of 296 days, and 6% having resumed oral nutrition and able to stop EN because of this improvement (13). For obvious ethical reasons, no study has been designed in order to show a benefit of artificial nutrition versus the absence of nutritional support in comparable groups, and the only studies available, with conflicting results, are either observational or with non-comparable groups; therefore, in patients who need tube feeding due to the severity of disease, an increase in survival is not proven (14).
3.2.3 Nutritional Status

There is resistance to refeeding in older patients. Namely, for the same amount of nitrogen and energy provided by EN, the increase in weight, fat-free mass and chronic phase proteins is lower in older patients than in younger adults (7, 15). When an extra 7,500 kcal are needed to gain one kilogram of body weight in young malnourished patients, 8,800 to 22,600 kcal are needed in older ones (16). The same is true for PN (Fig. 4) (17). Chronic inflammation (18), insulin resistance (9) as well as a higher splanchnic extraction of proteins (19) might be responsible. Many tube fed patients are bedridden, and the consequent immobility further enhances muscle wasting and prevents gain in lean mass. Weighing is also problematic in these patients. Among the therapeutic adjuvants that may be used to counteract this resistance to refeeding, exercise performed during artificial nutrition is probably the most important (20).
**Fig. 4** Correlation between daily changes in body cell mass and energy provided during a 2-week parenteral nutrition course in 325 mildly malnourished patients aged 20-80. Adapted from (17).

### 3.2.4 Function and Quality of Life

Health-related quality of life is lower in older home EN patients compared with younger ones (21). Again there are few studies on the effects of artificial nutrition on functional status and health-related quality of life. This may be due to the fact that most studies have included patients from nursing homes with an impaired physical functioning beyond improvement and unable to fill in a questionnaire themselves because of cognitive impairment. Some studies have shown a positive impact of EN on functionality and others a negative impact. Older patients on home EN and PN achieve lesser levels of rehabilitation than their younger counterparts (9, 22).

### 3.3 A Specific Nutrition Formula for Older Patients?

There is no evidence in favour of a specific formula in EN or PN in the older adult. Rees et al. have proved high-energy high-protein EN diets to be able to help reach a positive nitrogen balance faster, which may be helpful in stressed older patients (23). As a higher protein intake is recommended in these patients, possibly to counteract the higher splanchnic extraction, high-protein formulae may be helpful. As diet-induced thermogenesis is similar to that in younger adults (24) the use of high-energy formulae is not warranted, and the energy load of the formula will be considered concomitantly with the hydration needs. Sodium reabsorption is lower and the threshold for thirst higher in older adults, which highlights the needs for water intake (30 ml/kg/d) which should be taken into account in the prescription of EN/PN formulae. Semi-elemental EN formulae do not have any age-specific benefit over polymeric ones. Last, fibre supplementation is able to improve bowel function with reduced stool frequency and more solid stool consistency, without affecting the nutritional efficiency of enteral feeding in hospitalised older patients (25). For PN, lipid oxidation is not impaired by age, unlike carbohydrate oxidation, which may warrant the use of formulae with higher lipid contents (grade B) (9).

### 3.4 Disease

Even though the same diseases leading to a need for nutritional support can be found throughout the lifespan, there are differences in indications in older patients (Fig. 5) (22). Patients’ outcomes differ, with age being an important factor (Table 2).

#### Table 2
Outcome of patients on home enteral nutrition (5)

<table>
<thead>
<tr>
<th></th>
<th>Head and neck cancer</th>
<th>Neurological diseases</th>
<th>Dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>76</td>
<td>148</td>
<td>54</td>
</tr>
<tr>
<td>Age</td>
<td>65</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>Body mass index</td>
<td>19.9</td>
<td>19.9</td>
<td>17.4</td>
</tr>
<tr>
<td>30-d survival</td>
<td>88%</td>
<td>83%</td>
<td>54%</td>
</tr>
<tr>
<td>1-yr survival</td>
<td>37%</td>
<td>41%</td>
<td>20%</td>
</tr>
<tr>
<td>5-yr survival</td>
<td>24%</td>
<td>21%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Fig. 5 Proportions of young and older adult patients starting home enteral and parenteral nutrition in the USA (1985-92) according to the major diagnostic groups. Adapted from (22). HEN: home enteral nutrition; HPN: home parenteral nutrition.

3.4.1 Hip Fracture

Hip fracture is a common condition in the older patient. A Cochrane analysis that includes four trials testing supplementary overnight EN failed to show benefits on survival, but these studies were heterogeneous (26). Bastow et al. have showed a benefit of EN on anthropometric measurements, with reductions in rehabilitation time and hospital stay in the most malnourished patients (27). On balance, oral nutritional supplements should be prescribed at least temporarily in all patients (grade B) (28).

3.4.2 Neurological Dysphagia

In neurological dysphagia, nutritional therapy depends on the type and extent of the swallowing disorder. Nutritional therapy may range from normal food to mushy meals (modified texture), thickened liquids of different consistencies or total EN delivered via nasogastric tube or PEG. In a Cochrane analysis of interventions for dysphagia in acute stroke, EN delivered via PEG was associated with a greater improvement of nutritional status when compared to EN delivered via nasogastric tube (29). Sanders et al reported an improvement in activities of daily living in 25 stroke patients (mean age 80 years) with EN via PEG (PEG placement on average 14 days after stroke) (30). The better post-procedural prognosis if PEG is placed more than one month after the stroke leads to advice PEG placement if dysphagia persists after one month (31).

3.4.3 Dementia

An inadequate intake of energy and nutrients is a common problem in demented patients. Malnutrition may be caused by several factors including anorexia (common cause: polypharmacy), insufficient oral intake (forgetting to eat), depression, apraxia of eating or, less often, enhanced energy requirement due to hyperactivity (constant pacing) (14). In advanced stages of dementia, dysphagia may develop and might be an
indication for EN in a few cases. Most studies, with a low level of evidence, have shown a worse outcome in enterally-fed demented patients and/or demented patients receiving PEG, compared to either the absence of intervention in demented patients (5) or the same interventions in non-demented patients (12, 32). EN may be recommended at early stages of the disease, or after an acute weight loss in patients with Alzheimer’s disease (33). However, for patients with terminal dementia (irreversible, immobile, unable to communicate, completely dependent, lack of physical resources) EN is not recommended (grade of recommendation C) (14).

3.4.4 Pressure Sores

Pressure ulcers are associated with an increased risk of morbidity and mortality. A systematic review by Stratton et al. shows that enteral nutritional support, particularly high protein supplements, can significantly reduce the risk of developing pressure ulcers (by 25%). However, available studies on the effect of EN do not show improved healing of decubitus ulcers (34).

The importance of protein in pressure sore healing was suggested in an 8 week non-randomised study in 28 malnourished nursing home residents with decubitus ulcers (35). The administration of a formula with 61 g protein per litre (24% of the total energy) was more successful in decreasing total pressure ulcer surface area than a formula with 37 g protein per litre (14% of energy). A high energy intake is also important. If oral nutritional support fails, enteral nutrition should be proposed, provided that the expected benefit is thought to outweigh the risks of the technique (28).

4. Ethical Issues

Ethical issues are crucial in deciding upon starting an older patient on artificial nutrition. Public controversy about life-sustaining technologies for older persons now focuses on decisions about withholding or withdrawal of tube feeding, but debate about the legal and ethical issues involved in these decisions tends to obscure the relevant clinical considerations (36). In most countries, nutritional support is considered a medical treatment and not comfort care. The patient’s informed consent needs to be obtained, with family or a caregiver as possible surrogates (where legislation permits this). Sedation of the patient for acceptance of the nutritional treatment is never justified. Proposing PEG because the patient takes too long to feed is also unacceptable. The decision must always – if possible – be based on medical evidence. The justification for nutritional support should be critically reviewed at regular intervals, to determine whether the treatment is mainly prolonging the patient’s life or his/her suffering. Although artificial nutrition may be withheld, there is a general consensus that once initiated, it may not be withdrawn, unless the patient’s circumstances change substantially (37).

5. Summary

Enteral and parenteral nutrition are valid options in the malnourished older patient, both in the hospital and at home. Older patients share most indications and complications with younger adult patients, even though more focus needs to be put on function and quality of life than on mortality.

6. References


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