Home parenteral nutrition

Michael Staun
Home parenteral nutrition

Management of the chronic condition

Michael Staun
Copenhagen
Indication for home parenteral nutrition (HPN)

• Needed for patients with intestinal failure
• Patients in whom nutritional and water and electrolytes balance cannot be corrected by enteral route
• Short or long term depending on whether intestinal failure is reversible or chronic
HPN in adult population
Incidence / Prevalence

• Data for Europe:
  – Incidence, per mill inhabitants/year:
    • France (2001-2004) 3
    • Spain (2001) 1.65
    • Denmark (2001) 5
  – Point prevalence, per mill inhabitants:
    • Scotland (2001) 12
    • UK (2001) 9
    • Denmark (2001) 20

• The point prevalence of HPN is estimated to be 6 to 10 times higher in US compared to Europe
Distribution of underlying diseases for HPN patients in Europe (1997; n = 479)

- Cancer: 39%
- Crohn's disease: 19%
- Vascular diseases: 15%
- Others: 18%
- Radiation enteritis: 7%
- AIDS: 2%

ESPEN-HAN, Clin Nutr 1999; 18: 135
### Causes of death related to HPN

<table>
<thead>
<tr>
<th></th>
<th>Belgian-French study</th>
<th>Danish cohort study</th>
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</thead>
<tbody>
<tr>
<td><strong>Number of pts</strong></td>
<td>n = 217</td>
<td>n = 202</td>
</tr>
<tr>
<td><strong>Benign underlying</strong></td>
<td>100%</td>
<td>94 %</td>
</tr>
<tr>
<td><strong>diseases</strong></td>
<td></td>
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<tr>
<td><strong>Deaths (total)</strong></td>
<td>n = 73</td>
<td>n = 51</td>
</tr>
<tr>
<td>HPN related</td>
<td>n = 8 (11%)</td>
<td>n = 6 (3%)</td>
</tr>
<tr>
<td>Catheter-associated</td>
<td>n = 4</td>
<td>n = 2</td>
</tr>
<tr>
<td>sepsis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver failure</td>
<td>n =3</td>
<td>n =2</td>
</tr>
<tr>
<td>Venous thrombosis</td>
<td>n =1</td>
<td>n =1</td>
</tr>
</tbody>
</table>

*Messing B et al, Gastroenterology 1995  
Jeppesen PB et al, Scand J Gastro 2005*
HPN
Management of the chronic condition

Training, nutrition support team

Catheter-related complications
  – Sepsis
  – Venous thrombosis

Metabolic
  – HPN associated liver disease
  – Metabolic bone disease
How to teach the patients?

Nutrition support team

• Written manuals with photographic instructions
• Videotapes
• Interactive programs
  – ‘HPN-school’ with demonstrations, hands on and exercises by patients/relatives and community nurses
  – PC-based?
Instruction manual handed out to the patient
The teaching program

The European survey reported the following:
- Catheter care (100%)
- Preventing and recognising complications (98%)
- Most common mistakes (92%)
- Pump care (92%)
- Managing complications (90%)
- Adding vitamins (55%)
- Bag preparation (50%)
- Intravenous medication (50%)

Home parenteral nutrition (HPN) teaching practice in Europe
Teaching the patient in the ward
The impact of training for HPN

• Group A
  – Oral instruction, two sessions ‘hands on’
  – 91 port-a-cath, 26 tunnelled cath.

• Group B
  – Detailed instruction theoretical and practical, written material, hand out.
  – 68 port-a-cath, 45 tunnelled cath

• Fewer infections in group B
  – 50 % reduction to 3/1000 catheter-days (p<0.001)

Patient support and education

Patient affiliation to ongoing HPN education interactive video-based for 18 months (randomised, controlled), 39 patients

– Significantly fewer hospitalisations due to line infection at 6 and 18 months
– Better quality of life score
– Lower rate of depression
– Patients better at defined problem solving

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Sepsis incidence in HPN patients in Denmark – 1991-2001

Ugur A, Marashdeh B, Jeppesen PB et al, Scand J Gastro 2005
The European perspective - HAN survey sepsis 2002

• 12 centres, 447 patients, a total of 110869 catheter days
• About 25% had problems, about 50% of infectious origin and in half the cases - removal of the catheter
• Risk factors were port-a-cath and daily use of catheter

Central line infection
How to prevent?

- Cornerstone: strict adherence to the use of sterile barrier precautions
- Disinfect catheter hubs – common site of contamination
- Remove catheters when no longer needed
- Routine changes of catheters do not reduce infectious complications

Repeated line infections

What to do?

• Change the line
• Re-education by HPN team in all procedures
• Catheter lock with antibiotics?
  – Case reports available
  – Taurodiline daily in 7 patients for 3-62 months
  – 10 fold reduction in line infection rate
• More studies are warranted

HPN Management of the chronic condition

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Central vein thrombosis

• **Clinical features:**
  – Pain in the chest, shoulder or intrascapular area
  – Swelling of the ipsilateral arm
  – Superior vena cava syndrome
  – Isolated fever

• **Diagnosis:**
  – Bilateral upper limb phlebography
  – Doppler ultrasound
  – CT-scan
Catheter related venous thrombosis

• Higher risk with insertion at femoral > jugular > subclavian site

• If diagnosed in the HPN patient population
  – Removal of catheter if septis or malfunction
  – Anticoagulant treatment – for as long as HPN continues?
  – Thrombolytic medication?
  – Loss of venous access is often the consequence

• Clinical studies warranted
# HPN

## Management of the chronic condition

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</table>
HPN associated liver disease

• **Prevalence**
  – Abnormal liver function tests are reported in 15-85% in patients on HPN

• **The underlying pathology**
  – Steatosis
  – Periportal inflammation
  – Cholestasis
  – Fibrosis and cirrhosis
  – Liver failure

HPN associated liver disease - aetiology

- **Patient related factors**
  - Short gut, resection of the ileum
  - Exclusion of the colon
  - Bacterial overgrowth, endotoxins
  - Enterohepatic cycle disrupted
  - Recurrent sepsis – infections
  - Pre-existing liver disease

Luman W., Shaffer J. Clin Nutr 2002; 21: 337*
HPN associated liver disease –

• **Nutrition related factors**
  – Hyperalimentation
  – Lipid intake \( \geq 1 \text{ g/kg/day}^* \)
  – Glucose overload (steatosis)
  – Antioxydant deficiency (vitamins E-C, selenium)
  – Source of fat emulsion, few data

HPN associated liver disease

• Prospective study of 90 patients
• Benign intestinal failure

• Chronic cholestasis
  – At least 1.5 fold increase in liver function tests for 6 months

• Complicated liver disease
  – Jaundice > 1 month, portal hypertension, ascites, bleeding from varices, liver failure, cirrhosis or fibrosis

*Cavicchi M et al, Ann Int Med, 2000; 132: 525-32*
HPN associated liver disease - results

Chronic cholestasis:
• 65%, after a median of 6 months
• Risk factors: bowel length < 50 cm
  lipid intake >1 g/kg/day

Complicated liver diseases:
41.5% after a median of 17 months
Risk factors: lipid intake >1 g/kg/day

Cavicchi M et al, Ann Int Med, 2000; 132: 525-32
HPN-related liver diseases
Preventive measures

- Supply enteral nutrition when possible
- Treat underlying disease, inflammation, stenosis, reduce bacterial overgrowth
- Reanastomose excluded intestine if possible
- Do not supply > 1g lipid/kg/d parenterally
- Treat / prevent infections/ sepsis
**HPN Management of the chronic condition**

**Training, nutrition support team**

**Catheter-related complications**
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**Metabolic**
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Metabolic bone disease and HPN – prevalence

The clinical features:

Bone (joint) pain: 35%¹

Previous fracture: 10%¹

Bone mineral density (BMD):

Osteopenia: (T-score < - 1 SD and > -2.5) 43%¹ - 52%³

Osteoporosis: (T-score < - 2.5 SD): 41%¹ – 67%² - 33%³

¹Pironi and ESPEN-HAN Group; Clin Nutr 2002
²Cohen-Solal et al., J Bone Miner Res 2003
³Haderslev et al., JPEN 2004
## Aetiology

<table>
<thead>
<tr>
<th>General</th>
<th>Underlying diseases</th>
<th>HPN</th>
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<tbody>
<tr>
<td>• Age</td>
<td>• Malabsorption</td>
<td>• Aluminium toxicity</td>
</tr>
<tr>
<td>• Menopause</td>
<td>• Chronic inflammation</td>
<td>• Negative calcium balance</td>
</tr>
<tr>
<td>• ↓ Sunlight exposure</td>
<td>• Corticosteroid</td>
<td>• Impaired PTH secretion</td>
</tr>
<tr>
<td>• Smoking</td>
<td>• Chronic metabolic acidosis</td>
<td>• Micronutrient deficiencies</td>
</tr>
<tr>
<td>• Lack of physical activity</td>
<td>•</td>
<td>• The use of heparin ?</td>
</tr>
<tr>
<td>• Alcohol intake</td>
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</table>
BMD - study 1

- n = 65 patients on long-term HPN (enrolled in a previous cross-sectional survey)
- Protocol: BMD at femoral neck and lumbar spine z-scores < -2
- Follow-up: 18.1 ± 5.5 months
- Results: BMD Z-score significantly increased at lumbar spine; no change at femoral neck
- Lumbar spine-score negatively correlated with female sex and age when starting HPN

Pironi, L et al. and the HAN-Working group, Clin Nutr 2004
Follow-up: (mean duration, 5.5 ± 1.2 years)
The changes in Z-score at the lumbar spine were dependent on the age when IF occurred. The older the patients, the higher the increase in Z-score during HPN.
HPN had no deleterious effect on cortical bone mass and BMD of trabecular bone improved in most patients.

Cohen-Solal et al., J Bone Miner Res 2003
BMD - study 3

- n = 75 patients (1995 – 2003)
- Mean follow-up time: 4.1 years

Results:
- Annual decline in BMD was moderate (1%/y) and not significantly larger than in age- and sex-matched healthy subjects.
- Bone disease in HPN-patients is mainly related to the underlying disease

Haderslev et al., JPEN 2004
Prevention

• Intravenous vitamin D: 200 IU/d

• Daily amounts of minerals:
  – Ca = 4.5 - 11 mmol
  – P = 15 - 30 mmol
  – Mg = 4 - 12 mmol

• Avoid acidosis

• Lifestyle – smoking, exercise

Pironi et al., Clin Nutr 2001
Treatment

- Bisphosphonates
- Glucagon-like peptide 2
- PTH ?

Haderslev et al., Am J Clin Nutr 2002
Haderslev et al., Scand J Gastroenterol 2002
Bisphosphonates for osteopenia in patients on HPN

• 12-months, double-blind, randomized, placebo-controlled-trial
• Clodronate 1500 mg i.v. every 3 months
• 20 patients on HPN with BMD T score < -1

Results:
In the clodronate group:
1. ↓ of biochemical markers of bone resorption
2. Mean BMD ↑
3. No change for spinal BMD

Haderslev et al., Am J Clin Nutr 2002
Percentage changes in BMD at 12 months

Placebo
Clodronate

Mean change from baseline (%)

* P < 0.05
HPN-related liver diseases
Preventive measures

- In general use less than 1 g lipid/kg/day (data about the composition of lipid emulsion are scarce)

- A liver transplantation (combined with intestine) must be considered in case of cirrhosis with hepatic failure
Home Parenteral Nutrition

Type of lipid emulsions

- LCT – Safe
- LCT-MCT controversies about effect on liver abnormalities \textit{Goulet O., Nutrition, 1992}
- Structured Lipids: safe \textit{Rubin M., Nutrition, 2000}
Outcome at 1 January 1998 for HPN patients enrolled between 1 January 97 and 31 June 97

ESPEN-HAN, Clin Nutr 1999, 18, 135
Dual-energy X-ray absorptiometry (DXA)