A Patient’s Journey through Complicated Pancreatitis

Nutritional Management of Acute Pancreatitis: Indications, timing and routes

Matthias Plauth and J Powell-Tuck
A patient’s journey through complicated pancreatitis

Chairs:
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Clinical case - enteral nutrition
Acute Pancreatitis

- Incidence up to 38 per 1000,000 increasing
- 25% life threatening complications
- Mortality 6-10%

ESPEN guidelines:
Clinical Nutrition 2002 21 173-183
Meier et al ESPEN consensus group
The scenario

- Male, 60, Weight 78kg, Height 1.70m, MUAC 32cm
- Severe abdominal pain radiating to back over 8 hours. Sweaty, nauseated, faint.
- Alcohol 8 units per day, no relevant Past History, Family History, Social History.
- Severely tender abdomen
- P110/min, BP 90/45, amylase 1750 u/l, WBC 16,000/l, Glucose 11mmol/l, Urea 17mmol/l, albumin 32g/l, Ca 1.9mmol/l, PaO2 7.5 kPa.
Scenario 2

- Circulatory support: iv fluids and plasma expanders and analgesia
- High Dependency Unit
- CT extensive pancreatic inflammation with swelling into peri-pancreatic fat
Exocrine Pancreatic Secretion in Acute Pancreatitis

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Pancreatic secretion (exocrine)

- 1'500 ml/d
- enzymes (e.g. trypsin, chemotrypsin, elastase, lipase etc.)
- cations: Na\(^+\), K\(^+\), Ca\(^{2+}\), Mg\(^{2+}\) (pH~8.0)
- anions: HCO\(_3^−\), Cl\(^−\), SO\(_4^{2−}\), HPO\(_4^{2−}\)
- water
Pancreatic secretion - enteral vs parenteral

- $n = 12$, chronic pancreatitis
- pancreatoduodenectomy
- needle-catheter jejunostomy vs TPN
- pancreatic juice, 4-h fractions
- all indices slowly increasing
- on day 3 abrupt rise, thereafter stabilisation
- no difference between the groups

Pancreatic juice during feeding

Pancreatic bicarbonate concentration

Pancreatic secretion - enteral vs parenteral

**Pancreatic stimulation**
(lipids, amino acids, carbohydrates)

- gastric > duodenal > jejunal (> intravenous)

- standard diet > elemental diet

Pancreatic stimulation by feeding

- oral +++
- duodenal ++
- jejunal (+)

 jejunal feedings result in negligible increases in output of:
  - enzymes
  - bicarbonate
  - volume

Conclusions - enteral feeding

- enteral feeding → stimulation of exocrine secretion
- gastric > duodenal > jejunal
- standard diet > elemental diet
- jejunal elemental feeding = safe and effective
Clinical Trials in Pancreatitis - What does the literature tell us?

- P.N. vs no nutrition
- E.N. vs no nutrition
- P.N. vs E.N.
  - Mild disease
  - Severe disease

Must consider
  - Outcome measures
  - Amount of nutrition actually delivered
  - Composition of nutrition used
Early P.N. vs. No nutrition

- Sax et al (1987)
  - 54 patients, with mild disease (Ranson≈1)
  - Early PN (within 24 hours) or i.v. fluids only

Outcomes
- TPN group commenced oral diet 4 days later than controls (p<0.09)
- LOS in TPN group 6 days longer (p<0.04)
- More metabolic complications in TPN group
- No difference in catheter related sepsis
- Patients with 0 or 1 Ranson’s criteria more likely to be eating by day 7 (p<0.05)

Considerations
- Calorie Intake: Hyperglycaemia, Excessive CO₂ production
Early E.N. vs No Nutrition

  - 27 patients, APACHEII >7 and/or Glasgow >3
  - 14 conventional therapy, 13 EN + conventional therapy

- **Outcome**
  - EN group achieved 21% of nutritional goal over 5 days
  - Oral diet reintroduced 1 day earlier in EN group (p=0.66)
  - No difference in IL6, sTNFRI or CRP
  - Deterioration in gut permeability was not accompanied by a rise in IgG antiendotoxin core antibody
E.N. vs. P.N. in Mild Acute Pancreatitis


- 34 patients, 38% with severe disease, predominantly gallstone disease
- Randomised to TPN or EN for 7 days then re-evaluated

Outcome

- CRP (p<0.005) and APACHEII score (p<0.00001) significantly improved following EN
- No significant difference in LOS, incidence of sepsis, organ failure and mortality

Consideration

- PN group received an average of 50% more calories
- EN group, severe patients fed NJ, mild/moderate fed orally
E.N. vs. P.N. in Mild Acute Pancreatitis

  - 32 Episodes (30 patients over 32 admissions), aetiology predominantly alcohol related
  - 16 TPN via central or peripheral line, 16 TEN via NJ tube

Outcome
- Nutritional Intake: EN 71%, PN 85% by day 4 (NS)
- No deaths, no difference between groups in serial pain scores, days to normalisation of amylase, days to diet by mouth or nosocomial infections
- PN group had higher incidence of hyperglycaemia in first 5 days (p<0.02)
- PN 4x more expensive than EN (p<0.005)
E.N. vs. P.N.
in Mild Acute Pancreatitis

  - 89 Patients, aetiology predominantly alcohol related, 19% severe disease
  - First phase of study: 48 PN, 41 EN (NJ)

Outcome

- Lower rate of septic complications in EN group ($p=0.08$)
- In severe disease, EN group had lower incidence of MOF (NS)

Considerations

- Uncooperative patients and patients intolerant of enteral feed were excluded from the randomisation
E.N. vs. P.N. in Severe Acute Pancreatitis

- Kalfarentzos et al (1997)
  - 38 Patients, predominantly gallstone related
  - Imrie classification >3, or APACHEII >8
  - 18 EN via NJ, 20 PN via CVC

**Outcome**
- No difference in ICU support, LOS, protein and calorie intake or nitrogen balance
- Increased incidence of infectious complications in PN group (p<0.01)

**Considerations**
- 90% success rate for NJ placement
- Lipid in both PN and EN was MCT/LCT
Scenario 3

- Jejunal feeding
- NJ tube placed endoscopically
- Nutrition team invited to review
A Patient’s journey through complicated pancreatitis

What type of jejunal feed would you choose for this patient?

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Human studies - Jejunal feeding

  *Effect of continuous jejunal perfusion of elemental and complex nutritional solutions on pancreatic enzyme secretion in human subjects.*
  - Volunteers
    (elemental diet vs food homogenate)

- Keith RG. Surg Gynecol Obstet 1980 Sep; 151(3): 337-43
  *Effect of a low fat elemental diet on pancreatic secretion during pancreatitis.*
  - 3 patients with chronic pancreatitis
    (elemental diet vs regular feedings)

- Grant JP et al. JPEN 1987; 11:302-4
  *Effect of enteral nutrition on pancreatic secretions.*
  - 1 patient duodenal fistula
Human studies- Jejunal feeding

  
  *Effect of enteral nutrition on exocrine pancreatic function.*
  - 12 patients post-op. chronic pancreatitis
    (7 semi-elemental diet vs 5 with TPN)

- **Duerksen DR et al. Nutrition 2000; 16:47-49**
  
  *Does jejunal feeding with a polymeric immune-enhancing formula increase pancreatic exocrine output as compared with TPN? A case report.*
  - 43–y-old woman post-op. pancreatoduodenectomy

- **Duerksen DR et al. JPEN 2002 May-Jun; 26(3): 205-8**
  
  *A comparison of the effect of elemental and immune-enhancing polymeric jejunal feeding on exocrine pancreatic function.*
  - 10 patients underwent partial pancreatectomy, randomized
    (5 elemental diet + 5 immune-enhancing polymeric diet)
FUTURE STUDIES

Prospective, randomized controlled trials

Sample
- Large (multicentre studies?)
- Patients severe acute pancreatitis
- Stratified patients for - disease severity
  - aetiology of pancreatitis
  - nutritional status

Study groups - elemental vs polymeric
  - standard?
  - immune-enhance?

Outcome measures
- degree of pancreatic secretions, days of ICU stay, days of hospital stay, days to oral intake, days to normal serum enzyme levels, tolerance to enteral nutrition and mortality
**Nutritional Requirements**

According to 2002 ESPEN Guidelines on Nutrition in Acute Pancreatitis

<table>
<thead>
<tr>
<th>Component</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>Energy</td>
<td>25 - 35 Kcal / kg BW / day</td>
</tr>
<tr>
<td>Protein</td>
<td>1.2 – 1.5 g / kg BW / day</td>
</tr>
<tr>
<td>CHO</td>
<td>3 – 6 g / kg BW / day (Gluc &lt;10 mmol/L)</td>
</tr>
<tr>
<td>Fat</td>
<td>&lt; 2 g / kg BW / day (TRG &lt;12 mmol/L)</td>
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R Meier et al.
Clinical Nutrition 21(2); 171-183
THE CHOICE OF FEEDING FORMULA

Beliefs

Studies

- Elemental or semi-elemental form. - low fat, MCT, LCT, a.a, short chain peptides less pancreatic stimulation for product absorption.

Evidence-based

There isn’t enough outcome data to make firm recommendations regarding the specific type of diet.
Scenario 4

- The patient is vomiting and in pain.
Aspiration of n/g tube 4-6hrly

- gastric phase of pancreatic stimulation is activated by gastric distension
- N/J tubes can become displaced into stomach (McClave et al 1997)

Large amounts of gastric aspirates alone are not an indication for stopping n/j feed - only if they contain feed or other signs/symptoms are present
Aspirating N/J tube 4-6hrly

- If large volumes obtained may indicate non-absorption/ worsening ileus - but can you do it?
- Could confirm n/j is still in jejunum by aspiration of fluid with pH 6 or above. (Methany 1993)
Monitor patient for pain, abdominal distension, nausea.

- 30% of patients in this group develop pain & bloating. Most can be resolved by temporarily stopping/reducing rate of feed. (Windsor et al 1998, Braga et al 2002)
- Often caused by trying to start/advance feed too quickly
- Can be initiated by sight and smell of food (Haynes-Jones 1986)
Listening for bowel sounds

- Do most nurses listen to bowel sounds regularly and can they interpret what they hear?
- How reliable as a measure of gastrointestinal function is the presence/absence of bowel sounds?
Pancreatitis Journey: the story so far

- Male, 60, Weight 78kg, Height 1.70m, MUAC 32cm
- Acute severe pancreatitis
- Resuscitation
- Naso-jejunal feeding
- Feeding poorly tolerated with pain, vomiting, and patient intolerance so that parenteral nutrition is now preferred option.
Standardised Parenteral Nutrition Regimens

Advantages
- Commercially available licensed products
- Additions can be made within validated stability limits
- Use of pre-compounded base bags reduces preparation times, wastage and costs (Maswoswe et al, 1987)
- A limited range of regimens can meet most patients' requirements (Pichard et al, 2000)
- Limiting available regimens reduces prescribing errors (Petros & Shank, 1986)

Disadvantages
- Still require aseptic manipulation to be 'complete'
- Limited availability of novel substrates as components of commercially available bags
- Tendency to make the patient fit the bag
- Not suitable for all patients
A dedicated skin-tunnelled central venous catheter is inserted.

Pyrexia persists

Drainage of sterile fluid collection under ultrasound

Day 16: N input 18gN/day, urine losses 24gN/d

? Line infection
Incidence

- 6,000 patients/year in UK acquire CR-BSI - Fletcher et al (1999)
- Most studies look at incidence of CR-BSI in patients who have CVC’s for many reasons - not just PN.
Removal of catheter

- Removal on the basis of clinical suspicion alone - tip cultures negative in 70-80% of cases. Ryan et al (1984)
- Catheter may be contaminated during removal
- Exposes patient to the risks of re-insertion
- Feeding time may be lost
Exchange over guidewire

- technique also advocated by Hayley et al (1992)
Stop feed, take cultures etc.

- Quantitative blood cultures comparing colony counts from catheter and peripheral shown to be useful. Capdevilla et al (1992)
- 10-15 fold increase of same organism from catheter thought to be predictive of CR-BSI
- Difficult to get quantitative counts in some centres
- Takes 24hrs to get results
Others

- Acridine Orange Leukocyte Cytospin (AOLC) test - Rushforth (1993) Only useful in neonates
- AOLC + endoluminal brush - Kite (1997).
Summary

Still no reliable, easily used test that doesn’t involve removing catheter.

- Don’t automatically assume catheter is source of sepsis
- Be guided by clinical condition of patient
- If exit site is suppurating- remove catheter
- Develop local protocols