# TPN

Kelli-Ann Wong
MNT2
January 24, 2013

# NY

- 55 year old female
- Height: 152.4 cm
- Weight: 57 kg (136 lb)

- BMI: 25 (Overweight)
- IBW: 45 kg
- % IBW: 136%

# PMHx & Dx

- PMHx: Ovarian cancer 15 years ago
  - Underwent hysterectomy and bilateral salpingo-oophorectomy

- Admitted to the gynecology-oncology service for treatment of recurrent granulosa cell ovarian cancer

# Clinical

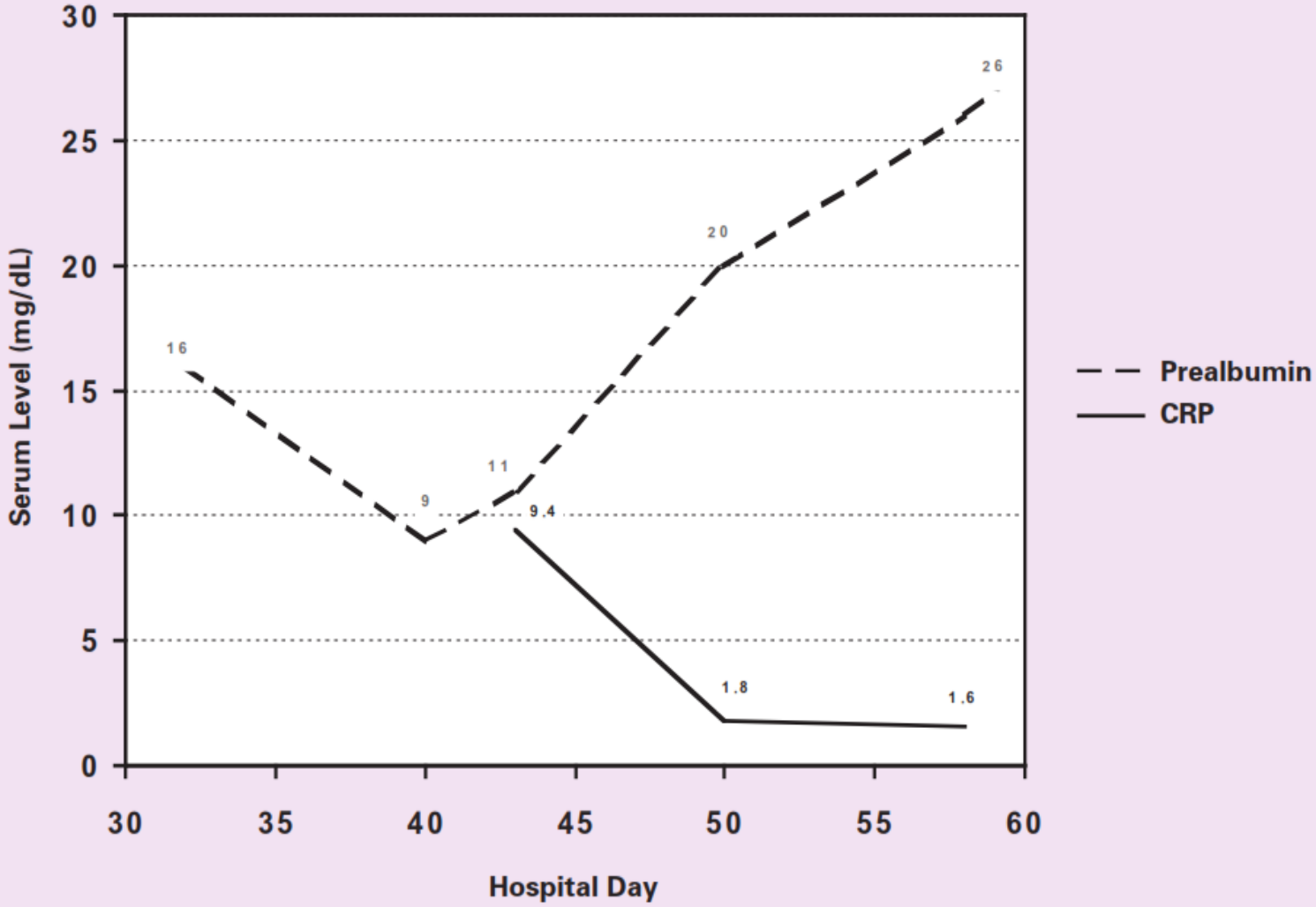
- Started TPN when pt developed a postoperative proximal enterocutaneous fistula
- Received sliding scale insulin d/t CBG levels > 150 mg/dL
  - Started with 3U.

    Increased to 35U on TPN day 14
- Pt continued to have hyperglycemia and high insulin requirements
  - TPN intake increased from 40 mL/h to 50 mL/h
- NPO nasogastric tube upon transfer
- Wound vacuum-assisted closure (VAC) placed

# Clinical cont.

- Octreotide prescribed to reduce intestinal secretions
- Pt dextrose levels were kept low to keep infection levels low
- Pt developed cholestasis after 4 weeks of continuous TPN
  - Cycle TPN and allow oral sips of liquid
- Percutaneous endoscopic gastronomy (PEG) inserted and removed at 80% closure
- Pt weight decreased to 47.5kg (104.5 lbs)

**Figure.** Temporal relationship for prealbumin and C-reactive protein (CRP) levels (mg/dL) for patient NY.



# Enterocutaneous Fistula

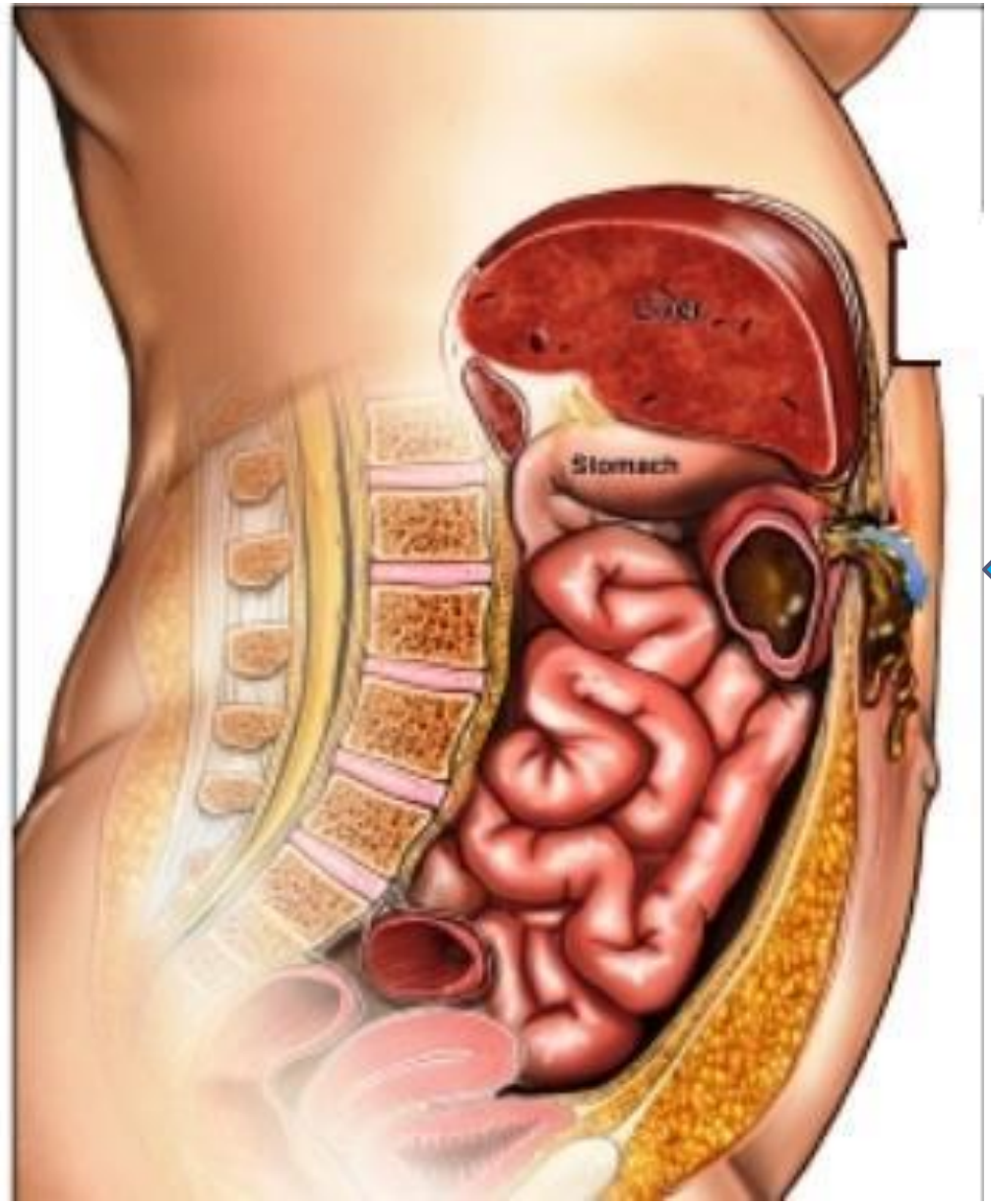
- Gastrointestinal Fistula:  an abnormal opening which allows contents of the stomach or intestines to leak

- Enterocutaneous Fistula: when contents leak through an opening in the skin

**Table II Treatment phases**

| Phase | Time Course | Primary goals |
|---|---|---|
| 1. Recognition and stabilization | 24–48 hours | Correct fluid and electrolyte imbalances |
| | | Drainage of intra-abdominal abscesses |
| | | Control of sepsis |
| | | Control of fistula drainage |
| | | Ensure adequate skin care |
| | | Aggressive nutritional support |
| 2. Investigation | after 7–10 days | Determine anatomy and fistula characteristics |
| 3. Decision | up to 4–6 weeks | Determine likelihood of spontaneous closure |
| | | Plan course of therapy |
| 4. Definitive therapy | after 4–6 weeks or if closure is unlikely | Closure of fistula |
| | | Reestablish gastrointestinal continuity |
| | | Secure closure of abdomen |
| 5. Healing | 5–10 days after closure onward | Ensure adequate nutritional support |
| | | Transition to oral intake |

Pritts TA, Fischer DR, Fischer JE. Postoperative enterocutaneous fistula. In: Holzheimer RG, Mannick JA, editors. Surgical Treatment: Evidence-Based and Problem-Oriented. Munich: Zuckschwerdt; 2001.




Enterocutaneous Fistula

http://www.thirdage.com/files/cond/enterocutaneous-fistula.jpg

# Energy, Protein, Fluid Requirements

- EER for PN

  57 kg x 25 kcal/kg =1425 kcal

- Protein: 1.5 g/kg
  - ~ 91 g PRO

- Fluid
  - 1995 mL + plus to replace NG and fistula losses

# Current TPN order

- **17.5% dextrose and 7.5% amino acids @ 40 cc/hr**
- 40 cc/hr x 24 hr = 960 ml
- D:17.5/100 x 960 = 168 g x 3.4 kcal/g = 571 kcal
- AA: 7.5/100 x 960 = 72 g x 4 kcal /g = 288 kcal
- Total of 859 kcal (15 kcal/kg; 1.2 g/kg protein)
- Continued to have CBGs 151 – 200 mg/dL , 35 U R insulin

- **17.5% dextrose and 7.5% amino acids @ 50 cc /hr**
- Total of 1074 kcal (19 kcal/kg; 1.57 g/kg protein)

# Ovarian Cancer & TPN

- 7th most common cancer in women world wide
- Tumor involves one or both ovaries and extends to outside the pelvis

- Malnutrition significantly influences morbidity and mortality
- TPN improves anthropometrics, improves and prevents deterioration of nutritional state, improves quality of life, and Karnofsky performance status in cancer patients who survived > 3 months (Soo and Gramlich)
- Ovarian cancer has been shown to have the highest survival (Soo and Gramlich)

**Table 3.** Type of malignancy in patients on PN.

| Malignancy | No. of patients | Mean survival (months) (±SD) |
|---|---|---|
| Ovarian | 13 (34%) | 8.23 (5)* |
| Colonic | 6 (15.8%) | 3.29 (1.9) |
| Gastric | 6 (15.8%) | 3.96 (5.5) |
| Peritoneal | 3 (7.9%) | 7.33 (6.7) |
| Unknown | 2 (5.3%) | 4 (–)† |
| Esophageal | 2 (5.3%) | 1.1 (0.5) |
| Carcinoid | 1 (2.6%) | 6 (–) |
| Cervical | 1 (2.6%) | n.a., transition to HEN |
| Ampullary | 1 (2.6%) | 6 (–) |
| GIST | 1 (2.6%) | 6 (–) |
| Anaplastic large-cell lymphoma | 1 (2.6%) | 0.25 (–) |
| Rectal | 1 (2.6%) | 4 (–) |

**Note:** SD, standard deviation, n.a., not applicable.

*Two patients had ongoing therapy.

†One patient had ongoing therapy.

# Medication

- Octreotide
  - Prescribed to decrease intestinal secretions
  - Increase absorption of fluid and electrolytes from the GI tract
  - Increase transit time
  - Control severe flushing and diarrhea associated with GI tumors
  - Suppresses growth hormone, insulin, and glucagon

# PES

- Unintentional weight loss d/t cancer cachexia and limited TPN AEB 25% weight loss in 62 days, which is severe weight loss.

# Alternative PES

- Altered GI function related to abdominal compartment syndrome, small bowel resection, ileostomy and mucus fistula AEB fistula output requirement for wound VAC and electrolyte and fluid shifts.

# Goal

1. Achieve energy balance while avoiding hyperglycemia
2. Weight maintenance with goal weight between 54 – 60 kg
3. Achieve normal protein stores and lean body mass
4. Provides essential fat without cholestasis

# Intervention

1. Continue provide regular insulin to achieve euglycemia
2. Increase calories to 25 kcal/kg to prevent further weight
3. Maintain protein at 2 g/kg
4. Include lipids 2x /weekly to provide EFA and to reduce dextrose requirements and subsequent hyperglycemia and cholestasis.
5. Promote normal hydration status

# TPN Calculation

Protein: 7.5% Travosol

91g pro ÷ 0.075 = 1213 mL

91g pro x 4 kcal/g = 364 kcal

Total calories = 1425 kcal – 364 kcal pro = 1061 kcal

Total Fluid = 1995 mL fluid – 1213 mL = 782 mL

Dextrose

1061 kcal and 782 mL to be provided by dextrose

1061 kcal ÷ 3.4 kcal/g = 312 g dextrose

321 ÷ 782 mL = 0.410

321 ÷ 0.410 = 783 mL DW

Rate = 1213 mL + 783 mL +150 mL = 2146 mL

2146 mL ÷ 24 hours = 89 cc/hr

Volume of Macronutrients

= 1213 mL + 783 mL = 1996 mL => 2.0L

# Monitoring

1. Monitor CBGs q 6 hrs, goal 180 mg/dL, monitor CHO to insulin ratio 10:1
2. Weekly weights to monitor weight
3. Serum  urea levels, biweekly prealbumin and CRP levels
4. Tetraene/triene ratios, observe for s/s EFA deficiency (ie skin dryness), TG and LFTs biweekly to monitor cholestasis
5. In's and outs (PO intake, IV fluids, and NG losses, fistula, urinary output) daily monitored to determine fluid status, observe for s/s of dehydration

# References


- Hopfer Deglin J., Hazard Vallerand A., and Sanoski C.A., Davids's Drug Guide for Nurses Twelfth Edition. *Octreotide*. F.A. Davis Company 2010: 941-943
- A.D.A.M. Medical Encyclopedia. *Gastrointestinal fistula*. May 1, 2013. http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002115/. Accessed January 23, 2013
- Pritts, T.A., Fischer, D.R., Fisch, J.E., Univeristy of Cincinnati College of Medicine, Department of Surgery. *Postoperative enterocutaneous fistula*. 2001. http://www.ncbi.nlm.nih.gov/books/NBK6914/. Accessed January 4, 2013.
- University of California, San Francisco, *Diabetes Education Online Sliding Scale* Insulin. 2013 http://dtc.ucsf.edu/types-of-diabetes/type2/treatment-of-type-2-diabetes/medications-and-therapies/type-2-insulin-rx/sliding-scale-therapy/. Accessed January 23, 2013.
- Soo, I. and Gramlich, L. *Use of parental nutrition in patients with advanced cancer*. Appl. Physiol. Nutri. Metab. 33: 102-106 (2008).
- Pritts TA, Fischer DR, Fischer JE. Postoperative enterocutaneous fistula. In: Holzheimer RG, Mannick JA, editors. Surgical Treatment: Evidence-Based and Problem-Oriented. Munich: Zuckschwerdt; 2001.
- Kern K.A. and Norton J.A. *Cancer cachexia*. J Parenter Enteral Nutr. 1988 May-Jun;12(3):286-98