

# Complications of Parenteral Nutrition

Prof. Dr Anis Ahmed Professor of Surgery Rawalpindi Medical University Rawalpindi



#### **Mission Statement of RMU**



- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

#### **Professor Umar Model of Integrated Lecture**



### Objectives

Highlight various complications of TPN , their prevention and management

## Complications

- MECHANICAL
- METABOLIC
  - Glucose Metabolism
  - Protein Metabolism
  - Fat Metabolism
  - Elevated LFT's/Liver dysfunction
  - Electrolyte Disorders
- SEPTIC

Emphasis on prevention

## **Septic Complications**

- Sepsis
  - Secondary to contamination of CVP line
    - Patients with systemic sepsis
      - Glucose intolerance
      - Fever
      - Find focus of infection
  - Contamination of solutions

- Skin is the primary source of contamination of the external catheter surface
- During insertion, bacteria impacted on tip and external catheter surface
- Catheter arrives in blood with a specific quantity of bacteria





Treatment – Catheter Sepsis Coagulase Negative Staphylococcus



#### Staphylococcus Aureus

- Mortality rates from S.Aureus greatly exceed many other organisms
- Removal of CVC in S.Aureus infections associated with more rapid improvement and lower mortality

#### Candida

#### If organism isolated Candida regardless of the stability of patient CATHETER MUST BE REMOVED

- ANTI-FUNGALS BEGUN
- EVALUATED FOR
  - Endocarditis (Echo)
  - Endopthalmitis (Ophthalmology)

### in Parenterally and Enterally Fed Trauma Patients

Blu	nt Trau	ma Pe	Penetrating Trauma			
Total				U		
	TEN	TPN	TEN	TPN	TEN	
TPN						
Complication	n = 48	n = 44	n = 38	n = 48	n = 44	n =
84			-			
Abdominal Abscess	2	1	2	6	4	7
Pneumonia	4	10	1	2	5	12
Wound Infection	0	2	3	1	3	3
Bacteremia	1	4	0	1	1	5
Urinary Tract	1	1	0	1	1	2
Other	5	4	1	1	6	5
<b>Total Complications</b>	5 13	22	7	12	20	34
% Complications	27%	50%	18%	30%	23%	39%
Per patient group						

### Mechanical/Technical

### complications

- Pneumothorax
- Haemothorax
- Hydrothorax
- Subclavian artery injury
- Thoracic duct injury
- Cardiac arrhythmia
- Air embolism
- Catheter embolism
- Cardiac perforation with tamponade

#### Multilumen catheters

#### Associated with increased infection

- Manupulation
- Intensive use

#### Catheter infections are highest

- Femoral vein
- Jugular vein
- Subclavian vein

#### Risk of infection for indwelling catheters

- Less than 3 days Negligible
- 3 to 7 days

• More than 7 days 5 to 10%

3 to 7 %

## Metabolic complications

#### • Hyperglycemia

- Normal rates of infusion due to impaired glucose tolerance
- Rapid infusion of hypertonic solutions
- Latent diabetics
- Severe surgical stress or trauma
- Treatment consists
  - Volume replacement
  - Electrolyte correction
  - Insulin

#### Hyperglycemia: Prevention and Treatment

- Start TPN at 50 ml/hr or with 10% dextrose
- Advance rate at 25 ml/hr each day
- Do not overfeed (≤5-7mg/kg/min)
- Check BS at least daily
- Do not advance if BS > 200 mg/dl
- If > 200 give insulin to control BS then advance
- May decrease the % of total calories from dextrose

#### Rebound Hypoglycemia

- May occur if TPN interrupted for > 30 min
- Endogenous and exogenous insulin
- Prevention
  - Taper TPN before stopping (1/2 rate x 1-2 hours)

#### CO<sub>2</sub> Retention

- Occurs in pts with resp. disease. (i.e. COPD)
- Occurs with overfeeding
- Especially if primary source of calories dextrose
- Prevention
  - Feed per nutritional assessment
  - Provide mixed substrate

### **Protein Metabolism**

#### • Azotemia

- Occurs in pts with renal failure
- Prevention: restrict protein ARF: 0.5-0.8gm/kg/d CRF: 0.8-1 gm/kg/d
- Dialysis
- Specialized AA formulations??

#### • Hyperammonemia

and Hepatic Encephalopathy (HE)

- Occurs in pts with liver failure
- Restrict protein as necessary ie. 0.5 gm/kg/d
- Treat HE with lactulose or antibiotic enemas
- For HE consider Hepatamine

### Fat Metabolism

- Essential Fatty Acid Deficiency
  - EFA = linoleic acid
  - Cause: TPN without fat
  - Prevention: Give IV fat emulsion
- Hyperlipidemia
  - If trig too high (>400 mg/dL) give IV fat emulsion for EFA only

### Hepatic dysfunction

# pathology

Pathology

- Steatosis / Steatohepatitis
  - Most common in adults
- Cholestasis
  - Most common in children
- Phospholipidosis
- Fibrosis / Cirrhosis
  - Suboptimal TPN prescription
  - Advanced duration of TPN
- Gallstones
- Sludge

#### Management

- Maximize Oral / Enteral Nutrition
  - Increases immunological integrity of gut
  - Stimulates Motility
  - Reducing intestinal stasis
    - Bacterial Translocation
    - Endotoxin production
  - Stimulate CCK secretion
    - Stimulate GB contraction
    - Reducing gallstone and sludge formation

## **Optimize TPN Prescription**

- Discontinuing TPN infusion for a period of time (8 hours)
  - Lower hyperinsulinemia
  - Decreasing liver steatosis
- Avoiding excess calories and overfeeding
  - Dextrose < 5mg/kg/min</li>
  - Harris Benedict to determine requirements
- Lipid infusion < 1g/kg/d</li>
  - Minimize cholestasis
  - Benefit combined MCT/LCT as opposed to LCT alone

### Take Home Message

- Septic complications are common, serious and preventable
- Short term TPN should be avoided in sick patient
- Avoid Excess calorie infusion/Over feeding
- Absolute protein restriction in renal and liver dysfunction is not desirable
- Hyperglycemia should be avoided