**Clinical Nutrition and dietetics – 4th semester**

**Paper No.: CND 404**

**Name of the paper: Dietary management of diseases - Part IV**

**Topic: Post-operative nutritional care (sepsis).**

 **Lecture No.: 3**

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1. **Introduction:**

An optimal nutrition status is an important factor to provide successful post operative outcomes. Surgical procedure is a critical factor for such post operative nutritional care. Laparoscopic techniques imposes minimum stress and there by insulin resistance in ‘flow phase’ is minimum but open surgery render in up to 50% reduction in insulin sensitivity and so it affects fat, protein and carbohydrate metabolism drastically. Insulin resistance is associated with increased morbidity, mortality and length of hospital stay.

1. **Post surgical complications modulators:**
2. Under nutrition state at pre-surgical condition.
3. 20-30% less body weight than ideal.
4. Obesity.
5. Digestion and absorptive disorders.
6. High body temperature after surgery.
7. Low acceptability of energy yielding and body building nutrients.
8. **Internal condition post operative state:**
9. Due to tissue damage and necrosis, the patient remains in negative nitrogen balance.
10. Dehydration is noted in post operative state due to restriction in fluid intake.
11. Peripheral oedema is developed especially at the site of surgery.
12. Dumping syndrome is developed due to difficulty in tolerating the osmotic load.
13. **Post operative ‘Ebb-phase’ and ‘Flow-phase’:**

Initial responses to bodily insult reflected by hypotension, low cardiac activity and cardiac output, low body temperature, diminution in oxygen consumption, hypovolemia, hypoperfusion and lactic acidosis. These all are known as ‘Ebb-phase’. In this phase, insulin levels fall in direct response to the increase in glucagon that acts as a signal to increase hepatic glucose production.

A neuroendocrine response to physiologic stress that follows the ‘Ebb-phase’ which is indicated by hypermetabolism and hyper catabolism known as ‘Flow-phase’. This phase is divided into two sub phases known as ‘Acute Response and Adaptive Response’ sub phases. Acute response sub phase is catabolic predominance sub phase characterized by high level of glucocorticoid, glucagon, catecholamine, negative nitrogen balance, elevation in metabolic rate and high oxygen consumption. The ‘Adaptive Response’ sub phase is ‘Anabolic Predominates’ associated with diminution in hypermetabolic state, recovery, wound healing along with restoration of body protein.

1. **Nutritional care at post operative state:**
2. **Energy:** Calorie requirement is elevated during acute response sub phase of ‘Flow phase’. This amount is as high as 4000-6000 kcal/day but never less than 2500-3000 kcal/day. This excess energy is needed for anabolic effect specially protein synthesis where inclusion of single amino acid in protein chain require 4 high energy phosphate bonds. Excess energy is also needed for wound healing, immunoglobulin synthesis etc.
3. **Protein:** Protein requirement 1.25-1.50 g/kg body weight/day or about 100 g protein as a rule. Protein requirement may be as high as 250 g/day. This excess protein for-
4. Rapid wound healing.
5. Increasing immunity for resistance of infection.
6. Protecting action upon the liver against the toxic effect of anaesthesia.
7. Arresting extra vascular oedema.
8. Combating negative nitrogen balance at ‘Flow phase’.
9. Avoiding shock.
10. Enhancing transportation of lipids in blood.

In specific surgical cases where gastrointestinal tract can not be used, intravenous feeding may be adopted,. In such cases, hydrolysed protein or amino acid mixtures, dextrose and a fat emulsion are used. The most important point is that in such nutrition support system, patients return to oral feeding as quick as possible because oral feeding provides proper nutrition and stimulate gastrointestinal tract. Intravenous feeding can not replace food in all respects, it can prevent starvation temporarily.

Glutamine supplementation in this phase is very important. Its requirement level is 0.57 g/kg/day and its range is 03-0.5 g/kg body weight. It increases glutathione levels which act as an antioxidant. It has direct anti catabolic activity and so preserves lean body mass during post operative state. Glutamine also acts a positive immunomodulator. Arginine, methionine and lysine should be supplied in excess level which are requiring for collagen synthesis and control inflammation.

C. **ɷ-3 fatty acid:** This is antiinflammatory in type and there by check the pro inflammatory product formation in cells. It has stimulatory effect on immuno system and so controls the infection in surgical patients. Fish oil especially marine fish oil contains high level of ɷ-3 fatty acid. Its requirement in post operative state is 0.1-0.2 g/kg body weight/day but never grater then 20% of total dietary fat intake.

D. **Carbohydrates:** Tissue demands carbohydrate for sparing both proteins for tissue synthesis as well as liver from damage due to glycogen depletion but of total energy, 60-65% energy should be derived from carbohydrate.

E. **Minerals:** Potassium, phosphorus, sodium and chloride need to be focused as huge loss of K and P take place due to tissue damage. Loss of sodium and chloride may occur due to vomiting, diarrhoea, perspiration, anorexia and diuresis.

F. **Vitamins:** Vitamin C intake at post operative state should be increased for wound healing. Vitamin K supply should be increased to resist bleeding.

G. **Fluids:** Fluid balance may be disturbed due to surgery linked vomiting, haemorrhage, diuresis and fever. Dehydration should be checked as it may results acidosis that enhances the life risk at this stage. Parenteral fluids are administered if the patient is unable to insert sufficient liquid by mouth. When the patient once begins oral feedings, the diet should rapidly progress from clear to full liquid and then to a soft and finally a regular one.

1. **Protocol of ERAS (Enhanced Recovery After Surgery):**

It is a fast-track programme to improve the patient’s general well being after surgery.

1. Curtailed fasting pre-operative carbohydrate loading.
2. Early postoperative diet initiation is part of this protocol.
3. Postoperative hypoglycaemia removal by carbohydrate intake.
4. Intra-operative and postoperative intravenous fluid delivery results fluid balance.
5. Early feeding after surgery results easily recovery of bowel functions and removes postoperative nausea and vomiting.
6. Early post operative artificial nutrition by monomeric and oligomeric diet results quick wound healing and avoid excess loss of lean body mass.
7. Postoperative exercise should be initiated as soon as possible for early mobilization and turns to working state.

**References:**

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