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

**Paper No. CND 404**

**Name of the paper: Dietary management of diseases part IV**

**Topic: Sepsis with special reference to surgery**

 **Lecture No. – I: Dietary care at preoperative state (Pre sepsis)**

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**Introduction:** Surgery results tremendous loss of blood as well as it results massive breakdown of tissues. Moreover surgery also results

* Onset of physical stress
* Minimize the body weight
* Results mental trauma
* Requir wound healing

All the above process should be overcome at post operative state. So, at preoperative state, preconditions of the patients from the view points of nutrients and energy supply are most vital that decrease the chance of mortality and morbidity due to surgical operation. From survey it has been noted that post operative complications are closely related with low or poor nutritional status of the patient at preoperative state. Out of the patients admitted to surgical wards, 25% of the patients are suffering from under nutrition. Patients who are under intestinal surgery should be assessed the nutritional status before there operation.

**2. Prognostic Nutritional Index (PNI):**

Before surgical operation (moderate to severe), the PNI of the patient should be measured to predict the complications including sepsis or death related to under nutrition linked operation failure or motility.

For measuring PNI, the following nutritional sensors are used:-

1. Serum albumin in g/dl.
2. Triceps skin fold in mm.
3. Serum transferrin in mg/dl.
4. DH (Delayed hypersensitivity) reaction to a recall antigen (mumps, candida)

PNI% = 158-(16.6×albumin in g/dl)-[0.78× (triceps skin fold in mm)]-[0.20× (serum transferrin in mg/dl)]-[5.8× (DH value)]

DH = 0 if nonreactive, 1 if<5mm in diameter, 2 if >=5mm in diameter

On the basis of PNI (%) results, the interpretations are

1. If PNI % <40, it indicates low life risk due to surgical operation.
2. If PNI % value is 40-49.99, it focuses the intermediate level of risk due to surgical operation.
3. If PNI % value is >=50, it reflects high life risk of the surgical operation.

**Nutritional sensors as operative risks:**

1. The loss of 10% body weight is associated with increased surgical risk.
2. Patients having BMI less than 19 are considered as malnourished and have surgical risk.
3. Low plasma albumin concentration is another surgical risk.

So, preoperative nutritional case is very much linked with success surgical cases. When, emergency surgery is needed, in that case there is no adequate time for such case but when the surgery is planned well in advance, the adequate nutritional case may be adopted to ensure a healthy patient before surgery which will increase the success rate.
**Importance of preoperative nutritional case:**

1. To increase stress tolerance capacity of the body which may raise due to surgery.
2. To store nutrients especially energy, proteins, vitamins, and minerals which are require during surgery and post operative state as immediately after surgery, the nutrient supply is not adequate or balance as per requirement due ton interference in oral feeding.
3. Anorexia which is noted in postoperative state also limits the nutrients intake. This deficiency of nutrients of this stage may be recovered by stored nutrients through preoperative nutritional care.

**Guidelines of preoperative nutritional care:**

1. **Carbohydrate loading:** Sufficient glycogen storing in liver is essential in preoperative state to overcome surgery related stress and to favour ERAS (Enhanced recovery after surgery). Surgery induced fatigue, hypoglycaemia, may be overcome by such preoperative hepatic glycogen loading. This glycogen loading is also considered as challenging avenue against NBM (Nil-By-Mouth) which is advised by doctors usually at least 8 hours before surgery. This is followed because by the end of eight hours the stomach is completely empty and ensures that the patient does not vomit to bring up food when anaesthesia is administered to him at the time of operation. Moreover, presence of food in stomach at the time of operation increases the risk of postoperative gastric retention that may interfere surgical procedure itself. So, during NBM phase, energy supply of the body should be maintained by preoperative hepatic glycogen loading without protein breakdown.

Metabolic phases occurring after surgery also divided ‘Ebb-phase’ and ‘Flow-phase’. Glycogen loading in pre operative state also helps the fluid intake and maintained the fluid balance of the body which is a major weapon against hypovolemic shock noted in ‘Ebb-phase’ at post surgery. Moreover, acute response in ‘Flow-phase’ results catabolism predominance. To combat this response, hepatic glycogen loading during preoperative state is an important weapon to reduce protein catabolism that may be utilised for wound healing, recovery by immunocharging etc.

Generally 7-14 days prior to surgery this preoperative nutritional care is adopted specially for moderate to severe under nourished patients.

For glycogen loading, 7 days prior to surgery, first 3 days the diet is restricted to carbohydrate by decreasing 65% energy from carbohydrate to 55% from carbohydrate. For next 4 days, extra carbohydrate with less fibre is supplied that may provide 70-75% of daily energy. This will help hepatic loading of glycogen which become double of the normal.

1. **Protein:** During preoperative nutritional care protein should be supplied at 1.25-1.5g/kg body weight/day to maintain positive nitrogen balance.
2. The main function executed by dietary protein in preoperative state is to increase plasma albumin level which prevents postoperative oedema.
3. Moreover this normal level of plasma albumin also prevent the drug toxicity which may develop in post surgical state as free level of drugs in plasma is control by plasma albumin that control the drug toxicity.
4. The first class dietary protein in preoperative state also helpful for immunoglobulin synthesis that potentizes the immuno status and combat the infection due to surgery.
5. This protein intake in preoperative stage is helpful for enzyme synthesis to control the ‘Flow-phase’ metabolic reaction.
6. Post operative wound healing is controlled by collagen synthesis which is mainly controlled by arginine, methionine, lysine and proline. Most of this are present in first class protein.
7. **Fat:** Poly unsaturated fatty acid especially ɷ-3 fatty acid should be supplied through diet in this stage which may be utilized for improving immune function, that reduced infection, diminished stress induced cell injuries and also acting as anti inflammatory agent. It reduces the complications those may be raised due to surgery.

Essential fatty acid like linoleic acid and arachidonic acid should be supplied as these are essential for prostaglandin synthesis which plays a major role in cellular metabolism and inflammation.

1. **Vitamins:** Antioxidant vitamins like vitamin A,E,C should be suppled which help to store vitamin A & E in liver which are require for –
2. Surgery related stress induction can be managed by such vitamins which are acting as free radical scavengers.
3. Vitamin A also stimulates immune system by increasing the number of macrophages and monocytes in the wound during inflammation and also stimulates epithelialisation.
4. **Minerals:** Preoperative nutritional care should cover iron, zinc, calcium and magnesium for-
5. Increasing haemoglobin level to combat ‘flow-phase’ at post surgery.
6. Metabolic stress may be combated by calcium and magnesium which are important co factor of metabolic enzymes.
7. Zink also increase insulin sensitivity that tries to overcome the acute stage of ‘Flow-phase’ at post surgery. Moreover, zinc itself as anti stressor also favour antioxidant enzyme activities that reduced the surgery induced stress linked cellular injuries and favoured quick recovery.

**Overall preoperative nutritional care:**

1. A well nourished patient usually tolerates major surgery better than a severely malnourished patient.
2. Malnutrition is associated with a high incidence of operative complications and death.
3. Preoperative nutritional support should be administered for 7 to 14 days to moderately or severely malnourished patients.
4. Before abdominal surgery, the colon should be free from residue to limit postoperative infection.
5. Low fibre food or a liquid diet is commonly given for 2-3 days prior to surgery.
6. Enteral products that are low in residue can be used for colon preparation prior to surgery.
7. Preoperative education about avoidance of nicotine and alcohol.
8. Judicious use of immunonutrients, antioxidants, vitamins, minerals, and trace-elements are to be considered in preoperative diet.
9. TPN is given preoperatively only when absolutely essential.

**References:**

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