NUTRITIONAL THERAPY FOR SURGICAL PATIENTS

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Abstract.

The objective of this article is to emphasize the importance of nutritional therapy and explained in simplest and practical way because treatment from this aspect is commonly ignored by junior doctors.

Key Words: Nutritional therapy, enteral feeding, parenteral feeding.

INTRODUCTION :

Normally well nourished patient, when undergo elective surgical procedure, can survive without specific nutritional support for few days. However a prolonged disease process, investigation and treatment & postoperative complications during hospital stay leads to decline in nutritional status of patient.

Nutritional Deficiency

Nutrition plays a vital role in wound healing and collagen maturation. Poor nutritional support leads to delayed and poor wound healing and predisposes wound infection. Infection and injury inhibits the ketotic response to starvation and encourage mobilization of muscle protein. This process leads to generalized muscle weakness, oedema and weight loss. Severe malnutrition can weaken the respiratory muscle, and patient is unable to cough effectively which promotes chest infection and atelectasis. The immune response to infection also becomes down-regulated and T-cell, B-cell and macrophage function deteriorates.

Nutritional Assessment

Although it is not necessary to perform nutritional assessment on every patient, this is indicated when there is:

- Prolong disease process that lead to weight loss, for example, Oesophageal Carcinoma.
- High stress disease: like major burn, major surgery, sepsis and sever pancreatitis.
- Post operative complications.

Nutritional deficiency is assessd by careful history taking examination and Labs tests.

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History:-

Decreased dietary intake may result from poor appetite, unavailability or inappropriate diet. Patient may be unable to swallow as in case of stroke, dementia or upper gastrointestinal obstruction. Patient may have history of impaired digestion and absorption in the presence of pancreatic disease, inflammatory bowel disease or intestinal resection. There may be increased nutritional requirement in patient due to chronic disease, sepsis, burns or multiple surgical procedures.

Examination:-

Monitoring of weight loss is a useful means of nutritional assessment. 10% weight loss indicate mild malnutrition, while 30% loss is an alarming situation. Obvious features of malnutrition are thin, lean wasted appearance, peripheral edema, sunken eyes, easy shedding of body hairs, voice weakness and enlargement of salivary glands. Midarm circumference for muscle mass, triceps skin fold thickness for fat store should be assessed, when patient require long term nutritional support. Body mass index (BMI) gives the information about the change in body weight. It is calculated by wt in kg/height m2. Normal BMI is 20-25.

LABS:-

Lab tests are not specifically assessed, as the interpretation may give confusing picture. Generally there will be low serum proteins, low lymphocyte count, and delayed hypersensitivity reaction.

Energy Requirement:-

Nutritional requirement for a particular patient depends on sex, age, degree of preexisting nutritional status, degree of

surgical stress and severity of post-operative complications.

Energy is provided by carbohydrate and fat, while protein is used to compete metabolic response of body to trauma. In septic condition, there will be increased protein breakdown and body utilizes lipid more easily than glucose, therefore sepsis is associated with hyperglycemia (septic diabetes).

Typical surgical patients need 1800 to 2500kcal/ day. The average daily requirement, in seriously ill patient, is 25 - 30 kcal/kg/day. Daily nitrogen requirement is 0.2 gms/kg. 6.25 gm of protein provide 1gm of nitrogen.

Percent of the energy sources are carbohydrate 50% , fat 35% , protein 15%. One gm of carbohydrate provide 4kcal, 1gm of protein provide 4kcal, while 1gm of fat provide 9kcal. These energy sources must be delivered in combination with fluid, electrolytes, vitamins and trace elements. Fluid requirement is 30-35ml/kg/day. Major electrolytes like Na, K, and CI requirement is 1.0 mmol/kg/day each. Zinc, Magnesium, phosphorus are the main trace elements required in daily diet.

Nutritional Routes

1- Oral or enteral feeding
2- parenteral feeding

Enteral Nutrition

The preferred rout is oral/enteral rather than parenteral, because it preserve intestinal structure and the role of the intestine in immune function. Non use of enteral feeding is related to villous and cellular atrophy leading to bacterial translocation and migration into systemic circulation. This may start or poteniate systemic inflammatory response syndrome.

Enteral nutrition is used in patients with a normal functioning gastrointestinal tract. It may be given orally or via nasogastric, nasoduodenal, or nasojejunal tube feeding, depending on patients condition. Tube feeding is delivered by silastic fine bore tube (8 Fr). These tubes are tolerated well, even for 2 months, with few complications. Large bore N.G tubes should be avoided as it is badly tolerated and associated with aspiration pneumonia, oesophageal erosion, hemorrhage, perforation and tracheo-esophageal fistulation.

Other methods of enteral feeding should be considered before rushing to parenteral nutrition as in case of oesophageal obstruction secondary to inoperable malignancy or stricture, Gastrostomy can be performed for feeding purposes. Likewise in gastric outlet obstruction feeding jejunostomy can be made.

Following major abdominal operation Needle cathater jejunostomy is used for feeding.

Percutaneus Endoscopic Gastrostomy:

It is achieved by incision over the illuminated tip of the endoscope whilst it is in the stomach and then rail-roading a feeding tube through gastric and abdominal puncture hole. It is indicated in case of oesophageal stricture, Carcinoma of oesophagus, head injury, bulbar palsy and stroke etc..

Needle Catheter Jejunostomy

Feeding tube is inserted with a trocar into the lumen via a 5 to 8 cm submuscosal tunnel made in the jejunum and loop of jejunum anchor to the underside of the abdominal wall.

Types of Enteral Feeding:-

Polymeric diet: High molecular weight diet is used in normal functioning G.I Tract. It is composed of intact proteins, starch and long chain fatty acids.

Elemental diet: Low molecular diet is composed of amino acids, oligosaccharides and medium chain triglycerides. These products require minimal digestion and is easily absorbed. These diets are helpful in patient with pancreatitis, inflammatory bowel disease, distal intestinal fistulas.

Disease specific diet:- These diets are specially prepared for renal, hepatic or pulmonary dysfunction patients. These are very expensive, such as Glucerna is a special diet for diabetes.

Feeding Infusion:

Feeding infusion starts with small volume initially and it should be diluted. Concentration is gradually increased based on the patients tolerance. Enough water should be provided to avoid osmotic dehydration. Tube feeding residue should be checked every 4 to 8 hours. More than 100ml residue necessitate holding the feeding for 2 hours. Feeding tube should be flushed routinely with 25 to 100 ml of water to prevent clogging.

Complication Of Enteral Feeding

The most frequently seen complications are cramping,

distension, vomiting and diarrhoea. These may be managed by altering the fluid dilution or rate of administration.

Mechanical problems include tube displacements, malposition, intra peritoneal leakage and intestinal obstruction.

Other complications are dehydration, electrolytic imbalances and changes in blood sugar level. Aspiration can be a lethal complication and therefore patient should have their head elevated at 45 degrees, during feeding and position of the tube should be identified by x-ray prior to use.

Parenteral Nutrition

Indication

Failure of enteral feeding is the main reason for parenteral nutrition. Enteral feeding could not be possible in the presence of proximal intestinal fistulas, intestinal obstruction, acute inflammatory bowel disease, inoperable malignancy, hepatic and renal failure, post chemotherapy or radiotherapy mucositis, malabsorption syndromes, prolong ielus, pancreatitis, hypercatabolic states like burn, trauma, major surgery.

Route Of Parenteral Nutrition

1- Peripheral Vein Nutrition

- This route is used as temporary nutritional support, when anticipated period of starvation is less than 14 days. It is less complicated than central nutrition.
- Isotonic solution composed of amino acid, 5-10% dextrose and fat emulsion are commonly used.
- Phelibits is the main problem resulting from use of hyper osmolar solution. If osmololity exceed 600 mosm, which is almost equal to a 10% glucose solution, it causes line failure. Therefore full calories requirement cannot be delivered by peripheral vein. Regular change of I/V cannula is needed to avoid phlebitis.
- This can be controlled by using **long peripheral line** in which CVP line passes through peripheral vein.

2. Central Vein Nutrition

- This requires insertion of a catheter into the central vein (subclavein, internal jugular vein) under aseptic conditions. The occlusive dressing can be placed below the clavicle, allowing optimal care, patients comfort and mobility. Following insertion of catheter, position should be checked by chest x-ray.
- There are various catheters comprising single or multilumen tube. Catheter should not be used for other I/V solution or drugs, with the exception of Hickmann catheter, which can be used for other solutions.
- The major advantage of central vein nutrition over peripheral nutrition is its ability to provide full nutritional support for long term period. Hyperosmolar solution like 25-50% dextrose can be given by this route. Therefore minimized volume while optimizing calorie delivery. Precise and independent calories can be given which is able to achieve anabolic state. This is not physiologic delivery of nutrient into circulation. Therefore, causing GI mucosal atrophy, hormonal imbalances and changes in hepatic metabolism.

Contra Indication

TPN is contraindicated in the presence of severe hepatic failure with encephalopathy, severe glucose intolerance, and extreme fluid restriction in renal failure patient. It should be avoided if experienced personnel (dietician, pharmacist, trained nurse, physician) are not available.

Feeding Solutions

- **One - Bag Solution.**

  Solutions containing all nutrients including, glucose, fat, aminoacids, vitamins, trace elements, mineral, electrolytes in required amount of fluid are available in one bag, for 24 hours infusion. Main advantages are decreased risk of infection, decreased manipulation, cost saving and time saving. Complete data regarding patients requirements is provided to pharmacist to prepare fresh infusion bag for 24 hours infusion. Main advantages are decreased risk of infection, decreased manipulation, cost saving and time saving . Complete data regarding patients requirements provided to pharmacist to prepare fresh infusion bag for 24 hours.

- **Individual Solution**

Individual solution of glucose (5%, 10%, 25% dextrose), fat (10%, 20%intralipos), amino acids are available commercially. Indivdual ampoules of vitamins and minerals can be added in these solutions.

Administration 0f TPN:-

In case of one bag solution, full rate can start immediately, since the glucose concentration is reduced, whereas in case of individual solution infusion rate should be slow initially for at least 2 days, to allow the kidney and pancreas to be adjusted.

All TPN bags and tubing should be changed routinely every day. No addition should be made in TPN bag.

Complications of TPN

These are divided into following groups:

a) Catheter Related Complications:-

Pneumothorax and haemothorax are the main life threatening complication at the time of catheter insertion. Other complications are brachial plexus injury, catheter guide wire embolus, chylothorax, tracheal perforation, injury to oesophagus, subclavein venous thrombosis, air embolus.

Catheter can itself be blocked, malpositioned or dislodged. Catheter sepsis is the most problematic complication, which can be prevented by strict aseptic techniques.

b) Metabolic Complication

Bypass of GI tract causes abnormal liver functions. Alkaline phosphatase and bilirubin level rises to a plateau after a few days from the cholestasis produced by TPN. Others complications are fluid retention, hyperchloremic acidosis, cholestasis jaundice, immune suppression, electrolytes imbalance, glycosuria, hyperglycemia and hyperkalemia indicate glucose intolerance and require gradual introduction of insulin into the feeding infusion.

Practical Problems:-

TPN is inuasine, complicated and expensive. TPN requires intensive monitoring and trained nutritional team.

Monitoring

While patients are receiving parenteral or enteral support, they require close monitoring to prevent metabolic complications and to assess the progress. Labortory investigations are obtained at the start of nutritional support and checked at periodic intervals. The following tests are adequate for routine managment of most patients receiving TPN.

Take daily:- Full blood count, urea, electrolytes, blood sugar, urine and plasma osmolality and ABGs. Daily physical assesment, Input / Out put charting and record of body weight.

Twice weekly:- Investigation are carried out LFTs, clotting profile, plasma proteins, serum Ca, Mg, phosphate.

Weekly - Lipid profile, urine analysis for nitrogen balance are noted

Fortnightly- Vitamin B_{12}, folate, iron, zinc, is noted.

CONCLUSION

The best way of optimizing nutritional care is with a multidisciplinary support team, each member providing specialty expert care. The team consist of clinician, dieticians, pharmacists, nurses and microbiologist.

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