HYPERALIMENTATION

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INTRODUCTION

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Total intravenous feeding (Parenteral Hyper alimentation) is a technique of prolonged intravenous administration of all required proteins, calories, and essential minerals. Asterile hypertonic solution of the appropriate nutrients is delivered at asteady rate through catheters into a large vascular channel where blood flow is rapid. The solution is quickly diluted to isotonic concentration and disseminated throughout the body (Soper, and Freeman, 1979).

The Primary aim of total parenteral nutrition is to provide suitable carbohydrates, protein moieties, and other essential nutrients exclusively by vein for prolonged periods of time in quantities substantially greater than the basal requirements for caloric and nitrogen equilibrium in order to achieve positive nitrogen balance and an anabolic state during conditions usually associated with acatabolic response. In infants, an additionall goal is to maintain normal weight gain, growth, and development until adequate enteral feeding can be initiated or resumed. The basic principles leading to the success of this technique included the provision of all nutrients available in intravenous form, concentrated in afluid volume equal to normal daily water requirements and infused into a high-flow large diameter a central vein such as the superior vena cava (Sabiston, 1981).

In the past decade the use of total parenteral nutrition for treating malnourished and seriously ill patients has increased dramatically, it is not easy understood by the surgeons, as the indication for this treatment, however, are not clear, and its clinical value is in some cases debatable, the choice of regimen in particular is difficult because the precise nutritional requirements of patients are notknown, so this subject is selected to through spote light on it.

With the advent of total parenteral nutrition (TPN) it has becomes possible to meet nutritinal requirements in patients in whom use of the gastrointestinal tract was impossible or ill advised. For the first time, the surgeon has been able to restore nutritional status to such an extent that operative intervention can either be avoided or undertaken with much greater confidence of success, so anatomic or physiologic loss of the gut is no longer inevitably followed by malnutrition (Shizgal, 1981).

Most patients with gastrointestinal disease require less than 2500 K Cal/24 h (Quebbeman. etal, 1982) and there is no merit in exceeding 4000 K cal/24 h even in patients with major burn (Burke, etal 1979), for simplicity, safety and economy we used astandard prescription in adult patients whenever possible. The regimen was formulated to mimic anormal oral diet and contained equicaloric amounts of glucose and fat with amino acids, electrolytes, vitamins and minerals (Kettlewell, 1983).

Parenteral nutrition can be administered by two routes the so called hyperalimentation or total parenteral nutrition through a central venous catheter, necessitating the insertion of a catheter into the superior vena cava. The other route that is now possible with the availability of intra venous fat is peripheral administration, Although its use asanon protein calorie source to enhance protein conservation is still controversial (Condon and Nyhus, 1978).

REVIEW OF LITERATURE

NUTRITIONAL EQUILIBRIUM :

Nutritional equilibrium is dependent on a balance between nutrient requirement and its intake. Disease, injury, and surgical operations are often associated with adecreased oral intake and an increased requirement for protein and calories. The degree of the malnutrition that develops is directly related to the cumulative negative nutrient balance.

The energy necessary for accomplishing the physical and chemical work of each human cell is derived from various processes of oxidation of special energy-rich fuels. The daily quantity of energy necessary for maintaining the integrity of total cellular function has been termed basal metabolic rate (BMR) and is expressed in units of kilocalories per day. Anormal 70 Kg, male has a basal daily requirement of approximatly 1600 to 1800 Kilo calories. The imposition of additional demands of chemical or mechanical work raises the net daily requirement that must be met from either exogenous or endogenous sources.

The integrity of the body cell mass (BCM) requires a daily intake of amino acid substrate. Each of the different types of endogenous protein has acharacteristic constant turnover rate of the amino acid components during normal health. The amino acids ingested in excess of those required for maintenance are metabolized through deamination of the amide fragment, and the remaining carbon skeleton is either oxidized, trans-aminated, or stored as fat. The amide fragment is either converted to urea, a major portion of which is excreted in the urine, or recycled to form one of the non-essential amino acids.

The body cell mass (BCM) is the Sum of all the cellular elements of the body. Skeletal museles represents approximately 60% of the BCM, while the viscera account for 20 to 30%. The remainder is composed of red cells, the cellular mass of adipose and connective tissue, and the skeleton. It is that component which consumes oxygen, produces carbon dioxid, and performs all the work. It is the living component of body composition and as such is the ideal reference parameter for the body's metabolic activity as assessed by oxygen consumption, carbon dioxide production, caloric requirement, and work performance.

The extracellular (ECM) surrounds and supports the BCm. The fluid component of (ECM) consists of plasma and interstitial and transcellular water. The solid component of the ECM includes collogen, tendon, fascia, and the sketeton.

When the daily intake of calories and protein is equal to the amount required for maintenance, a zero balance is achieved, during the period of uncomplicated starvation, a negative balance for both calories and nitrogen develops, and simultaneous decrease in body weight follows. Adaptation to total calorie and nitrogen deprivation is initiated immediately by the deficiencies of biochemical substrate.

The body stores of carbohydrate, in the form of hepatic and muscle glycogen which utilized to meet the daily energy requirements during periods of starvation, are minimal, in a normally nourished 70 Kg, man, there are 150 and 75 gm of glycogen in skeletal musele and liver respectively (Cahill, 1970), these glycogen stores are depleted within the first 24 to 48 hours of total starvation subsequently the body relies on triglycerides from adipose tissues and amino acids from body protein.

The normal unstressed individual adapts to starvation with an increased reliance an lipids as the major endogenous fuel and consequent decrease in gluconeogenesis from protein. As a result, the daily urinary nitrogen loss decreases from 12 gm., early in starvation to 5 gm by the Fourth week of starvation

(Porte, etal, 1966). This negative nitrogen balance can be converted to protein loss, as 1 gm. of nitrogen is equivalent to 6.25 gm. of protein.

The individual deprived of foodstuff can survive and sustain asignificant loss in body fat stores until the gradual consumption of protein components exceeds the capacity to sustain life. The critical quantity of protein required for survival has not been determined in man. Not all protein participate in the gluconeogenesis caused by starvation. Malnourished children were found to have. Sever depletion of total protein and non collagen protein, while collagen protein was essentially unchanged (Picou, 1966).

Numerous data indicated that loss of 35 to 45% of body weight can be survived (Keys, etal 1950). When pre-operative weight loss was greater than 20% of normal the mortality rate was 33% in contrast to a 3.5% mortality associated with less weight losses in patients with the same pathologic conditions.

Nutritional Complication In The Surgical Patient

Nutritional Complications arising from preexisting Disease:

Most disease processes have the capacity to alter normal nutritional equilibrium if allowed to persist for a sufficient period of time, insidious subclinical illnesses can gradually modify appetite and consequently patterns of intake, in a manner not readily apparent to the patient. More overt processes can directly impair ingestion, absorption or assimilation. All of these processes share the common adverse effect of causing areduction in total body protein, especially skeletal muscles. For this reason, Dudrick et al, have recently appropriate outlined specific goals and indications for parenteral Hyperalimentation, Summerized below:-

1) New born infants with catastrophic gastrointestinal anomalies such as tracheoesophageal fistula or massive intestinal atresia.

2) Infants with gastrointestinal insufficiency associated with the short bowel syndrome,malabsorption, enzyme deficiency.

3) Adult patients with short-bowel syndrome secondary to massive small bowel resection or entero cutaneous fistulas.

4) Patients with high alimentary tract obstructions without vascular compromise, secondary to achalasia, stricture or neoplasia of the oesophogus, gastric carcinoma; or pyloric obstruction.

5) Patients with prolonged paralytic ileus following major operation, multiple injuries or blunt or open abdominal trauma or patiens with reflex ileus complicating various medical diseases.

6) Patients with normal bowel length but with mal absorption secondary to sprue, hypoproteinaemia, enzymes or pancreatic insufficiency, regional enteritis, or ulcerative colitis.

7) Adult patients with functional gastrointestinal disorders such as oesophageal dyskinesia following cerebral vascular accident, idiopathic diarrhea, psychogenic vomiting, anorexia nervosa.

8) Patients who can not ingest food or who regurgitate and aspirate oral or tube feeding because of depressed sensorium following sever metabolic derangements, neurologic disorders, intracranial surgery, or central nervous system trauma.

9) Patients with excessive metabolic requirements secondary to sever trauma such as extensive full thickness burns, major fracture.