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STANDARD AND SPECIAL AMINO ACID SOLUTIONS IN THE TREATMENT OF PATIENTS WITH RENAL INSUFFICIENCY

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Absract: *This article provides information on the use of standard and special amino acid solutions in the treatment of patients with renal insufficiency, disease prevention and control measures, and partially addresses the existing problems. Kidney failure is a set of symptoms that occur with gradual or sudden impairment of kidney function. It can continue in acute and chronic forms, differing in their symptoms and approaches to qualified medical care. Chronic renal failure is mainly the result of long-term diseases of the kidneys and urinary tract (glomerulonephritis, pyelonephritis, tuberculosis, kidney disease, etc.) and is accompanied by nephrosclerosis or enlargement of the kidneys (hydronephrosis). Thirst, dry mouth, itchy skin, vomiting, anemia; Symptoms of respiratory, cardiovascular, and gastric disorders may be present. The relative density of urine decreases and the volume increases.*

Keywords: *Symptoms of acute renal failure, treatment of acute renal failure, emergency care in acute renal failure, emergency care in chronic renal failure, treatment of chronic renal failure. Etiology of polycystic kidney disease, pathophysiology of polycystic kidney disease, clinical signs of polycystic kidney disease*

Kidney failure is a syndrome of decreased renal function. Occurs suddenly (acute) or slowly (chronic). Excessive blood loss, hypotension due to mechanical injury, or transfusion of blood that does not fit the patient's blood type, electric shock, septic abortion, etc .; damage to the renal parenchyma due to poisoning from drugs and other metal salts; Obstruction of the urinary tract with tumors or kidney stones, and damage to both kidneys due to injury can lead to acute renal failure. In acute renal failure, renal function, especially nitrogen, water, and other metabolism, is impaired, with low urinary excretion and, in severe cases, complete excretion (anuria, uremia). The amount of urea in the blood increases, and the body is poisoned by urine; fluid builds up under the skin, in the abdomen and chest (obesity) [7].

Combined and deep lesions of the metabolic homeostasis system in critical conditions determine the multi-component nature of the metabolic correction program as part of intensive care. Complete parenteral nutrition (TPN) is of particular importance in the complex of therapeutic measures aimed at maintaining metabolic homeostasis and maintaining the functions of vital organs in the period when the natural method of compensating for progressive deficiency of essential nutrients is excluded or very limited. and body systems. In this regard, PPP can be considered as the only way to meet the energy-plastic needs of the body, which requires pharmacotherapy of metabolic diseases and specially selected compositions of nutrients in the post-aggressive period.

Many years of experience in the use of parenteral nutrition as the main method of intensive care aimed at the elimination of severe disorders of water-electrolyte and protein metabolism, prevention and treatment of multiple organ failure in the complex treatment of serious diseases showed high efficiency. different etiologies.

Complete parenteral nutrition is indicated for patients who are unable to assimilate the required amount of nutrients that are naturally ingested or given through the gut. This category should primarily include patients with severe conditions and patients for whom a number of reasons are contraindicated in the consumption of enteral food for a certain period of time. Modern advances in PPN allow this method to be widely used not only in functional disorders of the gastrointestinal tract, cachexia, but also for long-term maintenance of the nutritional status of patients with brain injury (coma, bleeding).), somatic, oncological, mental or infectious diseases., as well as those who received aggressive treatments (chemotherapy, etc.) [2].

Modern ideas about the metabolic response to aggression, understanding the mechanisms of all types of metabolic diseases and the formation of hypermetabolic syndrome allowed to determine the set of ingredients needed for parenteral nutrition, their therapeutic efficacy and key approaches to its implementation.

Parenteral nutrition, like normal oral nutrition, should be balanced in terms of quantity and quality of ingredients, it should contain nitrogen and energy-giving substances, electrolytes, vitamins. The set of nutrients required for the implementation of PPP includes: energy sources (carbohydrates, lipids), plastic material for protein synthesis (amino acid solutions), water, electrolytes, vitamins, trace elements. Water and a number of electrolytes, as well as vitamins and minerals, belong to the category of irreplaceable substances. Modern solutions for PPP have a wide range of pharmacological effects at the systemic, organ, cell and subcellular levels.

One of the criteria for the adequacy of parenteral nutrition for patients and victims of severe conditions is to reduce the body's hypercatabolic reaction and maintain a proper level of protein metabolism to support plastic processes. In parenteral nutrition, amino acid solutions are the main source of nitrogen, a plastic material for protein synthesis. Previously established approaches to the nitrogen component of parenteral nutrition provided for the possibility of correcting the nitrogen balance and, above all, eliminating the negative nitrogen balance. However, the metabolic response to aggression is characterized not only by the development of a negative nitrogen balance, but also by typical changes in the extracellular and intracellular amino acid profile. While the need for amino acids varies in quantity and quality, there is a selective shortage of individual amino acids. In this regard, a number of amino acids began to be considered as pharmacological agents that actively stimulate the metabolic processes of the organs.

The amino acid solutions used for PPP are divided into standard and special. Standard solutions are for adult patients. Specific solutions include: parenteral nutrition of children, patients with acute and chronic renal failure, patients with various liver diseases, and nutritional supplements for the treatment of hepatic encephalopathy.

Standard balanced amino acid solutions are an important component of modern PPP. There are currently a number of standard drugs that are balanced in terms of essential and non-essential amino acid content - Infezol 40, Infezol 100 (Berlin-Chemie, Germany), Aminoplasmal E 5%, 10% (B. Braun, Germany), Aminosol - 600, 800, KE (Hemofarm, Yugoslavia).

In general, the composition of these drugs meets the basic requirements for modern amino acid solutions. However, there are certain differences in their compositions. However, data on their selection criteria and comparative clinical efficacy in intensive care in severe conditions are not currently available. there are. Clearly, in extensive clinical practice, preference is given to amino acid solutions with the best pharmacological properties. The availability of such data allows physicians to correctly direct the instructions for use of certain amino acid solutions and to correctly design a parenteral nutrition program.

Evaluation of the clinical efficacy of three standard solutions of amino acids (Infezol 100, Aminoplasmal E 10%, Aminosol 800) in general parenteral nutrition programs was conducted in 45 adult patients with diffuse purulent peritonitis.

Among the observed patients were 40 men (88.9%) and 5 women (11.1%). The share of those aged 50 to 70 years was 43.4%, and under 20 years - 6.3%. The reasons for the development of peritonitis in these patients were acute viscous small bowel obstruction, perforation of hollow organs, destructive appendicitis, intestinal obstruction of tumor genesis, abdominal abscesses, pancreatonecrosis.

According to the purpose of the study, all patients were divided into three groups (15 people in each group), the difference being in the solutions of amino acids included in the parenteral diet:

- Group 1 - Infezol 100 ± 20% glucose solution ± Lipofundin MCT / LCT;
- 2nd - Aminoplasm E 10% ± 20% glucose solution ± Lipofundin MCT / LCT;
- 3rd - Aminosol 800 ± 20% glucose solution ± Lipofundin MCT / LCT.

The composition of standard amino acids is given in the table. one.

The main intensive care of the postoperative period was the same in all three groups. The resuscitation complex includes infusion-transfusion therapy, antibiotic therapy, long-term epidural analgesia, extracorporeal detoxification methods, correction of hemodynamic, volemic and metabolic diseases, targeted treatment of intestinal insufficiency syndrome, HBO for nutritional support.

Surgical intervention was completed by intubation of the initial sections of the small intestine (70 cm distal from the Treitz ligament) with a multifunctional two-channel silicone probe ZKS-21. From the first hours after surgery, decompression, bowel lavage, and enterosorption were performed through the probe. Intestinal lavage is carried out by infusion of glucose-saline solution through the infusion channel with the addition of enterosorbents (enterodesis, enterosgel - 1 g / kg per day) through the infusion channel, against the background of continuous aspiration of intestinal contents through the decompression channel of the probe is done. OP-01 aspirator (vacuum 10-15 mm water column). Correction of volemic and metabolic diseases during this period was performed with intravenous infusion therapy (75-80 ml / kg per day). After an average of 24 hours, infusion solutions contain means for parenteral nutrition (amino acids, concentrated glucose, fat emulsions in a volume of 30-35 ml / kg per day - 2000-2500 kcal). The parenteral feeding scheme and doses of the main components are given in the table. 2-4. The duration of complete parenteral feeding was 5–7 days, followed by 7 to 10 days, with PPN supplementation (parenteral and enteral).

As the absorption and digestive functions of the small intestine were restored, we gradually switched to intra-intestinal administration of glucose-saline solution (4-5 days) and then semi-elemental and standard mixtures (7-8 days). The increase in the volume of enteral infusions allowed to reduce the volume of intravenous infusion therapy on days 3-4 of the postoperative period, mainly at the expense of colloidal and crystalloid solutions, while maintaining the same composition of solutions for parenteral nutrition. With a combined parenteral-enteral diet, the daily caloric intake increased to 3000-3500 kcal. From 9–10 days, nutritional therapy was administered enterally by injecting only 20% solution (2500 kcal) of 2500 ml of the standard mixture.

In addition to general clinical methods to assess the violation of the basic parameters of homeostasis and the effectiveness of nutritional support, methods of studying hemodynamics, oxygen budget, volemia, metabolism, immune system, functional status are used. gastrointestinal tract, enzyme levels and hormonal status.

When studying the main indicators of metabolism, initially on the 1st day after surgery, in all three groups of patients showed a clear metabolic reaction of the body with impaired water-electrolyte and protein metabolism, activation of sympathetic-adrenal and hypothalamic-pituitary-adrenal glands. systems.

According to clinical and radiological studies, on the 1st day after surgery, all patients showed clear signs of intestinal insufficiency syndrome with gastrointestinal tract disorders. Analysis of the structure of losses showed that the pathological discharge from the gastrointestinal tract and abdominal cavity contained 3.01 ± 0.024 g of potassium, 10.05 ± 0.92 g of sodium and 78.68 ± 1.53. g protein is present. However, an increase in potassium excretion (5.77 ± 0.1 g / day) and protein excretion in the urine to 124.5 ± 6.88 g / day was noted as a decrease in urinary sodium content (2.92 ± 0.031 g / day)., which testifies. about the shift of metabolic processes towards catabolism.

Impaired liver function is characterized by increased activity of aminotransferase (670.1 ± 106.8 nmol / sL) and alkaline phosphatase (968.5 ± 116.5 nmol / sL), an increase in ammonia in the blood (1.401 mmol ± 0.88 mm) . / L), LDH, SDH, GDG. Hypo- and dysproteinemia (total protein level 59–60 g / l, A / G ratio 0.78) reported a decrease in protein-producing function of the liver and an increase in protein loss. Increased levels of creatinine (114.9 ± 9.95 mmol / L) and urea nitrogen (14.74 ± 1.5 mmol / L), high leukocytosis (up to 10-11 ¥ 109 / L leukocytes) lead to severe intoxication of the formula shows teeth. left (stab 35-40%, segmented 57-60%), the level of intermediate molecules in the blood is 0.432-0.497 conv. Units

Because the enteral route of nutrient delivery was blocked during this period, the entire volume of infusion solutions, including parenteral nutrition, was injected intravenously and the probe was used to treat intestinal insufficiency syndrome and detoxify by decompression, active bowel lavage. introduction of glucose-salt solution and enterosorbents. As a result of treatment (decompression, bowel lavage, enterosorption) absorption processes began to recover from 4-5 days. On days 6–8, when digestive processes normalized, they gradually switched to an enteral diet with semi-elemental mixtures (1000–1500 ml per day, which is 1000–1500 kcal), and then with a standard (1000–1500 ml per day)., or 1000 -1500 kcal). This allowed to carry out the entire volume of enteral nutrition therapy in 9-10 days - 2500-3000 kcal per day (2500-3000 ml of enteral nutrition mixture).

In all three groups of patients, the effectiveness of the intensive treatment of intestinal insufficiency syndrome and artificial medical nutrition program was determined by establishing a dynamic control over the balance of losses and compensation of key indicators of electrolytes and protein metabolism. The gradual transition from PPN to the combined parenteral and enteral tubes, followed by complete enteral nutrition, allowed for a positive electrolyte balance from day 2–3 and protein and nitrogen from day 5–6. postoperative period [2,3].

As a result of the provided nutritional support complex, not only the protein-producing function of the liver, but also the functional state of the whole liver was improved, which was confirmed by a decrease in aminotransferase, alkaline phosphatase activity. By day 4, lactate dehydrogenase reaches normal values. A decrease in hyperammonemia from day 3 showed an increase in the detoxifying ability of the liver, an improvement in portal circulation. By day 7, nitrogen balance was positive, total protein and albumin levels rose to normal levels, which is probably associated with the full supply of the body’s energy-plastic needs due to adequate artificial medical nutrition with early introduction 'liq. from the enteral component.

Early intravenous infusions of corrective solutions and nutrient mixtures into the complex of measures taken during intensive care helped to eliminate metabolic diseases, fully meet the energy and plastic needs of the body of patients with peritonitis.

It should be noted that the analysis of the obtained results showed a positive effect of parenteral nutrition on the main parameters of metabolism. PPN prevents the development of critical immune deficiency and

helps the body to restore immunity due to the positive effect of complex therapy on the basic parameters of homeostasis. Thus, an increase in the number of T-lymphocytes was observed from 2 to 7 days (2.64 ± 0.17 ¥ 108 / l, p. In general, the results of studies showed that a balanced parenteral nutrition helps. reduction, ensuring plastic processes, replenishing energy costs, the composition of amino acid solutions play an important role [3].

The sufficiency of amino acid mixtures is assessed by the presence and ratio of non-essential and essential amino acids in their composition, the amount of nitrogen. From a modern point of view, synthetic amino acid compounds containing essential and non-essential L-amino acids as in egg white are optimal. Biological value is expressed as a percentage of the total egg white content (100%), which allows a clear differentiation of the biological value of amino acid mixtures. The higher the biological value of the drug, the higher its ability to provide the necessary endogenous protein synthesis.

In addition, the indicator of the biological value of the amino acid solution reflects the ability of the drug to affect the nitrogen balance. The ability to correct nitrogen balance and eliminate negative nitrogen balance in the first place is a very important condition for evaluating its effectiveness in intensifying PPP. clear therapy of critical situations. Under normal conditions, the processes of nitrogen entry and excretion are balanced. Pathological conditions are characterized by the development of post-aggressive, critical, negative nitrogen balance, in particular. Its formation depends on many factors, including the development of hypermetabolism syndrome, the shift of metabolic reactions to catabolism, an increase in nitrogen loss against the background of malnutrition of the patient. The introduction of a solution of amino acids with low biological value and low nitrogen or low amino acid profile maintains a negative nitrogen balance. During natural digestion, the concentration of free amino acids in the body is practically constant, and its changes also vary within very narrow limits, with a significant increase in the amount of protein delivered orally due to the mechanisms of amino acid homeostasis. The inclusion of all 20 amino acids (8 essential and 12 non-essential) ensures the maintenance of homeostasis of amino acids in the blood during drug administration, removes the additional burden on the body in the form of the need to synthesize essential amino acids. under stress conditions excludes a decrease in the rate of protein synthesis due to deficiency of this or that amino acid (Infezol 100, Aminoplasmic).

The main requirement for modern amino acid solutions is the mandatory composition of 8 essential amino acids. However, they are only healthy and irreplaceable for the adult body. It should be borne in mind that 6 amino acids (alanine, glycine, serine, proline, glutamic and aspartic acids) are synthesized from carbohydrates in the body, and 4 amino acids (arginine, histidine, tyrosine and cysteine) are adequately synthesized. quantities. Currently, some authors classify arginine and histidine as conditionally important amino acids, because in their absence, protein synthesis processes are significantly reduced [3,4].

The main parameters of amino acid solutions are: at least 5% amino acids, including 30% essential, leucine / isoleucine ratio about 1.6, essential amino acid ratio and total nitrogen for PPN about 3. In sick patients and mild malnutrition 1.8 .

Intravenous amino acids enter the body in one of two possible metabolic ways:

1) an anabolic pathway in which amino acids bind to specific products through peptide bonds - specific proteins;

2) transamination of amino acids.

The pharmacological aspect of individual amino acids applies not only to the composition and concentration of essential branched-chain amino acids (isoleucine, leucine, valine), but also to "unconditioned" amino acids - glutamine, arginine. The amino acid arginine contributes to the optimal conversion of ammonia to urea, has an immunostimulatory effect. Thus, arginine binds toxic ammonium

ions formed during protein catabolism in the liver and is therefore converted to a conditionally essential amino acid in liver failure. In addition, arginine supports anabolic processes because it stimulates insulin and growth hormone secretion. Glutamine is involved in the interstitial process and is used almost all over the body. Among its various functions, its role as a specific plastic material and energy substrate for the gastrointestinal tract, pancreas, liver, kidneys, alveoli of the lungs and leukocytes and rapidly dividing cells of the immune system is the first. 'comes out of the ring. Stress associated with infection, trauma, and other factors of aggression leads to abrupt changes in glutamine metabolism and a severe deficiency that determines the importance of glutamine in TPN. Malic acid is very important in this process to restore arginine and as an energy source for urea synthesis. The presence of non-essential amino acids in the drugs - ornithine, alanine and proline - is also important because they reduce the body's need for glycine. Proline is a component of collagen and is synthesized from glutamic acid. During transamination, alanine is easily replaced by pyruvate and is a substrate for gluconeogenesis. Ornithine stimulates glucose-derived insulin production and carbamoyl phosphate synthetase activity, which helps to reduce glucose utilization, urea synthesis, and ammonia levels by peripheral tissues, along with asparagine. Histidine is a neurotransmitter and stimulator of gastrointestinal tract movement.

The amino acid solutions provided contain Na ±, K ± cations, and Cl-anion. Sodium ion is the main cation of extracellular fluid and together with chloride anion is the main element for maintaining homeostasis. Potassium ion is the main cation of intracellular fluid. It has also been found that positive nitrogen balance in the body can be achieved with general parenteral nutrition only by adding potassium ions to the infusion solution [5].

Magnesium ion (Infezol 100, Aminoplasm) is used to maintain the integrity of mitochondria and excite impulses in nerve cell, myocardial and skeletal muscle membranes, as well as to transfer high-energy phosphates during ATP synthesis. In patients with long-term parenteral nutrition, hypomagnesemia is often accompanied by hypokalemia.

Replenishment of the standard amino acid solution of Aminosol 800 with B complex vitamins, riboflavin (B2), nicotinamide, panthenol, and pyridoxine (B6) is associated with their limited reserves in the body and the need for daily use, especially with long-term PPP. However, B vitamins do not completely solve the problem of meeting the body's daily need for vitamins in the case of TPN. When conducting PPP, especially long-term, it is necessary to include the whole complex of vitamins, including fat-soluble and water-soluble vitamins. In this regard, it is preferable to use a mixture of commercial multivitamins (cernevit, soluvit, etc.).

The aminosol solution of amino acids contains a component of the energy supply - sorbitol, which is phosphorylated in the liver to fructose-6-phosphate. It should be noted that the use of sorbitol and fructose in a number of countries is limited due to the risk of complications in patients with congenital fructose intolerance (liver necrosis, hyperlactemia). The use of xylitol is limited due to the possibility of secondary oxalosis (Recommendations for parenteral and enteral nutrition for adults. Austrian Clinical Nutrition Society, 2003).

Comparing the composition of the amino acid solutions under consideration, it can be noted that all drugs contain essential amino acids, but in different concentrations: Infezol - 41.27 g / L, Aminoplasmal - 39.2 g / L, Aminosol - 25 , 4 g / L. However, the total concentration of amino acids in the drugs is the same - 100 g / l. There is no significant difference in the total nitrogen content - 15.6–16.92 g / l (Table 5). However, there are differences in the amino acid profile. The concentration of essential amino acids and the total amount of amino acids for some amino acids are high in Infezol 100 and Aminoplasma preparations. Quantitatively, Aminosol differs from other drugs for a number of amino acids: it contains the highest concentrations of alanine, glycine and malic acid. However, Infezol - lysine, Aminoplasmal - leucine, histidine. The ratio of leucine / isoleucine in the aminoplasm is 1.7; Aminozolda - 1.5; Infezolda - 1,1. The

ratio of essential amino acids and total nitrogen (E / T) in Infezol 100 is 2.64; Aminoplasmosis - 2.45; Aminozol - 1.5 (Table 1) [5,6].

In critical conditions, basic nutritional support includes the introduction of amino acids from 1.5 to 2.0 g / kg per day, including essential amino acids - 45-50%, non-essential - 30-35%.

Thus, an approach to the use of amino acid solutions for parenteral nutrition of critically ill patients involves reducing nitrogen losses and ensuring plastic processes. The introduction of an amino acid solution with insufficient nitrogen content or a low amino acid profile maintains a negative nitrogen balance. With natural digestion, the concentration of free amino acids in the body is practically constant, and its changes vary within very narrow limits, even with a significant increase in the amount of protein delivered orally due to the mechanisms of amino acid homeostasis. The inclusion of all 8 essential amino acids and the most (12) non-essential amino acids ensures the maintenance of homeostasis of amino acids in the blood during drug administration, removing the additional burden on the body. synthesizes amino acids that are not essential under stress, excluding a decrease in the rate of protein synthesis due to a deficiency of one or another amino acid [7].

Symptoms of acute renal failure

Acute renal failure is treated only in a medical institution and is characterized by the following symptoms:

- urinary incontinence - it may not be present at all or may be present in small amounts;
- digestive disorders - nausea, vomiting, diarrhea, loss of appetite;
- swelling of the legs and arms;
- increase in blood pressure;
- tachycardia;
- anemia;
- drowsiness;

Treatment of acute renal failure

Treatment of acute forms of renal failure begins with identifying the cause of the pathological condition - it is not an independent disease, but a complication of existing diseases. To quickly get rid of the factors that cause acute renal failure, doctors can take various measures depending on the disease: elimination of blood loss, restoration of normal heart function and intravenous administration of blood substitutes . If there are mechanical obstructions to the flow of urine, they can only be removed surgically - for example, ureteral catheterization, nephrostomy [15,28].

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