Preoperative preparation for patients with nutritional disorders

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Eating disorders are very common today. An increasing number of patients that undergo anesthesia and surgery have some nutritional disorder. These disorders are very versatile starting from obesity to anorexia. Significant changes in all organ systems are present. These pathophysiological changes are increased with the duration of the disease. There are many changes in the functioning of the cardiovascular system in all these diseases and there are significant. Respiratory and ventilatory functions are changed too. There are also many endocrine disorders. As a final result, there are many serious biochemical and coagulation disorders. These patients are often under some drug treatment. Patients could be under psychiatric therapy (psychiatric drugs) and/or could take drugs for relieving symptoms related to the pathophysiological changes in different organ systems. Preoperative preparation of patients must be detailed. All changes must be improved to optimal condition. In addition, it is necessary to think about the possible influence of used drugs on the anesthesia.

Key words: nutritional disorders, preoperative preparation, anesthesia, surgery

INTRODUCTION

Eating disorders are very common today. An increasing number of patients that undergo anesthesia and surgery have some nutritional disorder. These disorders are very versatile starting from obesity to anorexia. Patients with malignant diseases often have high nutritional disorders too. All these disorders, even if it’s not life threatening, could affect intraoperative treatment as well as postoperative recovery by various disturbances in organism.

In order to better preoperative preparation for surgery, anesthesia and postoperative recovery, the team which involve in surgical treatment of patients expanding knowledge in internal medicine, psychiatry and dietetion. Modern life and habits, results in new nutritional disorders with pathophysiological disorders may affect preoperative preparation, anesthesia and outcome of surgical patients. Nutritional disorder that can affect surgical treatment

I Eating Disorders
II Malnutrition
III Obesity

I EATING DISORDERS (ED)

ED is one of the psychiatric disorders, syndrome characterized by severe disturbances in eating habits. These are extreme disorders in which person is on extremely reduced or increased food intake. So they constantly worried about her/his looks and weight. These diseases are: a) Anorexia Nervosa b) Bulimia Nervosa c) Eating Disorder Not Otherwise Specified (This category is for disorders of eating that do not meet criteria for any specific eating disorder) ¹

a) ANOREXIA NERVOsa (AN), is defined, from American Psychiatric Association,¹ as “refusal to maintain body weight at or above a minimally normal weight for age and height (e.g. weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).”

There are two types¹:
1. Restricting Type (during AN a person has not binge eating or purging behavior)
2. Binge Eating / Purging Type (during AN a person has binge eating and purging behavior).
TABLE 1

BASIC CHARACTERISTICS OF PATIENTS WITH ANOREXIA NERVOSA

<table>
<thead>
<tr>
<th>System</th>
<th>Anorexia nervosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermatological</td>
<td>Fine lanugo, dry skin, dehydrated, poor wound healing</td>
</tr>
<tr>
<td>Oedema</td>
<td>Might have</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>Generalized myalgia, muscle weakness, ileus, diplopia, osteopenia and osteoporosis</td>
</tr>
<tr>
<td>Cardiovascular system</td>
<td>Hypotension, bradicardia, electrocardiographic abnormality, mitral valve prolapse</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Bradipnea, pneumothoraces, aspiration pneumonia</td>
</tr>
<tr>
<td>Urinary</td>
<td>Proteinuria, renal calculi, dehydration</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Hyperplasio of salivary glands, oesophageal strictures, gastritis, oesophagitis, hepatomegaly, cirrhosis, ileus, high transaminases</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Amenorrhea, decreased values of T3 i T4 , decreased cortyzol function</td>
</tr>
<tr>
<td>Haematological and immunological</td>
<td>Anaemia, leucopenia, thrombocytopenia</td>
</tr>
<tr>
<td>Electrolite disturbance</td>
<td>Hypomagnesemia, hypocalcaemia, hypophosphataemia, hipokalaemia (diuretics abused), hypochloraemia (vomiting, laxative abuse)</td>
</tr>
<tr>
<td>Metabolism</td>
<td>Decreased</td>
</tr>
<tr>
<td>Neurological</td>
<td>Generalized weakness, hypothermic, abdominal pain</td>
</tr>
</tbody>
</table>

For AN the prevalence rate is 0.29% and incidence is 4.2 per year per 100,000 population in Europe. From the seventies (of last century), the incidence was particularly increased in women aged 15 to 24. Although this is the first psychiatric disorder, leads to a large number of pathophysiological disorders in the body (Table 1).

This patient has a BMI <17.5. He/she has dry skin with wounds that are slow healed. It is not unusual that liver is enlarged with cirrhosis (caused by alcohol and drugs). It may exist lanugo to preserve heat. He/she has osteoporosis. Complain on general weakness and pain in muscles due to electrolyte disturbances. Due to slow metabolism often has bradycardia and because of electrolyte disturbances has different arrythmias. Frequent mitral valve prolapse is probably due to loss of heart muscle mass. Vomiting caused by him/herself, lead to alkalosis in this patient and therefore they are bradipnoic. Because of dehyd ration, abuse of laxatives and diuretics, kidneys can not function normally and calculation is often and many electrolyte disturbances too. Besides, dehydration activated renin - angiotensin - aldosterone system. Peristaltic is slowed and due to frequent vomiting this patient has oesofagitis with oesophageal stenosis. They are anemic, leucopenic and thrombocytopenic and finally, taking everything into account, they have a coagulopathy. There are some possible differential diagnostic dilemma in terms of anorexia (Table 2).

Treatment

Treatment of this disease is (somehow) unique and different from the treatment of other psychiatric disorders. Effective treating of mood and cognitive disturbances with long-term nutritional support to return to optimum body weight are basics. Different therapy psychotherapeuti c approaches are used to the patient and his family. There is also a psychopharmacologic treatment such as selective serotonin reuptake inhibitors (SSRIs), antipsyc hotics (neuroleptics).

Pre-operative assessment and management

Although mainly concerned young people who have no comorbidty, the above-mentioned pathophysiological disturbances caused by reduced intake of food make these people as people with very violated health. These patients often have multisystem organ dysfunction. Besides of that, we must keep on mind possibility of psychopharmacologic treatment, abusing of some medications such as diuretics, laxatives and amphetamines (in various forms). According to that, preoperative physical examination with laboratory investigations (blood and urine) is necessary. Many of the abnormalities are a consequence of malnutrition and used drugs.

As many of these patients have cardiovascular disorders electrocardiogram is always necessary and echocardiogram in some cases.

Adequate patients rehydration and optimal condition of electrolytes are required before surgical intervention. Due to delayed stomach emptying and dilatation, nasogastric tube must be placed before induction of anesthesia. Prokinetics agent and an antacid can be used.

As these patients are susceptible to hypothermia, the operating theater should be warm. In addition, intravenous fluid and liquid for rinsing of cavity should be heated. Position of patient on operating table should be comfortable...
b) BULIMIA NERVOSA (BN) is defined, from American Psychiatric Association\(^1\) as recurrent episodes of binge eating. An episode of binge eating is characterised by both of following:

1. Eating, in discrete period of time, an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances...
2. A sense of lack of control over eating the episode...

During the BN patients can have procedures to prevent weight gain (self-induced vomiting, misuse of laxatives, enemas, diuretics, or other medications, fasting, or excessive exercise).

The incidence of this disease is around 13 per 100 000 per year and the prevalence of BN is 1%\(^4\).

Patients with BN are usually of normal weight, although some may be slightly underweight or overweight. For these reasons, clinical signs of BN is more difficult to detect. Symptoms of bulimia may be part of the anorexia nervosa syndrome. AN and BN are in a very close relationship.

**Therapy.**

As with AN, in BN treatment is quite complex. The individual and family psychotherapy and behavioral therapy are used. Same drugs are used as in AN, including benzodiazepines\(^7\).

Complications of BN are also its pathophysiological characteristics. As a result of frequent vomiting and reflux we can observe changes on the teeth, gums, Mallory-Weiss syndrome. In addition there may be diabetes, colitis, infertility, pancreatitis, arthritis, osteoporosis. By inducing vomiting occur alkalosis, hypokalemia, and dehydration. Subconjuctival hemorrhage is due to frequent vomiting too. On the back of their hand are seen the presence of abrasions and scaring (Russell’s sign). This is a sign of self-induced vomiting over a long period of time.

The use of laxatives leads to rectal bleeding, abdominal pain, loss of bowel tone. In addition to the use of laxatives, these patients used diuretics so they are often dehydrated. As a result of electrolyte disturbances, arrhythmias are appeared.

Hypokalemia and increased amylase are significant biochemical disorders.

A large number of symptoms and biochemical signs are very similar to AN.

Preoperative preparation, induction and maintenance of anesthesia are identical as in AN. Therefore, preoperatively we should correct all electrolyte and other abnormalities that occurred as a result of self-taking medication or therapy prescribed in the treatment of BN\(^8\).

**II MALNUTRITION**

A large number of patients who will undergo surgery is in malnutrition. A direct link between increased postoperative morbidity and mortality in patients with nutritional status named malnutrition were demonstrated\(^9\).

From these reasons, malnutrition is concerned as a growing problem in hospitals with a major impact on morbidity and mortality\(^10\).

By definition, malnutrition is the imbalance between intake and requirement which results in altered metabolism, impaired function and loss of body mass or as a state of nutrition in which a deficiency or imbalance of energy, protein and other nutrients causes measurable adverse affects on tissue and / or body form\(^11\).

**TABLE 2**

<table>
<thead>
<tr>
<th>DIFFERENTIAL DIAGNOSTICS IN RELATION TO ANOREXIA NERVOSA</th>
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<tbody>
<tr>
<td>1 Morbus Crohn</td>
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<tr>
<td>2 Colitis ulcerosa</td>
</tr>
<tr>
<td>3 Diabetes mellitus</td>
</tr>
<tr>
<td>4 Morbus Addison</td>
</tr>
<tr>
<td>5 Coeliac disease</td>
</tr>
<tr>
<td>6 Hyperthyreosis</td>
</tr>
<tr>
<td>7 Hypofunction of hypophysis</td>
</tr>
<tr>
<td>8 Tumour of hypothalamus</td>
</tr>
<tr>
<td>9 Malignancy</td>
</tr>
<tr>
<td>10 Drug abusing</td>
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</tbody>
</table>

**TABLE 3**

<table>
<thead>
<tr>
<th>ALTERED PHYSIOLOGICAL AND METABOLIC FUNCTIONS IN OBESE</th>
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<tbody>
<tr>
<td>Arterial hypertension</td>
</tr>
<tr>
<td>Increased insulin concentrations in plasma</td>
</tr>
<tr>
<td>Insulin resistance</td>
</tr>
<tr>
<td>Hyperglycaemia</td>
</tr>
<tr>
<td>Hyperlipidaemia</td>
</tr>
<tr>
<td>Non alcoholic steatohpatosis</td>
</tr>
<tr>
<td>Increase in circulatory volume</td>
</tr>
<tr>
<td>Increase in cardiac output</td>
</tr>
<tr>
<td>Increased oxidative demands</td>
</tr>
<tr>
<td>Disturbed function of the respiratory sy</td>
</tr>
</tbody>
</table>
In hospitals, major cause of malnutrition is a disease. The reasons for this are usually trauma, inflammatory diseases, tumors, nausea, vomiting, mechanical obstruction, loss of appetite, ...

The prevalence of malnutrition in hospitals around the world is up to 50%11. Nutrition screening and assessment should be quick and easy. Today are developed the numerous scores for nutritional status assessment. Keeping on mind the importance of this assessment and a number of reasons for the occurrence of malnutrition we can use four types of measurements to assess the severity of malnutrition: measurement nutrient balance (dietary history, nutrient losses in excreta, energy expenditure, nitrogen balance), measurement body composition (weight, height, body mass index,...), measurement inflammatory activity (CRP, Hb, albumin level,...), measurement function (muscle, immune, cognitive)12,13. One group of parameters is indicator of the inflammatory activity and the others are for organism composition.

Malnutrition, particularly undernutrition have a great impact on the anesthesia mainly because it has an impact on a number of physiological function. Although we expected specific biochemical abnormalities they are mainly related to the disease that has led to malnutrition. So there are no specific biomarkers for malnutrition or biomarkers which will clearly separate acute and chronic malnutrition13,14.

Mental functions in patients with chronic malnutrition has been reduced and slowed15. In addition, they are more susceptible to mental depression16. Their muscle strength and cell mass are reduced in the malnutrition17,18. These patients are susceptible to hypothermia because of loss of tissue and muscle19,20. Preoperative, intraoperative and postoperative hypothermia leads to major disorders of cognitive function, loss of coordination, metabolic disorders.

Loss of muscle mass is followed by loss of cardiac muscle mass. For this reason, there are reduction in cardiac output, bradicardia and hypotension17,18,21. Changes in the level of electrolytes and minerals, followed with hypovitaminosis (vitamine B1), can lead to arrhythmias. Loss of muscle mass is associated with problems in ventilatory function. Decreased muscle mass of respiratory muscles can not provide a good response to hypoxia and hypercarbia17,22.

Together with decreasing pressure and cardiac output, glomerular filtration is reduced too. In this way, regulation of the amount of water and minerals in the body is disturbed. The amount of water in the body is higher than usual with the electrolyte disbalances18,23.

Reduced use of gastrointestinal tract and different degrees of malnutrition soon disturb the integrity of the intestinal mucosis with spreading inflammatory infiltration17,24.

Spaces between enterocytes spread, so the translocation of bacteria is facilitated, resorption decreased, followed by diarrhea worsening patient’s condition. Due to decreased food intake, protective function of gastric, pancreatic and biliary secretion are reduced. All together change the composition of intestinal flora, and these individuals are susceptible to infections.

Response to infection is also weakened, especially cell mediated immunity.

Cytokine metabolism is altered so limfocite proliferation is reduced25,26.

Preoperative assessment and management

In patients on elective surgery should be repaired preoperatively as possible electrolyte status, hypovitaminosis, arrhythmias. Started with antibiotic prophylaxis, because of the increased risk of infection. If you have time, patient should be preoperatively prepared with parenteral or enteral nutrition through nasogastric, nasojejunal tubing or nutrition through gastric or jejunal stoma. Be aware of the possibility of refeeding syndrome.

Maintenance of anaesthesia

Due to a significant loss in muscle mass, patient should be comfortably laid on the operating table (prevention of decubitus). Heating equipment should be placed on the operating table for maintenance of the patient’s temperature during surgery. It is also necessary that these patients receive a warmed infusion solution during surgery, so the solutions that are used must be heated.

Compensate arterial pressure by restitution of circulatory volume, and if necessary, using sympathomimetics.

Adopt the drug administration to the reduced circulatory volume, and hypoalbuminemia.

Postoperatively, there is a possibility of difficult weaning due to impaired ventilatory function. Due to coughing problems, prolonged intubation with a bronchoaspiration is required for maintenance airways.

III OBESITY

Obesity is a chronic disease with excessive enlargement of body fat29. It could be expressed through the body mass index (BMI, kg/m²). Adult with BMI 25-30 are overweight and over 30 is obese28.

In developed countries of Europe about 25% of the adult is obese. In a global world, obesity is present in 10-60% of the adult population. In Serbia, 18.3% of adult population is obese (BMI >30). Most frequent in the age group 45 to 7530.

Increased body weight caused by the accumulation of body fat very quickly leads to many physiological changes and metabolic dysfunction (Table 3), called metabolic syndrome27.

Proportional to the duration of obesity there are many changes in organ systems. There are no organic system that does not suffer due to increased body mass31.

Common changes of respiratory function are obstructive sleep apnoea, snoring, daytime sleepiness, recurrent apnoea, hypoxemia, hypercapnia, reductions in functional residual capacity and total lung capacity31,32.
Before anesthesia is also necessary to assess possible difficulties for intubation. It could be present difficult physical access to the airways related to obesity because of reduced mobility of the neck, big cheeks, big breasts, reduced mouth opening, etc.

Cardiovascular diseases are dominant in obese. The most common are hypertension, ischemic heart disease and cardiac failure. All persons with a BMI >30 should be examined very detailed in terms of detecting cardiovascular disease.

Preoperatively, these patients need a detailed overview of the complete blood count, coagulation and biochemical parameters, arterial gas analysis in supine and upright position. Chest radiography is also essential.

Taking into account all results, these patients require final evaluation of their condition and optimal preparing for anesthesia.

CONCLUSION

Disturbance of circulatory volume accompanied with hemodynamic and cardiac output unstability, arrhythmia are universials for all the mentioned nutritional disorders. Besides, all these conditions are followed by respiratory and ventilatory disorders, renal disorders, immune, gastrointestinal and other functional disorders. Thus, we must be aware of having a very severe patients with multiple organ damage.

SUMMARY

PREOPERATIVNA PRIPREMA BOLESNIKA SA NUTRITIVNIM POremećajima

Poremećaji ishrane su danas veoma česti. Javljaju se u raznim oblicima od gojaznosti do anoreksije. Povećan je broj bolesnika sa nutritivnim poremećajima koji se iz nekih razloga podvrgavaju anesteziji i hirurškoj intervenciji.

Ovi poremećaji su uzrok značajnih promena u svim organskim sistemima. Nastale patofiziološke promene su izraženije sa trajanjem poremećaja. Najviše su izražene promene u funkcionalisanju kardiovaskularnog sistema. Respiratorna i ventilatorna funkcija kao i endokrina su tačkove promenjene. Postoje i ozbiljni biohemiji i koagulacioni poremećaji.


Ključne reči: nutritivni poremećaji, preoperativna priprema, anestezija, hirurgija

REFERENCES


