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Successful Non-surgical Management of Superior Mesenteric Artery Compression Syndrome: A Case Report

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Abstract In this study, we aimed to report a case of superior mesenteric artery syndrome, with a particular focus on the patient's non-surgical management including enteral nutrition therapy. The focus of this patient's care includes nasogastric tube management, parenteral and enteral nutrition care (personalized nutrition treatment plan), proper lying position, negative pressure drainage in the stomach, and psychiatric mental health nursing. This case study supports that with efforts focusing on patients' nursing and enteral nutrition therapy, non-surgical management could be an effective approach in treating superior mesenteric artery compression syndrome.
Keywords Superior mesenteric artery syndrome; Nasogastric tube; Enteral nutrition; Psychiatric mental health nursing

INTRODUCTION

Superior mesenteric artery syndrome (SMAS) is a rare digestive condition with unclear etiologies. It occurs when the duodenum is compressed between the aorta and the superior mesenteric artery, which leads to partial or complete blockage of the duodenum. Also, severe weight loss may lead to the loss of the mesenteric fat pad that has a cushioning effect on vascular compression of the duodenum, resulting in duodenum stenosis or obstruction [1]. SMAS is relatively rare in clinical practice. According to the reports, the prevalence of SMAS is between 0.01% to 0.30% [2, 3]. The main symptom of patients with SMAS is severe malnutrition. Therefore, effective enteral nutrition support treatment can ameliorate the nutritional status of patients and therefore improve the outcomes of the disease. Particularly, enteral nutrition achieved by the triple lumen nasogastric tube feeding is a non-invasive approach that is not very challenging to manage and can reduce the occurrence of lung infections. Moreover, this type of enteral nutrition method is more likely to be accepted by the patients, since it is less traumatic but effective in delivering the nutritional

supplies. Herein, we reported a case of SMAS admitted to our department who received the enteral nutrition support treatment and successfully discharged.

Case presentation

A 32-year-old male patient presented to the Emergency Center of the Seventh Affiliated Hospital of Sun Yat-sen University on April 7, 2020, with complaints of intermittent abdominal distention and vomiting for 10 years and the conditions aggravated in the past 2 weeks. He has abdominal distension starting from 10 years ago, accompanied by vomiting (stomach contents and bile) after eating, which was affected by body position or types of food. His symptoms were then relieved spontaneously and recurred 5 years ago after a family tragic event. He experienced depression with decreased appetite, upper abdominal distension, and vomiting, so he went to the Affiliated Hospital of Tongji University for medical treatments. He underwent the capsule endoscopy exam which showed no abnormalities. His symptoms were relieved spontaneously again after discharge. The patient experienced severe abdominal distention, vomiting, decreased appetite with depression again in the past two weeks. Treatments including acid suppression and antiemetic were ineffective. The patient provided a history of asthma for 27 years. He had no significant surgical history but had lost 5.5 kg in weight.

The contrast-enhanced computed tomography (CT) and CT angiogram (CTA) of the upper abdomen demonstrated that the horizontal segment of the duodenum and the renal veins were compressed and narrowed, supporting the diagnosis of superior mesenteric artery syndrome. The upper gastrointestinal angiography demonstrated chronic gastritis, reverse peristaltic waves in the descending and ascending segments of the duodenal bulb, local longitudinal pen-shaped pressure marks in the horizontal segment of the duodenum, and the compression of the superior mesenteric artery. The patient scored 4（less than 7 indicates malnutrition) in nutrition risk screening (NRS2002) [4]. He was 170cm tall, weighed 47kg, and had a BMI of 16.3kg/m2. His Subjective Global Assessment (SGA) score [5] was B, which indicated the presence of malnutrition. Moreover, his score on Hamilton Anxiety Rating Scale was 25 (a score greater than 21 indicates anxiety).

After admission, a nasogastric tube was placed for decompression, and enteral nutrition was given to the patient. After professional nursing and personalized enteral nutrition, his symptoms gradually relieved, accompanied by an increase in weight. In addition, psychiatric mental health nursing was delivered and effectively relieved his anxiety. The patient was then discharged on May 9th, 2020.

The key aspects and principles of non-surgical management related to this patient are detailed below.

The nursing management of the triple lumen nasogastric tube

After inserting the nasogastric tube, the opening of the tube should be carefully secured on the patient's face but not on the nose. the length at the place where the nostril passes should be marked and handover in each shift to prevent the tube from coming out and the nutrient solution entering the stomach, which may induce or aggravate vomiting and abdominal pain. Moreover, continuous gastrointestinal decompression is critical. Monitor the residual gastric volume every 4 hours is necessary.

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During the enteral nutrition treatment, patients should be closely observed (e.g., the patient's vital signs should be monitored and recorded). Patients should be patrolled frequently. If symptoms such as nausea, vomiting, abdominal distension, and diarrhea occur, the cause should be found out and treated in time. Also, during the enteral nutrition treatment, blood glucose, urine glucose, blood urine amylase electrolytes, liver and kidney function should be checked regularly, and urine output, stool frequency and properties should be observed. Blood glucose should be controlled between 8-10mmol/L, and 24 hours of input and output should be accurately recorded. The body weight should be monitored weekly. The patients need to do a nutritional assessment weekly.

Another critical aspect is to prevent infections. Oral care during enteral nutrition can help clear bacterial growth in the oral mucosa. If necessary, a gargle with a 5% sodium bicarbonate solution can be given to prevent oral infections. Moreover, strictly implementing aseptic operation techniques is critical to avoid contamination.

In order to keep the catheter unobstructed, the feeding tube should be flushed with 30-50 ml warm water pulsed once every 4 hours before and after each nutrient solution infusion to avoid blockage of the tube. The nutrient solution should be fully shaken before infusion, and the nutrient solution and medicine should be injected separately. If the flushing pipe is not smooth, the interval between flushing pipes should be shortened (flushing once every 1-2 hours can reduce the blocking rate). If the tube is blocked, it can be drawn back with a syringe or repeatedly flushed with low pressure, or instilled with sodium bicarbonate solution, cola drink, etc., to make it slowly dissolved.

Complication management

Due to the gastrointestinal dysfunction of patients with SMAS, a large amount of fast infusion of nutrient solution, changes in concentration, and low temperature can cause abdominal distension and diarrhea. Generally, most patients' symptoms can be relieved after adjusting the infusion rate, warming or changing nutritional preparations. Infection is also a common complication. Strictly implementing aseptic operations during enteral nutrition can effectively prevent infection. Also, the nutrient solution is a good culture medium for bacteria, so the infusion set should be replaced every day. The nutrient solution should be used immediately after opening the bottle. It is not suitable to keep it for too long (generally not more than 12 hours) in order to prevent bacterial contamination during the infusion. Maintain 1 hour of sunshine every day can help prevent infections and accelerate recovery. It is beneficial to instruct the patients to develop an appropriate activity plan (e.g., starting from walking 50 meters a day and increasing every day, gradually to 8000-10000 steps).

Enteral nutrition care

According to the patient's condition and the opinion of the nutrition department, a personalized enteral nutrition plan can be formulated, and an enteral nutrition formula with high protein levels that is easy to absorb is selected. The target calories are 1600-2000 kcal per day and protein is 78g per day. The enteral nutritional suspension (TPF-FOS) 1000ml and Peptison (Short-Peptide Enteral Nutrition) 500ml are given to

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the patient through enteral feeding pumps daily. According to the results of the enteral nutrition tolerance assessment [1], the corresponding intervention measures were carried out. At the same time, 1 scoop of whey protein powder and 50ml warm water was given by nasal feeding slowly, three times a day. The principle followed is from less to more, from slow to fast, so that patients have a process of tolerance and adaptation.

The nutrient solution infusion rate should be gradually transitioned from 20ml/h to 100ml/h, and the infusion should be at a constant rate, avoiding rapid and slow changes, and adjust the rate at any time according to the patient's condition. The temperature of the nutrient solution should be kept at 37-40℃, and a warm bag can be used to maintain the temperature in winter. The nutrient solution should gradually transition from low concentration to high concentration. When increasing the concentration, the amount of nutrient solution cannot be increased at the same time. The increase in concentration and amount can be carried out alternately.

In order to prevent complications such as abdominal distension, nausea, and vomiting, the amount of nutrient solution, the speed of infusion, and the temperature should be strictly controlled during enteral nutrition care. The patient should remain in a semi-sitting position (the bedside angle is elevated by 45°), and remain in a semi-sitting position for 1-2 hours after the infusion of the junction, or in a lateral and prone position to reduce the pressure of the superior mesenteric artery on the duodenum. When the patient has symptoms of nausea and vomiting, the infusion of the nutrient solution should be suspended, and the catheter should be flushed with 20ml of warm water and then clamped to clean the mouth and keep the patient’s airway unobstructed. SS 21.0 statistical analysis software, paired t-test analysis were used for statistical analysis. A p-value less than 0.05 indicated that the result was considered statistically significant.

Nutrition monitoring

The patient's weight, body mass index, triceps skin wrinkle thickness, arm muscle circumference, visceral protein measurement, and indirect energy measurement can help adjust the patient's nutritional treatment plan. The total amount of nutrient solution infused daily is determined based on the results of indirect energy measurement [6]. The body composition analysis is obtained by the multi-frequency bioelectrical impedance analysis method, which can evaluate the effect of patient nutrition treatment. The results of indirect energy measurement showed that resting energy expenditure increased by 2000 compared with the first admission, and energy consumption was higher. After adjusting the enteral nutrition treatment plan, 2000ml (10000) of enteral nutrition emulsion was given to improve the nutritional status of the patient.

In this case, after 4 days of treatment, the patient's self-sensed physical strength increased significantly, and he could get out of bed for activities and exercise without feeling hungry.

Psychiatric mental health nursing

When the patient was admitted to the hospital, the anxiety scale was evaluated, and the score was 25 points, showing obvious anxiety. He showed that he had lost confidence in the disease, remained silent, and resisted doctors and nurses. Through communication with patients and family members, we learned that the patient had poor physical fitness since childhood, including a history of asthma, weight loss, and repeated

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abdominal distension and vomiting since college. For more than ten years, he had been in many well-known domestic hospitals, but there had been no clear diagnosis and effective treatment, which caused him to lose confidence in treatment. This time he was diagnosed in our department and still held a distrustful attitude.

Therefore, we made a personalized management plan. First of all, a psychological nursing team was formed by the chief professor, doctors, chief nurses, and nurses, aiming to give patients psychological counseling from different angles. We shared the successful cases of enteral nutrition for patients with the same disease to let him know that this type of disease requires a gradual recovery process. Only by actively cooperating with treatment could he have a chance to return to normal diet, work and life. We instructed patients and their families to participate in the care of endoscopically inserted gastrojejunal tubes, adjusted the ratio and dosage of enteral nutrition, improved the nutritional status of patients, and made patients adapt to the daily state of taking the tube. We guided patients to actively carry out functional exercises and physical exercises, divert attention, and actively face the disease. Through psychological intervention, the patient was able to actively cooperate with treatment and care, and established confidence in overcoming the disease.

Follow up

We instructed the patient and his families on the importance of diet, including small and frequent meals, avoiding overeating, starting with a low-fat, semi-liquid diet, and gradually transitioning to a high-calorie, high-protein, low-sugar, and low-fat diet. This patient returned to our department every month for follow-up. We had established an online communication platform. When the patient encountered any discomfort, he could get the feedback in time and solve it online. If it could not be solved, he could return to the hospital for further treatment.

After 6 months of family enteral nutrition support treatment, the patient's nutritional status improved significantly. His weight had increased by 6 kg. He was evaluated for the effect of nutritional support before discharge from the hospital and at home nutrition for 1, 3, and 6 months. His body composition index BMI was increased from 16.3 to 18.3. His SGA rating changed from B (moderate malnutrition) before discharge to A (normal nutritional status). The self-evaluation results of his psychological anxiety scale and psychological depression scale showed that the patient had no abnormal mental activity.

DISCUSSION

The clinical manifestations of SMAS are non-specific and prone to be misdiagnosed. During the acute attack, conservative treatment should be adopted first, including fasting, gastrointestinal decompression, maintenance of water-electrolyte acid-base balance, and nutritional support treatment. When the patient's nutritional status improves, the angle between the superior mesenteric artery and the abdominal aorta will fill up with fatty tissue, and the angle will increase, which can relieve or cure the condition.

A study[7] showed that enteral nutrition support with PEG/J surgery can alleviate patients' gastrointestinal symptoms, improve their nutritional status, and expand the angle of the abdominal aorta, which is an effective way to treat SMAS. The enteral nutrition support treatment is suitable for patients who are in a stable condition and need to receive nutrition support at home. However, its safe and smooth

implementation cannot be separated from the management of a professional nutrition support team. The pre-discharge education, follow-up, and effect evaluation of patients need to be carried out under the guidance of the nutrition support team.

In this case, we conducted individualized training for the patients. From easy to difficult, we compile nursing routines into formulas, which were easy for the patient and his family members to understand and master. After discharge from the hospital, the patient was followed up through diversified standards. The follow-up nurse kept abreast of the patient's implementation of family nutrition, and effectively handled catheter complications for the patient, ensuring the safety and smooth implementation of family nutrition. Eventually, the patient's nutritional status improved, the angle between the abdominal aorta became normal, and his diet was restored.

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STATEMENT

There is no conflict of interest in this article.

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