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CASE REPORT

Nutritional management of a malnourished cancer patient with high output ileostomy: a case report

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Abstract

High output stoma is a complication that may follow ileostomy formation, with an incidence of 23%. There is no general consensus on the limit of ileostomy production to be defined as high output. However, output of more than 2000 mL/day, can cause fluid and electrolyte imbalance, also malnutrition due to reduced nutrient absorption. Delay in recognition and treatment, especially in cancer patient with high risk of malnutrition, can further deteriorate patient's nutritional status. A 43-year-old malnourished female with ascending colon cancer underwent tumor resection and ileocolostomy surgery. Starting from the third postoperative day, ileostomy effluent drastically increased to 2700 mL/day, causing severe hyponatremia, hypokalemia, and hypomagnesemia. Risk factors of high output stoma identified were routine prokinetic medication use and unresolved malignancy-related retroperitoneal abscess. Moreover, increment of food intake in the first days after surgery, specifically food high in insoluble fiber, was one of the contributing factors. High output stoma was then resolved by abscess drainage, discontinuation of prokinetic agent, and administration of antimotility agent. Hyponatremia and hypomagnesemia improved with correction, whereas hypokalemia needed longer time to resolve. Enteral nutrition was maintained and increased gradually to prevent further malnutrition. Oral hypotonic fluid intake was limited to 1000 mL/day and isotonic solution consumption was advised. High stoma production due to hypersecretory phase after ileostomy was expected, but thorough management would prevent patient's deterioration that was caused by the fluid, electrolyte, and nutritional imbalances.

Keywords: high output stoma, malnutrition, ileostomy, cancer

Introduction

High output stoma as one of surgery complications is still commonly found with incidence of 23%.[1,2] There is no consensus on the definition of high output stoma, ranging from more than 1000 to 2000 mL/day, but clinically ileostomy effluent of more than 2000 mL per day can lead to significant fluid and electrolyte loss. Further it can cause malnutrition, dehydration, electrolyte imbalance, and also renal failure.[3,4] Delay in recognition of high output stoma is one of the common reasons for potentially preventable emergency visits,[5] and for cancer patient with high prevalence of malnutrition, high output stoma could further deteriorate patient's nutritional status. Malnutrition itself is associated with higher rate of postoperative

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complication forming a vicious cycle of malnutrition. Cohort of 918 colorectal patients who underwent resection surgery showed malnutrition based on Global Leadership Initiative on Malnutrition (GLIM) criteria was associated with higher risk of total postoperative complications, either surgical or medical complications [OR 1.497 (1.042-2.152), p=0.029].[6]

There is no guideline on nutritional management of high output stoma readily available. Knowing that patient would enter hypersecretory phase early after surgery, it has yet to be defined on when and on what threshold of effluent volume are best to start therapy. There is also still no consensus on optimal nutritional provision route and type of formula that should be given in such case. This case report elaborates on nutritional management of high output stoma in a malnourished patient.

Case report

A 43-year-old female suffered from ascending colon adenocarcinoma with retroperitoneal infiltration underwent right hemicolectomy for tumor resection. Ileostomy was also performed for fecal diversion, as retroperitoneal abscess was found during surgery. The patient's condition was further complicated by her nutritional status which was severely malnourished. Patient's body mass index was 16.4 kg/m^2. She experienced weight loss of 21% in the last 4 months, with intake of only 35% energy requirement for more than 1 month. There were clinical signs of severe loss of muscle mass and body fat, also decrement of functional capacity. Severe malnutrition according to American Society for Parenteral and Enteral Nutrition (ASPEN) malnutrition criteria was assessed. Ileostomy initial production was 500–700 mL/day for the first two days after surgery. Starting from the third day, ileostomy production drastically increased to more than 2000 mL/day, reaching 2700 mL/day. Simultaneously, severe hyponatremia, hypokalemia, and hypomagnesemia were observed.

Intravenous hydration using normal saline was given to prevent dehydration due to fluid loss. Both intravenous and oral electrolyte correction were given to correct the imbalances, and loperamide as anti-motility drug was given to reduce the fluid loss from ileostomy effluent. Nutritional therapy was administered by enteral route, with energy target determined using Harris-Benedict formula and stress factor of 1.5, while protein target was 1.5–2 g/kg body weight. Oral hypotonic fluid intake was limited to maximum 1000 mL/day, and isotonic fluid was added to achieve patient's fluid daily need. Identifying and managing the cause of the high output was as important. Metoclopramide given after surgery as prokinetic was discontinued. Unresolved intraabdominal abscess was suspected, therefore abscess drainage was performed. With all the measures taken, ileostomy production gradually decreased, and electrolyte imbalances were corrected (**Figure 1**). Hypokalemia took a longer time to be corrected, while sodium and magnesium level were already in normal range.

Patient was given solid food and oral nutrition supplements (ONS), administered orally. Prior to abscess drainage, patient's average energy intake was 1000 kcal (27 kcal/kg body weight). Then patient's intake increased to 1500 kcal (41 kcal/kg body weight) after the procedure or increased by 40%. Patient lost 2.5 kg in a span of two weeks after surgery, yet upper arm circumference was found to be unchanged. Calculated cumulative fluid balance was 2300 mL, therefore could explain patient's weight loss.

Discussion

It is important to evaluate adaptation of newly formed ileostomy, so that any complications could be managed promptly. Ileostomy usually starts functioning in the first 24 hours, then hypersecretory phase is expected in first days, producing watery stool around 500–2000 mL/day.[7] This initial phase last around 1–2 months.[8] High output stoma is usually observed on postoperative day 2 to 15, with a median of the fourth day. Production volume ranging from 1800 to 5450 mL per day, with a median of 2460 mL.[1] In this case, effluent increment was observed starting on postoperative day 3, reaching 2700 mL/day. Electrolyte imbalance aside, note should be taken on patient's nutritional status. Malnutrition

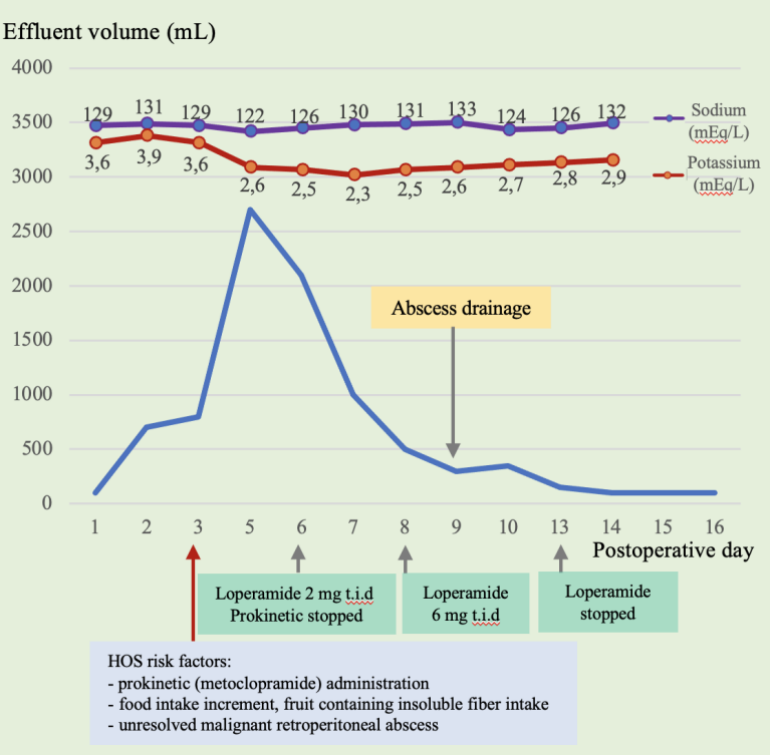

Figure 1. Effluent volume according to postoperative day compared with sodium and potassium level. HOS: high output stoma

prevalence in colorectal cancer patient ranges from 13 to 45%,[9] and malnutrition is associated with poorer 30-days outcome and infection rate, affecting not only postoperative morbidity and mortality, but also patient's quality of life.[10,11] It is imperative to ensure adequate nutritional provision and prevent nutrient loss from ileostomy effluent, especially for patient with severe malnutrition.

Several factors were identified as the cause of high output stoma in this patient. First, colon cancer infiltrated the retroperitoneal space causing abscess. Inflammation due to intraabdominal infection could contribute to the ileostomy overproduction by decreasing intestinal absorption due to intestinal edema.[1,12] Prokinetic agent could also cause high output stoma.[13] After ileostomy, the patient complained of nausea and bloating, which could be caused by ileal brake upregulation as a form of adaptation after the gut manipulation. Peptide YY secretion is increased after ileal resection, causing longer gastric emptying and slower gut motility to maximize nutrient absorption. Prokinetic agent was used to overcome ileal brake but could hinder chyme and fluid absorption and hence ileostomy production increment.[14] Loperamide as antidiarrhea agent stimulates μ-opioid receptors in the myenteric plexus, working on high output stoma by slowing intestinal transit time, blocking intestinal calcium channels, and decreasing gut secretion.[15]

Ileostomy production was also influenced by the amount of dietary and fluid consumption.[7] Increment of food and fluid intake was observed after surgery, specifically food high in insoluble fiber were consumed and fluid intake was 1500 – 2000 mL/day. Fruit pulp was found in the ileostomy effluent, raising concern of reduced bowel absorption capacity. The bowel resected was part of ileum from 20 cm oral from ileo-caecal valve and whole right colon, therefore it was predicted digestion and absorption of nutrients had already finished by the time chyme reaching ileostomy. Studies on fiber role in managing high output stoma are scarce and inconclusive. Generally, insoluble fiber consumption was encouraged to thicken stoma production, but in this case insoluble fiber consumption potentially increased effluent production, for that reason patient was advised to reduce insoluble fiber consumption.[16,17]

Ileostomy on ileo-caecal valve level produces 1000–1500 mL fluid a day, containing 200 mEq sodium, 100 mEq chloride, and 10 mEq potassium.[14] Fluid loss of more than 2000 mL per day had caused hyponatremia, hypokalemia, and hypomagnesemia. Sodium and magnesium level responded to treatment, while hypokalemia persisted even with correction and effluent volume decrement. After ileostomy, potassium excretion and sodium retention were increased following the increment of aldosterone level, hence explaining why sodium level responded well to correction while potassium level did not.[14]

Patient's hypotonic fluid consumption was restricted to maximum of 1000 mL per day, and isotonic fluid consumption was advised. Fluid best consumed by high output stoma patient is isotonic solution with sodium concentration at least 90 mmol/L.[18] Along ileum, sodium absorption was through gradient concentration, therefore hypotonic solution, such as water, tea, coffee, alcohol, and juice, would cause sodium efflux from plasma to gut lumen, while hypertonic solution would further increase fluid and sodium loss.[19] Sodium absorption along jejunum was different, because sodium needed glucose to be absorbed. Solution containing glucose and sodium could increase water absorption in jejunum by 60% and sodium by 40%, consequently providing solution that contained both sodium and glucose was recommended for patient with high output stoma.[13] Formula which has been studied for high output stoma management is St. Mark's electrolyte mix, containing 20 g glucose, 2.5 g sodium bicarbonate, and 3.5 g sodium chloride, mixed with 1 L of water.[20] This formula is similar with WHO oral rehydration solution (ORS) ReSoMal®, but 2004 WHO ORS mix, which is readily available nowadays, has osmolarity of 245 mmol/L, lower than plasma osmolarity. Commercial electrolyte solution containing 1.5 g sugar, 2.5 g sodium chloride, 1.5 g potassium chloride, and 2.5 g sodium bicarbonate has also been used in high output management as the only oral source of fluids.[17] While commercial isotonic solution we had unexpectedly had higher osmolarity of 388–392 mmol/L with sodium content of only 21 mmol/L. Further study is needed to ensure which solution has the best effect in high output stoma management.

There is no consensus on optimal nutritional provision route for high output stoma. Enteral nutrition was continued to be given to preserve gut function and promote adaptation, with a choice of high-calorie and low fiber diet, ensuring better nutrient absorption.[4] Combination of solid food and oral nutritional supplements were given. Energy provision increment was achieved (69–94% target), with mean protein of 1.4 g/kg body weight/day. To ensure absorption while providing adequate protein, low residue high protein formula was chosen. Elemental formula was not given due to concern that hyperosmolar formula could worsen high output stoma. Mean of fat provided was 28%. It is recommended for cancer patient who loses weight to get more energy from fat.[21]

Conclusion and Suggestion

This case report showed a good outcome on nutritional management for patient with high output stoma. High stoma production due to hypersecretory phase after ileostomy was expected, but thorough management would prevent patient's deterioration that was caused by the fluid, electrolyte, and nutritional imbalances. Guideline on optimal nutritional management of high output stoma needs to be developed as it could prevent post ileostomy morbidity.

Conflict of interest

The authors declare that there is no conflict of interest related to the study.

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