Scientific Research Publishing

Open Journal of Internal Medicine, 2024, 14, 175-180
https://www.scirp.org/journal/ojim
ISSN Online: 2162-5980
ISSN Print: 2162-5972

Navigating Long-Term Management Challenges in Short Bowel Syndrome: A Case Report of Chronic Intestinal Failure Complicated by Kidney Dysfunction

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How to cite this paper: Feruza, A., Thajus, P., Spencer, S. and Khalid, M. (2024) Navigating Long-Term Management Challenges in Short Bowel Syndrome: A Case Report of Chronic Intestinal Failure Complicated by Kidney Dysfunction. *Open Journal of Internal Medicine*, **14**, 175-180.
https://doi.org/10.4236/ojim.2024.142017

Received: April 6, 2024
Accepted: May 28, 2024
Published: May 31, 2024

Abstract

The most common cause of intestinal failure is short bowel syndrome (SBS), occurring as a result of a small functional intestine length, usually less than 200 cm, leading to intestinal malabsorption. A 59-year-old female with a past medical history of Crohn's disease status post total colectomy with ileostomy over 20 years ago came to the hospital due to progressive weakness. Despite medical management, the patient had high ileostomy output, leading to electrolyte disbalance, metabolic acidosis, dehydration, and progressive kidney decline. Due to the high dependence on continuous fluid supplementation, it was decided to place a port for parenteral hydration to maintain fluid replacements and homeostasis after discharge. Prompt initiation of parenteral fluid replacement and close follow-up on patients with ileostomy and intestinal failure is strongly recommended to avoid complications and prevent intestinal, liver, or kidney transplants.

Keywords

Crohn's Disease, Intestinal Failure, Short Bowel Syndrome, High Ileostomy Output, TPN

1. Introduction

The most common cause of intestinal failure is short bowel syndrome (SBS), occurring as a result of a small functional intestine length, usually less than 200 cm, leading to intestinal malabsorption [1]. While most nutrients are absorbed

in the first 100 centimeters of the jejunum [2], the spectrum of the disease varies depending on the remaining small bowel length, it is a function, and the type of anastomosis: end-jejunostomy, jejuno-colic or the most favorable—jejuno-ileo-colic [3] [4].

After surgery, the evolution of the short bowel syndrome can be divided into three periods: the immediate postoperative period lasting 3 to 6 weeks, the adaptive period for about two years, and the stabilization period [5]. The care of SBS requires multidisciplinary support and close patient follow-up. With time, absorptive function may be increased by improving diet and minimizing parenteral nutrition. However, if the intestinal function is below the minimum necessary to absorb macronutrients, water, and electrolytes, short small bowel syndrome is responsible for chronic intestinal failure, usually requiring prolonged parenteral nutrition due to caloric, water, vitamins, and electrolyte deficiencies requiring artificial nutrition. Intestinal transplantation should be considered in selected individuals with short bowel syndrome who failed available intestinal rehabilitation pathways [6]. However, those complications usually develop shortly after surgery, outlining the need for further care.

Here, we present a case of short bowel syndrome complicated by kidney failure requiring reinitiating of parenteral hydration 20 years after performing colectomy with ileostomy.

2. Case Description

A 59-year-old female with a past medical history of Crohn's disease requiring total colectomy with ileostomy over 20 years ago, chronic kidney disease stage IV, anemia of chronic disease, history of breast cancer, and Lewy body dementia came to the hospital due to progressive weakness. On further history taking, the patient reported high ileostomy output requiring a change of 5 to 10 bags a day, complicated by multiple admissions to the hospital due to severe electrolyte derangements. At home, the patient was on magnesium, sodium, potassium, and bicarbonate supplementation due to electrolyte loss, vitamin D supplementation due to hypocalcemia, fiber supplementation, cholestyramine, and loperamide to control ileostomy output, and fludrocortisone for symptomatic hypotension. She also consumed increased amounts of water with electrolytes and had weekly fluid infusions. However, it did not prevent progressive kidney decline. On arrival at the hospital this time, laboratory findings were positive for hyponatremia with Na 131 mmol/L, hypokalemia with K 3.1 mmol/L, non-anion gap hyperchloremic metabolic acidosis with bicarbonate of 17 mmol/L, anion gap of 12 and chloride of 108 mmol/L, acute on chronic kidney disease with elevated creatinine of 4.34 mg/dL, while baseline creatinine—around 2.8 mg/dL. Due to the findings above, the patient was started on continuous fluids with 0.45% NaCl and 50 mEq of sodium bicarbonate; potassium and magnesium were repleted as needed. However, the patient was persistently remaining in an acidotic state, requiring intravenous electrolyte replacement. Due to the high dependence on

fluid supplementation, it was decided to start infusions through a port to continue parenteral electrolyte replacements and maintain homeostasis after discharge. Fiber supplements and loperamide were increased to decrease ileostomy output, which, combined with parenteral hydration, allowed to stabilize the patient, improve kidney function, resolve acidosis, and prevent intestinal-kidney transplant. The patient is currently on continuous fluid supplementation, tolerating it well, intending to slowly transition back to weekly fluid infusions to avoid the risk of infection if possible.

3. Discussion

Short bowel syndrome (SBS) is a devastating syndrome resulting from the loss of intestinal length due to disease or surgical resection. The general consequences of SBS include diarrhea, dehydration, electrolyte abnormalities, and weight decrease due to loss of digestive and absorptive surface area, exacerbated by bile-induced diarrhea secondary to loss of terminal ileum and non-absorption of bile acids [3]. In our case, the patient underwent total colectomy with ileostomy due to severe presentation of Crohn's disease resistant to medical management. While jejune-ileocolic anastomosis is considered the most favorable to avoid complications [3] [7], that was not possible in our patient due to severe bowel damage, which resulted in the placement of end jejunostomy, making the management the most challenging due to high-volume diarrhea.

The main consequence of SBS is a marked reduction of intestinal absorption surface. While Parenteral nutrition (PN) can be a maintenance therapy for intestinal failure, it has long-term complications due to catheter infection, break, it's malfunction, etc. Rehabilitative surgery should always be proposed, with the primary goal of restoring digestive continuity to enhance the possibility of PN withdrawal. Intestinal transplantation is proposed as a last resort [8].

However, patients with SBS can be expected to live prolonged lives, even after reasonably massive resection. The strategy would be to decrease ileostomy output to prevent electrolyte loss and replace electrolytes and nutrition if needed to fasten recovery.

There are several methods traditionally implemented in practice to reduce high stoma output. Commonly used antidiarrheal agents to reduce intestinal motility are loperamide, diphenoxylate with atropine, codeine, or clonidine, which can be given transdermally [9]. Loperamide is a mu-receptor agonist that, at therapeutic doses, acts on the mu-opioid receptors directly on the circular and longitudinal intestinal muscles, decreasing transition time and inhibiting peristalsis and electrolyte loss [10]. Because loperamide enters the enterohepatic circulation, disrupted in patients with SBS, high doses of loperamide-up to 16 tablets or 32 mg/day are frequently needed [3]. In our patient, due to high ileostomy output of up to 10 bags a day and dehydration, she was constantly dealing with hypotension, severe weakness, and fatigue, complicated by progressive kidney decline due to multiple episodes of acute, chronic kidney injury. Even-

tually, we decreased the ileostomy output by increasing fiber supplements to create a formed stool, increasing loperamide to inhibit peristalsis and electrolyte loss, and continuing famotidine to decrease intestinal secretion.

The specifics of managing fluid balance in patients with ileostomy are complicated by constant electrolyte disbalance. Such as, in our patient, chronic loss of potassium and bicarbonate led to hyperchloremic non-anion gap metabolic acidosis even though she was on bicarbonate and potassium supplementation at home. To compensate for high volume loss, the patient developed a syndrome of inappropriate anti-diuretic hormone secretion-SIADH, leading to elevated anti-diuretic hormone (ADH) levels. While it helped to maintain water balance by reabsorbing more water in the kidneys, on the flip side, it led to a dilution of sodium and hyponatremia. The combination of increased ADH in the setting of chronic progressive kidney disease makes the management of such patients particularly challenging. It is tough to predict blood sodium levels and control the rates of sodium replacement in settings of abnormal kidney function, which in turn can lead to dangerous hyper or hyponatremia, avoided in our patient by frequent electrolyte checks.

For fluid supplementation, patients are recommended to be started on excessive water intake with electrolytes, sometimes requiring intravenous fluids. While our patient received extra hydration with electrolytes with diet, she was also on continuous fluids of 0.45% NaCl with 50 mEq of sodium bicarbonate to compensate for acidosis. However, it was decided to place a port for parenteral support with a crystalloid solution due to inadequate response and dependence on intravenous fluids. While there are known potential complications of total parenteral nutrition (TPN), such as infection, occlusion, thrombosis, and catheter breakage, it is recommended to start aggressive fluid and electrolyte replacement in patients with SBS to avoid kidney damage. While it is rare to reinitiate parenteral hydration 20 years after ileostomy placement, it was started in our patient to prevent progressive loss of kidney function.

Prompt initiation of parenteral fluid replacement and close follow-up on patients with ileostomy and intestinal failure is strongly recommended to avoid complications and prevent intestinal, liver, or kidney transplants. Among SBS-associated complications are steatosis, cholestasis, cirrhosis, cholelithiasis, metabolic bone disease, kidney injury, chronic diarrhea, protein-energy malnutrition, dehydration, and electrolyte/micronutrient deficiencies. While total parenteral electrolyte replacement can run in some instances for 10 - 14 hours, it could be done either overnight or through programmable portable pumps. Patients with poor tolerance of parenteral nutrition should be considered for listing for intestinal transplantation in case reversal of ileostomy is not an option, as in our patient. Results of Intestinal transplantation are constantly improving, with a 5-year survival rate above 65% [3]. In some cases, it's recommended to combine intestinal with kidney or liver transplantation together in case of severe liver/kidney failure.

Long-term non-surgical management of patients with an ileostomy should include performing regular laboratory studies (e.g., electrolytes, liver/kidney tests), maintaining urine output of more than 1 L a day, monitoring weight change, and screening for bone density loss. While our patient tolerates total parenteral infusions and her acidosis and hypokalemia have resolved, she is on a close follow-up with regular assessment of fluid status, electrolytes, vitamin D, calcium, and constant weight control.

4. Conclusion

SBS is a devastating disorder occurring as a result of a small functional intestine length, usually less than 200 cm, leading to intestinal malabsorption. While different treatment strategies are available, physicians, patients and caregivers need to be aware of the condition, its complexity, and treatment opportunities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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