



Case Report

The Ileojejunal Bypass: The Forgotten Procedure

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Abstract: Since its inception in the early 1970s, bariatric surgery has experienced remarkable advancements, leading to improved patient outcomes. However, amidst these developments, the once-popular ileojejunal bypass procedure has faded into obscurity, along with its associated risks and complications. In this particular case, we present the medical history of a 68-year-old male who endured prolonged hospitalization due to a myriad of health issues, including malnutrition, kidney stones, chronic kidney disease, and persistent diarrhea following an ileojejunal bypass performed back in 1973. Troublingly, his symptoms were erroneously attributed to other causes for an extended period, overlooking the potential long-term effects of his prior surgery. This case emphasizes the importance of recognizing and monitoring the lasting impacts of historical surgical interventions, as well as the need for heightened vigilance in postoperative care.

Keywords: ileojejunal bypass; malnutrition; kidney failure; high output stoma

1. Introduction

In the 1970s, the ileojejunal bypass (IJB) emerged as an experimental surgical procedure for morbid obesity, although it was first described in the 1950s. Several different approaches were developed based on the original of an end-to-end jejunocolic anastomosis with an elongated blind loop. The initial encounter with nutritional deficiencies led to the development of a jejeunoileal anastomosis. This method was further enhanced by the claim that an end-to-end anastomosis yielded a more effective weight loss outcome [1,2]. The two primary variations of the IJB were the Scott bypass and the Payne bypass. The Payne bypass involved an end-to-side ileostomy using a short segment of the jejunum and terminal ileum, while the Scott bypass involved an end-to-end anastomosis between the jejunum and terminal ileum, with the excluded small bowel connected to the colon through an anastomosis. Over time, the trend shifted away from the end-to-end anastomosis due to the identification of relevant reflux into the blind ended bowel in radiological studies. Additionally, it was demonstrated that weight loss was less pronounced with this approach [2].

The IJB is a malabsorptive procedure that bypasses a significant portion of the jejunum, leading to the creation of short bowel syndrome. While it effectively leads to weight reduction, it also causes malnutrition and vitamin deficiencies. Common complications include protein and albumin deficiency, liver and renal failure, and the formation of kidney stones [3–7]. Consequently, many patients underwent surgical reversal to restore normal anatomy. Here, we present a case report about the reversal of an ileojejunal bypass. Another case report about a young patient with kidney stones one year after surgery was presented by Bivins et al. [8].

2. Case Presentation

In this case report, we present the medical history of a 68-year-old male patient who suffered from a range of symptoms including malnutrition, recurrent acute-on-chronic kidney failure, kidney stones, diarrhea, electrolyte imbalances, and deficiencies in vitamins



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and minerals. The patient had undergone an ileojejunal bypass surgery in 1973, which was never reversed, and there was a failure to establish a connection between his ongoing symptoms and the previous surgery. Over the years, the patient experienced a prolonged hospitalization and endured various complications associated with the ileojejunal bypass. His malnutrition and vitamin deficiencies resulted in a weakened immune system, poor wound healing, and an increased susceptibility to infections. The recurrent kidney failure and kidney stone formation further deteriorated his renal function, necessitating frequent hospital admissions for management of electrolyte imbalances. It was only through a comprehensive evaluation of the patient's medical history and a thorough examination that the link between his symptoms and the previous ileojejunal bypass surgery was established. Further investigations, including laboratory tests, imaging studies, and consultations with multiple specialists, were conducted to formulate an appropriate management plan. Given the patient's complex medical condition and the advanced stage of complications, the focus shifted towards mitigating the symptoms, improving nutritional status, and managing organ failure. Multidisciplinary interventions involving nephrologists, dieticians, gastroenterologists, and surgeons were employed to address the specific challenges posed by the previous ileojejunal bypass and its sequelae.

The patient's journey following the ileojejunal bypass surgery in 1973 was marked by a series of medical challenges and subsequent interventions. Despite initially being satisfied with the weight loss of round about 60 kg achieved through the surgery, the patient's health gradually deteriorated over the years. His encounters with the medical team began in 2009 when he sought treatment for a ureteric stone, which coincided with the diagnosis of stage II chronic kidney disease and severe hypothyroidism. As time went on, he faced recurrent episodes of ureteric stones and experienced a progressive decline in renal function.

In August 2021, a new complication arose when the patient was diagnosed with rectal carcinoma, leading to a rectal extirpation surgery. Unfortunately, the opportunity to reverse the ileojejunal bypass during this procedure was missed, and soon after the surgery, his condition deteriorated further. He developed a high-output stoma, and his renal insufficiency progressed rapidly to acute renal failure accompanied by significant electrolyte imbalances. These critical complications necessitated multiple ICU admissions and severely impacted his mobility. Although the patient's nutritional status was never formally evaluated, it was highly likely that he was malnourished, considering the chronic nature of his health issues and the metabolic demands on his body. Fortunately, in October 2021, one of the bariatric surgeons at the clinic encountered the patient during a medical student examination. The examination revealed severe metabolic acidosis, along with severe hypokalemia, hypocalcemia, and hypomagnesemia. The patient's acute-on-chronic renal failure was attributed to infection and dehydration, highlighting the urgent need for a reversal surgery. Our team planned to admit him for the surgery once the metabolic acidosis had been resolved. To minimize surgical risks and optimize the patient's condition, the medical team initiated parenteral nutrition and implanted a port system in January 2022. However, the port system encountered complications, becoming infected twice and resulting in inadequate elevation of the patient's albumin and protein levels. Consequently, the scheduled surgery in June 2022 had to be rescheduled. Tragically, just days before the rescheduled admission, the patient experienced another medical emergency, presenting to the emergency room with acute-on-chronic renal failure. His creatinine levels were alarmingly high at 12 mg/dL, and he faced life-threatening electrolyte imbalances. The planned surgery had to be postponed once again, as his immediate stabilization took precedence. It took a month of intensive fluid and electrolyte replacement, along with antibiotic therapy and continued parenteral nutrition, to stabilize his condition and prepare him for surgery. To obtain a better understanding of the anatomical conditions, we conducted a preoperative CT abdomen scan. An exemplary excerpt can be seen in Figure 1.



Figure 1. Preop CT scan.

Finally, in July 2022, the patient underwent the open reversal surgery. The procedure involved extensive adhesiolysis to free the adhered tissues, exposing the ileojejunal bypass as depicted in Figure 2. The bypassed segment of the small intestine measured 220 cm in length, leaving only 40 cm of small bowel in the normal passage. The 40 years of the diversion had atrophied the 220 cm of the small bowel. After identifying the ileojejunal anastomosis, it was cut approximately 3 cm proximal to the ileocaecal valve, close to the site of the anastomosis. The jejunum was then cut approximately 10 cm distal to the ligament of Treitz. The ileojejunal anastomosis was resected, as illustrated in Figure 3, and a new side-to-side jejunojejunostomy (Figure 5) and side-to-side ileoascendostomy (Figure 6) were performed to restore the natural flow of the gastrointestinal tract. However, the patient's recovery proved to be protracted and challenging. He experienced a prolonged post-operative ileus, a common complication following abdominal surgery, which resulted in delayed restoration of normal bowel function. During this time, his blood tests revealed elevated leukocyte and C-reactive protein (CRP) levels, indicating an ongoing inflammatory response. To further investigate and diagnose the condition, we performed a CT scan of the abdomen and the lungs. The results revealed an accumulation of free intra-abdominal air extending beyond the expected postoperative level. This finding could potentially indicate anastomotic insufficiency. To exclude the possibility of an anastomotic leak, a re-laparotomy was performed four days after the initial surgery. Fortunately, no complications were found, providing reassurance regarding the integrity of the surgical repair. In order to aid in the healing process and address the profound nutritional deficiencies, an initial course of treatment involved the administration of nutrition through parenteral means, bypassing the digestive system. This method ensured that essential nutrients were directly delivered

to the body. As the patient's condition gradually improved, it was deemed appropriate to transition from parenteral nutrition to an oral approach. To achieve this, protein powder and protein-rich liquid nutrition were introduced as substitutes for the previous parenteral feeding. This alteration allowed the patient to consume the necessary proteins and other vital nutrients through oral intake, promoting a more natural and sustainable means of nutrition. Over time, as the patient adhered to this revised dietary regimen, significant improvements in the nutritional state were observed. The availability of proteins and other essential nutrients through oral consumption facilitated the replenishment of vital resources, aiding in the recovery process and contributing to the overall improvement in the patient's health and well-being.

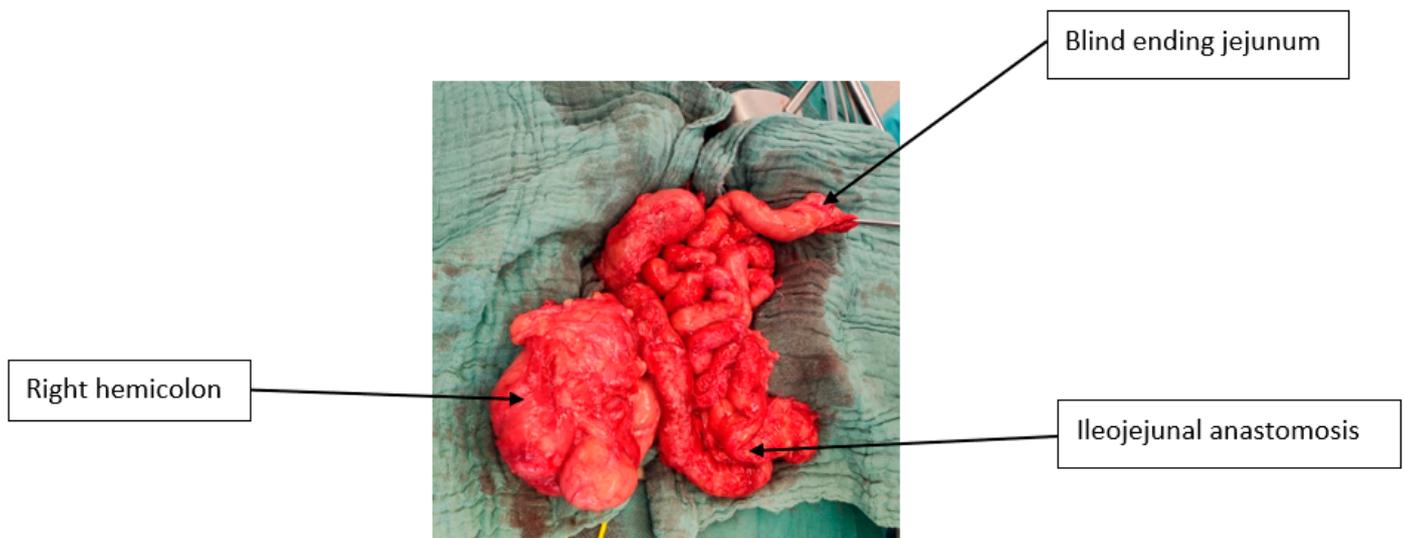


Figure 2. Intraoperative situs showing the ileojejunal bypass with the blind ending jejunum.



Figure 3. The resected ileojejunal anastomosis.

The patient's complete recovery was further prolonged, requiring seven weeks to establish complete oral feeding and achieve adequate bowel movements. After being discharged from the hospital, he underwent a rehabilitation program to assist in his physical

recovery and enhance his overall well-being. Three months following the initial surgery, a follow-up appointment was scheduled during regular office hours. During the appointment, the patient was found to be stable, reporting no issues with drinking or eating. His bowel movements had returned to regularity, indicating a positive outcome of the surgery and the comprehensive post-operative care provided.

To have a course of the laboratory values over the entire course, please have a look at Table 1.

See the timeline below as a summary of the course: (Figure 4).

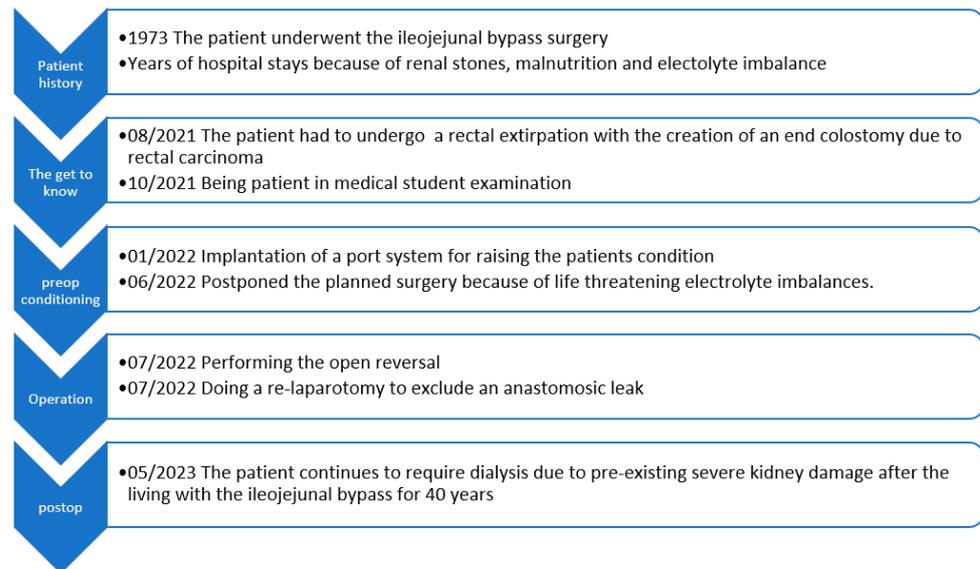


Figure 4. Timeline.

Please refer to the graphs/figures below for further discussion (Figures 5 and 6).

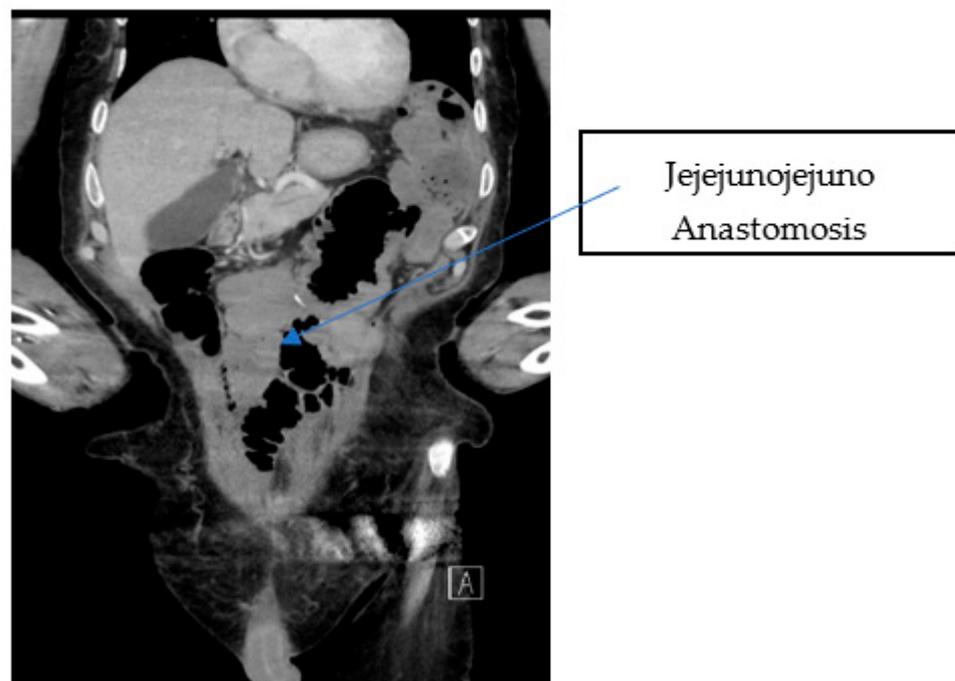


Figure 5. Postoperative CT scan.

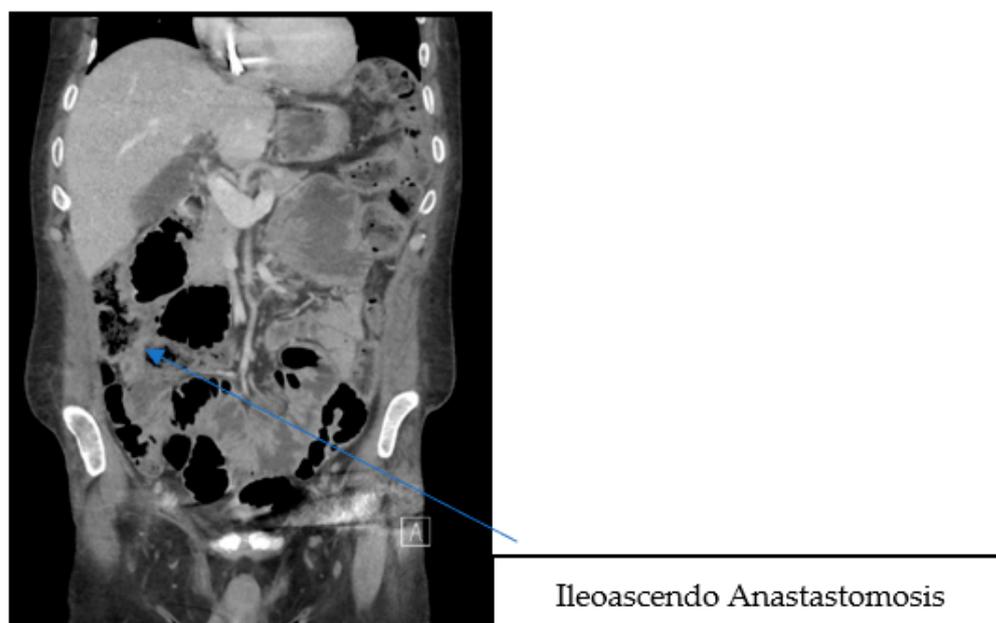


Figure 6. Postoperative CT scan.

Table 1. The course of the laboratory values.

Date	10/2021	First Contact	1 Month before the Planned Surgery	Preop	1 Month Later (8/2022)	3 Months Later (10/2022)	7 Months Later (2/2023)	10 Months Later (5/2023)
Hb g/dL (12–16)	11.5	9.5	12.7	9.5	7.9	8.2	11.1	11.9
Albumin g/L (34–50)	25.8	23.1	-	21.3	20.5	33.3	25.4	-
Kreatinin mg/dL (0.6–1.2)	4.4	4.4	12.2	3.7	3.4	7.8	5.4	6.7
Potassium mmol/L (3.5–5.0)	2.4	4.5	2.5	5.6	4.3	3.4	5.1	3.3
Protein g/L (54–79)	-	61.5	-	51.8	59.6	-	-	-
Phosphate mg/dL (2.3–4.7)	5.0	2.8	-	5.5	-	8.6	-	5.8
pH (7.37–7.45)	7.18	7.23	-	7.43	-	7.23	7.35	7.34
Bicarbonate mmol/L (21–26)	10.4	20.4	-	13.8	-	13.6	22.4	18.2
Base Access mmol/L (+/−2.5)	−18.8	−2.8	-	4.2	-	−13.3	−1.5	−7.4
Weight kg	-	64	-	59	69.9	58.0	64.9	-
BMI	-	21.4	-	19.7	23.4	19.4	21.7	-

3. Discussion

The presented case underscores the intricate nature of managing patients who have undergone ileojejunal bypass procedures. It emphasizes the importance of a multidisciplinary approach, involving various medical specialties, to provide comprehensive care and address the numerous challenges that may arise. From meticulous surgical planning to diligent post-operative monitoring, nutrition optimization, and rehabilitation, every step of the patient's journey plays a pivotal role in achieving favorable outcomes. By sharing this case, the medical team aims to raise awareness among healthcare professionals regarding the long-term complications associated with ileojejunal bypass surgery and the significance of timely interventions and appropriate management. The insights gained from this case serve as a reminder of the importance of patient-centered care, tailored treatment plans, and a holistic perspective on the patient's overall well-being in achieving optimal outcomes in complex surgical cases.

The recognition of the significant risks and complications associated with the ileojejunal bypass procedure has led to its obsolescence in the field of weight loss surgery. However, it is essential for physicians to continually expand their knowledge and understanding of these procedures to ensure the optimal management of patients who have undergone them. Hocking et al. showed the late-onset complications, such as diarrhea (72%), electrolyte imbalances (39%), kidney dysfunction, and liver dysfunction (29%), demand prompt recognition and appropriate intervention to prevent further morbidity and mortality [9,10].

Unfortunately, patients who have undergone ileojejunal bypass are often identified at an advanced stage of complications, leading to devastating outcomes. Some patients may face the need for liver and kidney transplants or even succumb to the severe consequences of the procedure. Reconstructive surgery is typically considered when complications have already developed, emphasizing the importance of early detection and intervention. Timely recognition of the signs and symptoms associated with ileojejunal bypass complications is crucial for improving patient outcomes. While the reversal of ileojejunal bypass can provide relief in certain cases, it is not without its own set of challenges. Anderson et al. reported a series of 60 cases where the anatomy was restored following ileojejunal bypass, and weight regain emerged as a significant problem in a substantial number of patients (45 of 60 patients) [3]. Reversal surgery may be complicated by sepsis, obstructed anastomosis, and prolonged ileus. Therefore, careful evaluation and patient selection are paramount when considering the reversal of ileojejunal bypass. The potential benefits of the procedure must be carefully weighed against the associated risks and potential complications.

Long-term follow-up and close monitoring are essential components of managing patients who have undergone ileojejunal bypass and subsequent reversal. Regular assessments and interventions are necessary to address complications and ensure optimal patient outcomes. Monitoring electrolyte levels, renal and liver function, and nutritional status are crucial for identifying and managing any emerging issues. Additionally, ongoing research and understanding of these procedures are necessary to advance medical knowledge and improve patient care.

By disseminating information about the risks and complications of ileojejunal bypass and promoting awareness among healthcare professionals, we can contribute to the prevention of unnecessary morbidity and mortality. Continuous education and professional development programs should focus on updating physicians' knowledge about historical surgical interventions and their long-term implications. This will enable healthcare providers to recognize the potential consequences of past procedures and implement appropriate management strategies.

While ileojejunal bypass procedures for weight loss have become obsolete, their long-term complications persist and demand attention from healthcare professionals. Late-onset complications, including electrolyte imbalances, kidney dysfunction, and liver dysfunction, must be promptly recognized and managed. Reversal of ileojejunal bypass can offer relief in certain cases, but careful patient selection and thorough evaluation are crucial. Long-term

follow-up and close monitoring are vital for optimal patient outcomes. By staying informed and proactive, physicians can contribute to minimizing the risks and complications associated with ileojejunal bypass and ensuring the well-being of their patients.

The presented case highlights the significance of maintaining knowledge and awareness of historical surgical procedures, even when they have fallen out of routine practice. Although ileojejunal bypass procedures are no longer performed for weight control purposes, their long-term effects and associated complications can still have a significant impact on patients' health. Nephrologists, in particular, can contribute greatly to the management of these cases by recognizing the unique physiology and anatomy involved.

In this specific case, the patient's favorable outcome following the reversal procedure is noteworthy. Despite his chronic kidney failure, the restoration of electrolyte balance within the limitations of his condition is an encouraging result. It is remarkable that the patient managed to maintain a precarious balance for more than four decades, underscoring his resilience in the face of the challenges imposed by the ileojejunal bypass procedure. This case serves as a reminder that historical surgical interventions can have lasting effects, necessitating ongoing monitoring and appropriate management. Healthcare professionals, including nephrologists, should remain vigilant when evaluating patients with complex medical histories, and consider the potential impact of previous surgical procedures. Timely identification and intervention can lead to improved outcomes and prevent further deterioration of renal function.

4. Conclusions

This case report should raise awareness among physicians about considering previous surgical interventions and staying updated on bariatric surgery advancements. By doing so, healthcare providers can deliver tailored care, address challenges related to historical surgical interventions, and promote overall patient health and well-being through continuous education and knowledge sharing.

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