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Renal failure due to rectal neoplastic polyp: McKittrick–Wheelock syndrome—a case report

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Abstract

Background McKittrick–Wheelock syndrome is an uncommon and severe disorder caused by large hypersecretory tumors located in the distal colorectal area. Excessive secretion from adenomas is an unusual clinical manifestation that leads to severe electrolyte and fluid depletion, subsequently resulting in kidney injury. Successful treatment relies on quick and cooperative decision-making for timely intervention.

Case presentation A 79-year-old Bulgarian male patient was admitted to the emergency department with syncope resulting from severe electrolyte depletion and renal failure caused by excessive secretion from a rectal polyp. The initial diagnostic and treatment journey included computed tomography, rectoscopy, biopsy, and an attempt at piecemeal removal, ultimately leading to abdominoperineal resection. Despite the permanent colostomy, the patient experienced a smooth recovery and significant improvement in his quality of life.

Conclusion McKittrick–Wheelock syndrome begins with nonspecific initial symptoms in the first extended latent phase, mainly diarrhea, followed by a brief deterioration phase and decompensation phase. However, the key to restoring renal function and correcting electrolyte imbalances lies in surgically removing the tumor, making early detection crucial. Employing a multidisciplinary strategy that includes prompt recognition, timely intervention, and thorough preoperative stabilization is crucial for achieving successful outcomes.

Keywords Case report, Colorectal surgery, Rectal polyp, Villous adenoma, Colorectal neoplasm, Renal failure

Background

McKittrick–Wheelock syndrome (MWS) is a rare and life-threatening disease characterized by a triad of symptoms: giant colorectal tumor, chronic mucous diarrhea, and renal function impairment, manifesting as electrolyte depletion [1]. The effective management of MWS hinges on rapid, collaborative decision-making to select timely and suitable treatments, which can be critical for patient survival [2]. The primary approach to treating MWS centers on tumor excision, which may be conducted through endoscopy or surgical methods [1]. This case is reported following the CARE guidelines for surgical case reporting [3].

Case presentation

This case report details the emergency admission of a 79-year-old Bulgarian male patient to the surgical department. The leading symptoms included chronic, profuse rectal mucus secretion and watery diarrhea, persisting for over a year, and worsening in the last 2 weeks before

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admission, with up to 10 episodes per day. Additionally, the patient experienced increasing general weakness culminating in syncope on the day of admission. His medical history included ischemic myocardial disease with prior myocardial infarction, chronic heart failure, arterial hypertension, ischemic cardiomyopathy, femoropopliteal thrombosis, and pulmonary embolism. A first-degree relative also had a family history of gastric carcinoma. Upon admission, his vital signs were as follows: blood pressure 90/55 mmHg and pulse 68 beats/minute. The patient was somnolent with severe general weakness. There was no abdominal pain or palpable mass. Digital rectal examination revealed a soft, polypoid tumor formation starting from the dentate line, with characteristics suggestive of a villous polyp. The proximal border of the tumor could not be clearly defined on palpation. Laboratory findings revealed severe dyselectrolytemia and renal dysfunction (Table 1). The urine output was 500 ml per 24 hours. Fluid resuscitation was initiated immediately with a total volume of 2000 ml, including isotonic saline, lactated Ringer's solution, and glucose solution supplemented with potassium. Ultrasound findings revealed a 10-cm oval pelvic tumor formation in the rectum, which was well defined, had mixed solid and liquid content, and had an unclear topographic origin. Over the next 24 hours, the patient's condition worsened, with urine output decreasing to 300 ml per 24 hours. Blood pressure decreased to 85/40 mmHg, and the heart rate was 89 beats/minute. Serum urea levels increased significantly to 77.7 mmol/l, and creatinine levels reached 556 µmol/l. The patient also exhibited delayed verbal responses, despite remaining alert and oriented. Owing to the deteriorating condition, intensive care unit transfer was performed, followed by emergency dialysis treatment. After two dialysis procedures, the patient's kidney function improved, with a urine output of 2500 ml per 24 hours, a blood pressure of 105/65 mmHg, and a heart rate of 71 beats/minute. Following stabilization, computed tomography (CT) was performed. CT revealed a polypoid, suprasphincteric rectal tumor with laterally spreading characteristics, extending approximately 9 cm cranially and resembling a villous polyp (Fig. 1). There was no radiographic evidence of extramural invasion or metastasis. A colonoscopy (Fig. 2), followed by a biopsy, confirmed that a villous polyp exhibiting high-grade dysplasia was present. Owing to the patient's comorbid status, a less invasive surgery was considered, and piecemeal polypectomy was attempted. The histopathological results were consistent with previous findings (Fig. 3). In the early follow-up, owing to continuous mucus secretion of the same volume (> 1.5 L per 24 hours), a more aggressive approach was discussed by a multidisciplinary

Table 1 Laboratory markers

Parameter	Reference range	Admission	48 hours later	Discharge	Units
WBC	3.5–10.5	21.05	19.06	4.13	G/l
NEU count	2.0–7.8	18.51	17.44	2.69	G/l
NEU %	44–76	87.9	91.47	65.14	%
LYM %	20–40	6.13	3.71	21.67	%
HGB	130–180	163.6	133.4	100.3	g/l
PLT	130–440	583.9	297.5	246.2	G/l
Chloride	98–107	67	88	106	mmol/l
Sodium	135–145	121	124	138	mmol/l
Potassium	3.5–5.1	3.3	3.8	4.8	mmol/l
Urea	1.7–8.30	37	77.7	3.7	mmol/l
Creatinine	50–133	522	566	89	umol/l
ABG	**Reference range**	**Admission**	**9 hours later**		
pH	7.35–7.45	7.23	7.53	—	—
PaO_2	80–100	106.1	73.6	—	mmHg
$PaCO_2$	35–45	52.9	26.7	—	mmHg
HCO_3	21–26	22.2	22.8	—	mmol/l
BE	−2 to + 3	−5.1	1.9	—	—
SaO_2	75–99	96.6	96.3	—	%

Values are presented as *n* (%) or min–max

WBC white blood cells, *NEU* neutrophils, *LYM* lymphocytes, *HGB* hemoglobin, *PLT* platelets, *ABG* arterial blood gas, *pH* acid–base balance of the blood, PaO_2 partial pressure of oxygen in arterial blood, $PaCO_2$ partial pressure of carbon dioxide in arterial blood, HCO_3 concentration of bicarbonate in arterial blood, *BE* base excess. SaO_2 arterial oxygen saturation

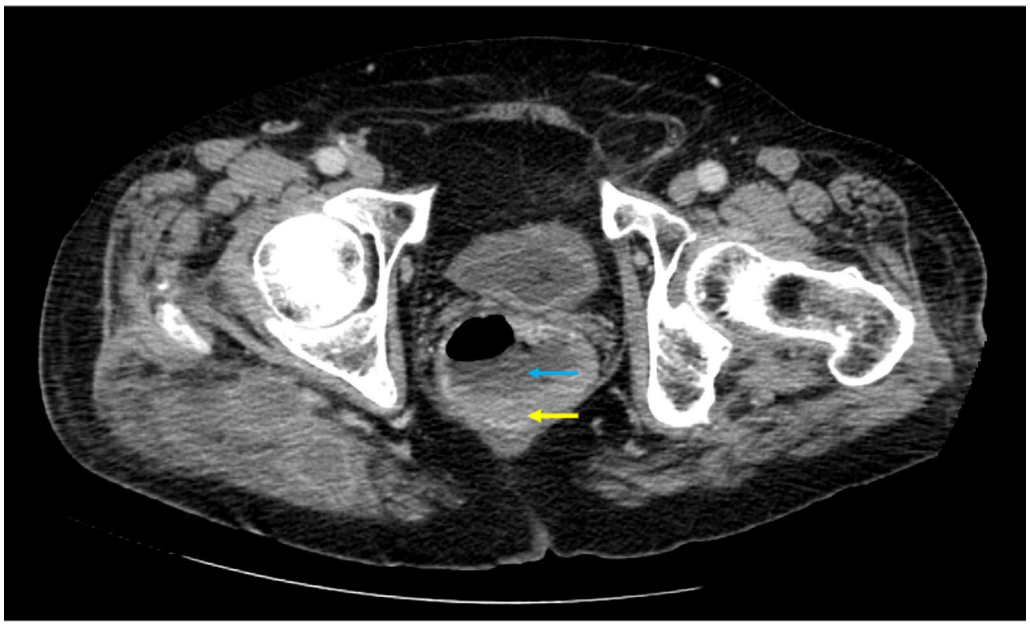

Fig. 1 Image of computer tomography with contrast of pelvis. Computed tomography image with contrast of pelvis describes polypoid tumor formation (yellow arrow), suprasphincteric rectal tumor formation with laterally spreading characteristics, extending approximately 9 cm cranially and resembling a villous polyp. Level of mucus fluid is marked with blue arrow

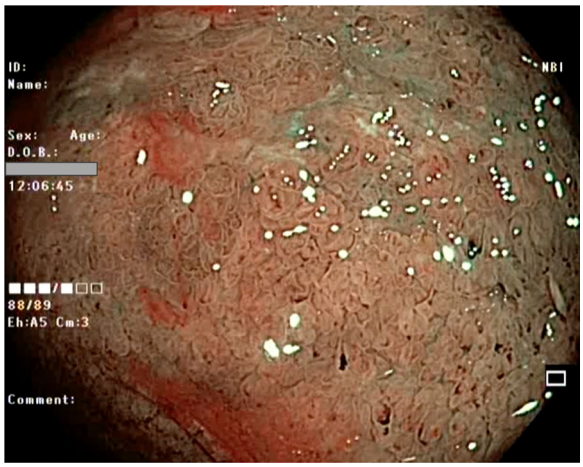

Fig. 2 Narrow-band imaging during colonoscopy. Narrow-band imaging was used during the patient's colonoscopy, revealing a large villous polyp and a significant amount of mucus

team. Following thorough and deliberate evaluation, the patient underwent abdominoperineal resection of the rectum using an open approach (Fig. 4). The patient recovered smoothly without any complications and was discharged on the eighth postoperative day. Pathohistological examination confirmed villous adenoma (9 cm) with high-grade dysplasia and superficial infiltration of the submucosa from grade (G) 1 adenocarcinoma with extracellular mucus secretion, staged as pT1N0M0R0 (Fig. 5). The multidisciplinary oncological board determined that adjuvant therapy was not needed and recommended only a dynamic follow-up. During the 30-day postoperative period, the patient's condition significantly improved, with no signs of asthenia or adynamia. Despite permanent colostomy, a significant improvement in quality of life was observed.

Discussion

McKittrick–Wheelock syndrome, first identified in 1954, can result from a hypersecretory villous polyp. This condition is characterized by a critical state that includes severe hyponatremia, hypokalemia, and potentially, acute kidney injury [4]. Colon polyps are categorized as non-neoplastic or neoplastic, with the cancer risk increasing with adenoma size. Sporadic colorectal carcinoma, which is more prevalent in older patients, results from the accumulation of cellular mutations. The transition from adenoma to carcinoma, a process that can span 5–20 years, is facilitated by specific carcinogenic pathways [5]. Among colonic adenomas, villous adenomas constitute 5%, with a mere 3% displaying secretory activity that correlates with their size. Commonly, these adenomas are found in the rectosigmoid region [6, 7]. Compared with individuals with nonsecretory tumors, patients with secretory villous adenomas exhibit higher adenylate cyclase activity. Owing to this heightened activity, the levels of cyclic

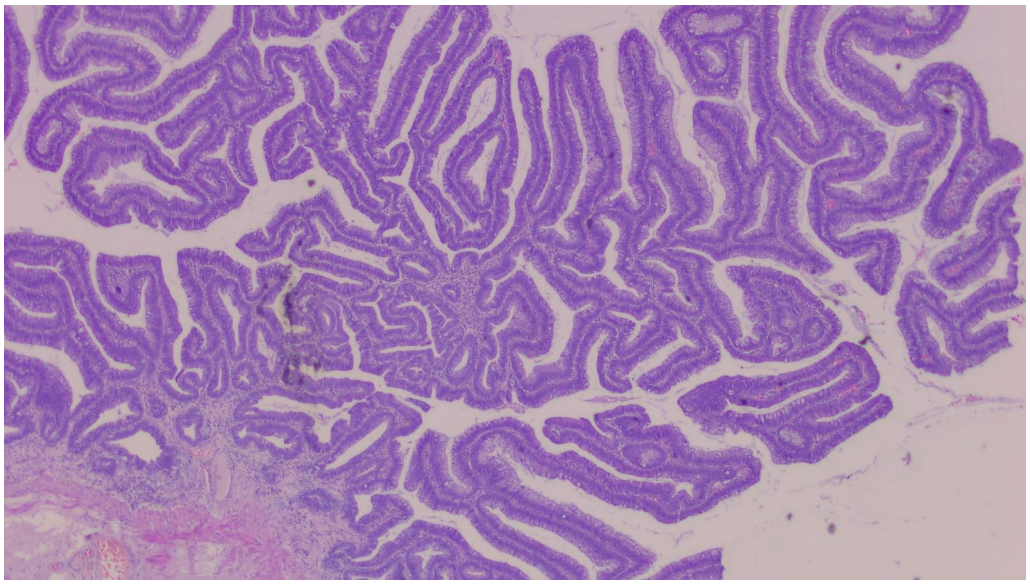

Fig. 3 Pathology report after piecemeal polypectomy. Pathology report after piecemeal polypectomy—villous adenoma with moderate to high-grade dysplasia, without invasion

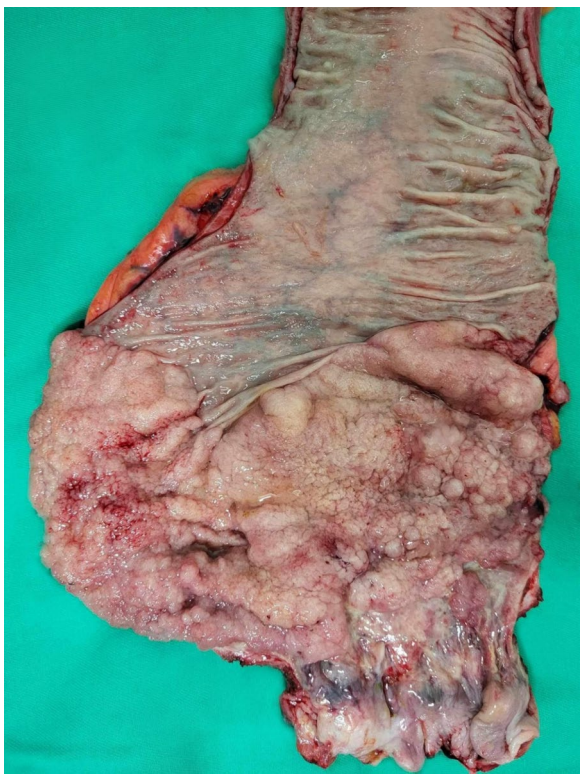

Fig. 4 Photograph of the surgical specimen. Gross description—large (9 cm) circumferential sessile tumor of the rectum with a villous appearance

adenosine monophosphate increase, which in turn inhibits the microvilli's absorption of sodium and chloride and encourages the crypt cells to secrete chloride and water [1]. The risk of malignant degeneration depends on both the size and type of polyp. Tubular adenomas are linked to malignancy in about 5% of cases, whereas villous adenomas can harbor cancer in up to 40%. For lesions not suitable for endoscopic resection, open or laparoscopic colorectal resection is preferred, with a mortality rate of 0.3% and an anastomotic leak rate of 1.4%. Complete excision is essential because biopsies are only 50% accurate and unsuspected cancer may be discovered in some patients after excision. Giant villous adenomas are high-grade dysplastic lesions with a carcinoma conversion rate of 17–33%. This can lead to troublesome mucus discharge and bleeding, resulting in severe hemodynamic changes. The combined risk of dysplasia and malignancy is approximately 83%, with a 50% risk of dysplasia and a 33% risk of malignancy in lesions larger than 8 cm. These giant polyps are generally not resectable endoscopically and often require radical oncologic resection. Laparoscopic colorectal resection is a safe and effective option [8].

To our knowledge, the most extensive systematic review to date, completed in 2018, reported a total of 257 cases [9]. This review offers key recommendations for the management of this condition: aggressive fluid resuscitation, early flexible sigmoidoscopy, CT imaging of the abdomen and pelvis, discussion by a multidisciplinary colorectal team, and surgery during initial hospital admission. Several treatment options are available for

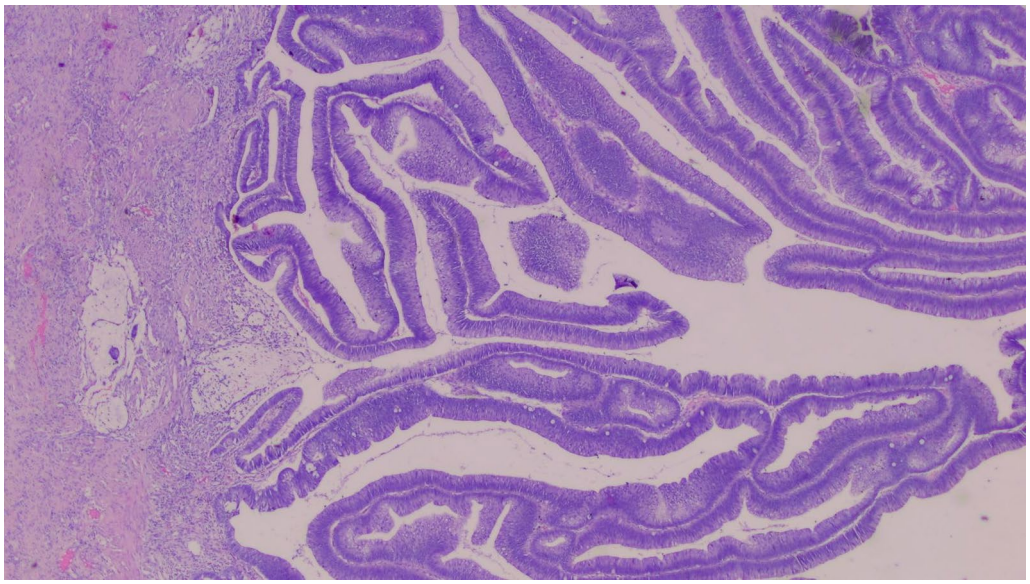

Fig. 5 Microscopic view of pathology report after surgery. Histopathological examination of the resected specimen revealed a villous adenoma with high-grade dysplasia and a small focus of invasive cancer with predominantly mucinous characteristics

secretory villous adenomas. Without treatment, these lesions have a mortality rate of 100% [9, 10]. Endoscopic treatment, which may involve either endoscopic submucosal dissection or endoscopic mucosal resection, is an option in rare cases. However, its applicability is often restricted owing to the large size of the polyp. Surgical approaches, whether minimally invasive or traditional, have shown promising outcomes. This underscores the critical message that the severity of the syndrome may necessitate colon resection or abdominoperineal resection as the only curative option [6, 11, 12].

Conclusion

The progression of MWS can be divided into three distinct stages of electrolyte depletion. The first stage is a prolonged latent phase during which symptoms are often mild and nonspecific. This is followed by a brief deterioration phase in which the symptoms rapidly worsen. Finally, the decompensation phase occurs, which is marked by severe electrolyte imbalance and significant clinical worsening [9].

The primary takeaway message from this case is the critical importance of early recognition and timely surgical intervention in management. Surgical removal of the tumor is essential for the definitive restoration of renal function and correction of electrolyte imbalance. Our case underscores the critical role of multidisciplinary decision-making and the potential benefits of a more aggressive surgical approach in severe and complex cases, such as ours.

Abbreviations

MWS McKittrick–Wheelock syndrome
CT Computed tomography

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Author contributions

Conceptualization: Ivan Petrov Vasilev and Maria-Elena Boyadzhieva. Data curation: Nikolay Penkov, Slavyana Slavcheva Usheva, and Yavor Asenov. Supervision: Theophil Angelov Sedloev and Georgi Chavdarov Jelev. Writing—review and editing: Plamen Penchevand Ivan Valentinov Dimitrov.

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Availability of data and materials

Data pertinent to our study can be obtained from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval was not applicable. Informed consent to share the test results, medical history, and imaging data was provided by the patient. Patient anonymity was ensured.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The authors have no conflicts of interest to disclose.

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