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CASE REPORT

Can Electrolyte Imbalance Indicate a Diagnosis? McKittrick-Wheelock Syndrome and Synchronous Colon Tumor

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ABSTRACT

Colorectal polyps are noteworthy because of their role in the development of various clinical conditions and their malignant potential. McKittrick-Wheelock syndrome, one of these clinical conditions, is characterized by dehydration, tenesmus, secretory diarrhea, fluid-electrolyte disturbance (hyponatremia, hypokalemia, hypochloremia, metabolic acidosis), and prerenal acute renal failure accompanied by large colorectal villous adenomas. Large villous adenomas, which cause the syndrome due to the hormones and secretions they produce, carry a high risk of invasive cancer because of their size and histological type. Definitive surgery or endoscopic resection following supportive treatment for fluid-electrolyte disorders is essential in the syndrome's treatment and leads to an increase in survival rate and quality of life. In this case report, we aim to present this rare syndrome and the synchronous tumor accompanying it for the first time in the literature.

Keywords: Colorectal polyps, colorectal carcinoma, electrolyte imbalance, McKittrick-Wheelock syndrome, synchronous colon tumor

Introduction

One of the well-known features of colorectal adenomas is their ability to become malignant. The more the villous component increases, the higher the risk of malignant transformation.[1] In some rare clinical features, such as McKittrick-Wheelock syndrome, polyps have clinical significance beyond the potential for malignancy. McKittrick-Wheelock syndrome is a rare clinical feature characterized by large colorectal villous adenomas leading to dehydration, tenesmus, secretory diarrhea, fluid-electrolyte disturbance (hyponatremia, hypokalemia, hypochloremia, metabolic acidosis), and acute renal failure.[2,3] Giant villous adenomas have been reported to be the source of these symptoms in the syndrome, but detailed histopathological examinations have also reported that the villous polyp is sometimes a malignant component.[4] This case report details the association of McKittrick-Wheelock syndrome caused by a giant villous adenoma in the rectum and synchronous sigmoid colon adenocarcinoma.

Case Report

A 67-year-old male patient was admitted to the emergency department with complaints of weakness and bloody diarrhea with mucus lasting longer than a week. In addition, the patient exhibited symptoms of tenesmus; however, due to the prominence of other clinical conditions, the patient did not initially report this complaint. Upon rectal examination, an irregular mass was palpated. Laboratory tests showed hypopotassemia [potassium: 2.9 millimoles/liter (mmol/L)], hyponatremia (sodium: 111 mmol/L), hypochloremia (chloride: 69 mmol/L), creatinine and urea elevation [5.81 milligrams/deciliter (mg/dL) and 290 mg/dL], and metabolic acidosis [pH: 7.30/bicarbonate (HCO_3): 15 mmol/L]. The patient's hemoglobin and other parameters were within the normal range. Urinary ultrasonography revealed no pathological findings. The patient was interned by nephrology for the treatment of acute renal failure and electrolyte imbalance.

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As a result of progressive creatinine, uremia, and deep metabolic acidosis (creatinine: 7.35 mg/dL, urea: 246 mg/dL, pH: 7.26, HCO_3: 10 mmol/L), which did not improve, hemodialysis treatment was initiated.

In the clinical follow-up after hemodialysis, kidney function tests and electrolyte values were evaluated as normal, and the patient was discharged. This clinical presentation recurred three times in the following three months and was treated similarly. A colonoscopy was planned for a rectal mass but was delayed due to these clinical conditions. In colonoscopic evaluation, a lobule-contoured, soft-textured vegetative mass was detected, starting from the 3rd cm of the rectum and continuing toward the 13 cm proximal, filling most of the lumen but not preventing the endoscope from progressing to the proximal (Figure 1). In addition, a second lesion was detected in the sigmoid colon (28 cm), occupying 40% of the lumen, not obstructing the proximal progression of the endoscope, with irregular borders, hard consistency, vegetative, and bleeding to the touch (Figure 2). There were no other pathological findings in the colonoscopy; biopsies were taken from both lesions. Abdominal computed tomography (CT) revealed increased wall thickness in the rectum and sigmoid colon at two different localizations, which suggested malignancy (Figure 3). Histopathological examination of the lesion in the rectum revealed a villous adenoma and the lesion in the sigmoid colon as adenocarcinoma. On positron emission tomography-CT examination, a hypermetabolic mass lesion localized in the rectosigmoid region was evaluated as primary malignancy [maximum standardized uptake value (SUV_{max}): 23.3], and hypermetabolic wall thickness increase in the sigmoid colon was evaluated as synchronous malignancy (SUV_{max}: 43.3) (Figure 4). The patient underwent laparoscopic low anterior resection and loop ileostomy (Figure 5), and the postoperative

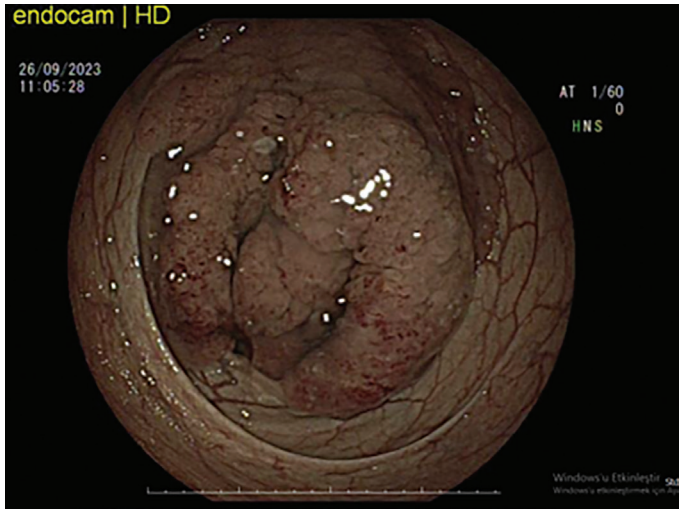

Figure 1. Endoscopic image of a soft, vegetative mass in the rectum

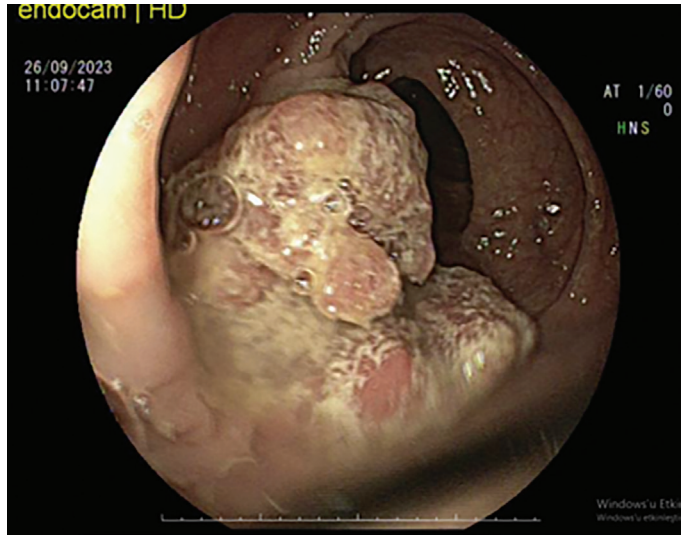

Figure 2. Endoscopic image of an ulcero-vegetative mass in the sigmoid colon

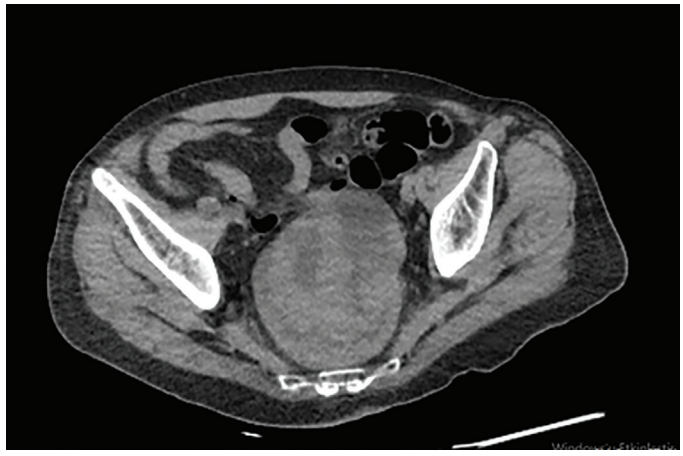

Figure 3. Computed tomography image of the mass

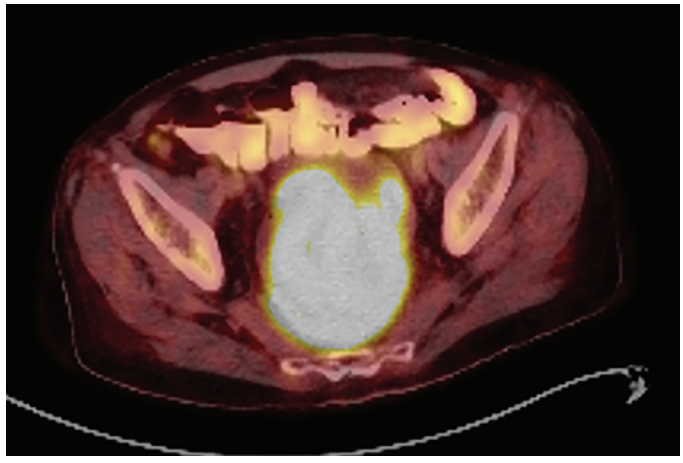

Figure 4. Positron emission tomography-computed tomography view of the hypermetabolic mass in the rectosigmoid

follow-up was uneventful. In the postoperative follow-up, it was observed that the patient's creatinine values, which had previously been partially improved despite hemodialysis, and electrolyte imbalance were almost completely restored. The patient's laboratory results in the postoperative period are shown in the Table 1 below. In the final histopathologic examination of the patient, a low anterior and sigmoid resection material was examined. Two different low-grade tumor foci were reported in the upper middle rectum and sigmoid colon. Histopathological features of the vegetative tumor adenocarcinoma were 60% cribriform and a 40% tubular pattern. A total of 25 lymph nodes were dissected, and one lymph node had tumoral invasion (histopathologic tumor grade was pT2N1aM0). Surgical margins were tumor-free and consistent with the oncologic resection margin.

After these pathologic results, the patient was referred for adjuvant treatment through the oncology outpatient clinic, and 12 cycles of m6 FOLFOX chemotherapy protocol were administered. The patient remains tumor-free in postoperative follow-up.

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Discussion

McKittrick-Wheelock syndrome has been defined as excessive secretory diarrhea caused by a villous adenoma and complicated by dehydration, a severe electrolyte imbalance, and acute prerenal failure.[2] There have been many assessments of the pathophysiology of the disease; the basic accepted theory is as follows: Small adenomas are usually asymptomatic; large villous adenomas sometimes produce sizeable amounts of mucin-containing electrolytes and can become symptomatic by causing mucus diarrhea, in which case it has been suggested that high levels of prostaglandin E2 (PGE2) in the blood may be the cause of the diarrhea. In the literature, PGE2 levels 3-6 times higher than normal have been shown in the presence of secretory diarrhea.[5] When mucin is produced, sodium and potassium pass to the intraluminal region, carrying the fluid together, and diarrhea occurs. In this syndrome, the large area covered by the adenoma with mucin production reduces the normal mucosal area required for absorption and disrupts the mechanism in two ways.[6] Electrolyte disturbances seen in large villous adenomas can reach remarkable dimensions. These adenomas can secrete approximately 4 L of fluid per day with an average sodium concentration of 120 mmol/L, potassium concentration of 4.4 mmol/L, and chlorine concentration of 123 mmol/L.[7] Increasing oral intake and other mechanisms can compensate for this fluid-electrolyte disorder and volume loss for a long time. However, if diagnosis and treatment are delayed, serious consequences, including cancer, may occur.[8] There may be recurrent hospital admissions for years due to compensatory mechanisms before deep metabolic acidosis, severe neurological symptoms, or severe acute renal failure that require intensive care unit hospitalization. In one case series, the mean time from the onset of symptoms to the development of severe circulatory disorders was reported as 5.5 years.[9] In our case, the patient had long-standing complaints of intermittent diarrhea. These symptoms, which were compensated for a while, eventually led to many consequences, including kidney failure, when they became unbearable. Fortunately, the patient received the necessary interventions before the results could cause irreversible damage.

Although a villous adenoma is mentioned in most of the cases with McKittrick-Wheelock syndrome in the literature, it should not be forgotten that an adenoma may turn into malignancy in the time until diagnosis and surgical resection, or an adenoma may accompany a synchronous malignancy. Cases with neuroendocrine tumors are also known in the pathology of patients who underwent surgical resection after diagnosis.[4] In 2016, Malik et al.[10] published the characteristics of 35 cases with McKittrick-Wheelock syndrome and reported that 22 patients had a villous adenoma, eight patients had

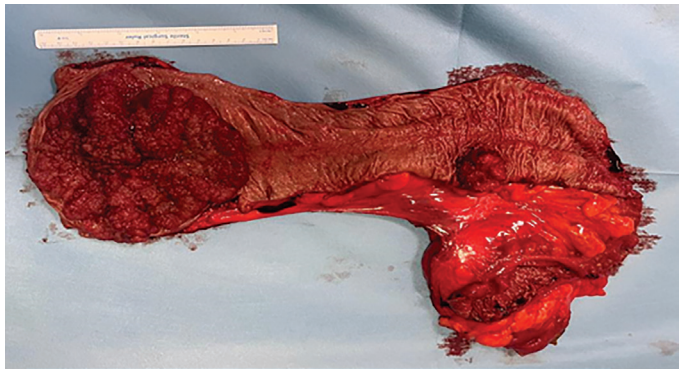

Figure 5. Surgical resection material

Table 1. Analysis of electrolyte and biochemical parameters of the patient in the perioperative period

	Preop	1-day postop	1-week postop	2-months postop
Urea (mg/dL)	182	190	68	35
Creatinine (mg/dL)	4.66	4.61	1.67	1.66
Sodium (mmol/L)	125.7	130.1	133	138
Potassium (mmol/L)	2.8	3	3.1	4.5

adenocarcinoma, one patient had hyperplastic polyps, and one patient had liver metastatic neuroendocrine tumor pathology. In our patient, the final pathology report after surgical resection indicated that low-grade infiltrative adenocarcinoma developed in two different foci in both the upper-middle rectum and the sigmoid colon. The development of adenocarcinoma on the background of both synchronous tumor and villous polyp makes our case unique in the literature.

In the literature, various modalities have been described in the treatment of McKittrick-Wheelock syndrome, ranging from medical support to minimally invasive to open surgery. It has also been shown that symptoms begin to regress 48 hours after the initiation of indomethacin treatment.[11] Endoscopic submucosal dissection can be applied successfully and beneficially in this case.[12] Transanal minimally invasive surgical techniques can similarly be applied in appropriate cases. Apart from these, the most used surgical method in the literature is minimally invasive laparoscopic surgery,[13] which, due to the characteristics of our case, is what we preferred.

McKittrick-Wheelock syndrome is a rare syndrome in which there are giant villous polyps and related clinical consequences. If the underlying clinical findings do not improve with treatment, it is important to investigate this in detail. Although villous polyp histopathology is usually evident in this syndrome, sometimes malignant potential can be seen.[8] Occasionally, a synchronous tumor may be present, although rare, and tumor development on the background of a villous polyp has never been reported in the literature. We aimed to contribute to the literature by presenting this phenomenon.

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Authorship Contributions

Concept: F.A., Design: E.E., Data Collection or Processing: E.B., Analysis or Interpretation: E.E., A.Ö.C., E.B., P.G.E., F.A., Literature Search: E.E., A.Ö.C., E.B., P.G.E., F.A., Writing: E.E., A.Ö.C., E.B., P.G.E., F.A.

Conflict of Interest: No conflict of interest was declared by the authors.

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