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Primary Singnet Ring Cell Carcinoma with Thyroid Storm: A Case Report

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ABSTRACT

Background: Signet ring cell carcinoma (SRCC) of the colon and rectum comprises 0.1–2.6% of colorectal cancers. Most cases are found at advanced stages and rarely at early stages. SRCC are commonly found in the stomach (95%), but can also be seen in the colon, rectum, ovary, peritoneum, and gallbladder. We present a case of primary SRCC of the tranfersum colon with hyperthyroidism caused by thyroid storm. ***Case:*** A 52-year-old female presented with abdominal pain and unintentional weight loss. Computed tomography scan of the abdomen and pelvis demonstrated a tranfersum colon mass with partial small bowel obstruction and enlarged lymph nodes adjacent to the colon without any other metastatic disease. Colonoscopy revealed a partial obstruction of the colon tranfersum. Tumor resection and anastomosis of the tranfersum the colon was performed. Pathology revealed malignant cells exhibiting signet ring morphology. The patient had hyperthyroidism before surgery, which caused post-operative thyroid storm. ***Discussion:*** Thyroid storm is an endocrine emergency that is characterized by multiple organ failure due to severe thyrotoxicosis, often associated with triggering illnesses. Early suspicion, prompt diagnosis, and intensive treatment will improve survival in thyroid storm patients. Primary SRCC is associated with a poor prognosis. This is attributed to being typically diagnosed at advanced stages. The factors causing the delay in diagnosis include the rarity of this tumor, intramucosal tumor spread with relative mucosal sparing, minimal symptoms, and the tumor resembling an inflammatory process on radiographic imaging. At advanced stages, the median and mean survival times are 20 and 45 months, respectively. In the case report, we described a rare case of primary signet ring cell carcinoma of the colon with hyperthyroidism caused by thyroid storm.

Keywords: Signet ring cell carcinoma; Colorectal cancer; Hyperthyroidism; Thyroid storm.

INTRODUCTION

Signet ring cell carcinoma (SRCC) of the colon and rectum is a rare and highly aggressive variant of colorectal adenocarcinoma, accounting for only 0.1% to 2.6% of all colorectal cancers [1]. It is histologically defined by the presence of malignant cells containing abundant intracytoplasmic mucin that displaces the nucleus to the periphery, creating the characteristic "signet ring" appearance [2,3]. While SRCC is most commonly found in the stomach, its occurrence in the colorectum is uncommon and often associated with a more advanced stage at diagnosis due to its submucosal spread and minimal mucosal disruption, which can lead to nonspecific or absent early symptoms. This biological behavior often results in delayed detection, with patients presenting at later stages when curative treatment options are limited [5,6].

Clinically, SRCC tends to affect younger patients compared to conventional colorectal adenocarcinoma and has a strong predilection for the right side of the colon, particularly the cecum and ascending colon [7,8,9], though cases in the transverse colon, such as the one described here, are also reported. The tumor is frequently diagnosed after it has already invaded deeply into the bowel wall or metastasized to regional lymph nodes or distant organs, contributing to its poor prognosis [10]. Furthermore, gastrointestinal malignancies are increasingly recognized for their associations with paraneoplastic syndromes, including endocrine dysregulation.

In this context, the co-occurrence of SRCC with thyroid storm, a rare but life-threatening manifestation of severe hyperthyroidism, presents a complex clinical challenge that requires prompt recognition and multidisciplinary management [11,12].

While thyroid storm itself is typically triggered by Graves' disease or toxic multinodular goiter, its emergence in the setting of advanced malignancy may be exacerbated by systemic inflammation, infection, or surgical stress. This case underscores the importance of considering both neoplastic and endocrine etiologies in patients presenting with constitutional symptoms such as weight loss, tachycardia, and gastrointestinal disturbances, especially when laboratory findings point to thyrotoxicosis [13,14]. The purpose of this report is to describe a rare case of primary SRCC of the transverse colon discovered in a patient who simultaneously developed thyroid storm, to review the current literature on its pathobiology and outcomes, and to highlight the diagnostic and therapeutic challenges involved in managing such complex, multisystem presentations.

CASE PRESENTATION

A 58-year-old female presented to the emergency department with a two-week history of progressive abdominal distension, generalized weakness, unintentional weight loss of approximately 8 kilograms, and intermittent low-grade fever. She also reported palpitations, excessive sweating, emotional lability, and tremors that had worsened over the prior three days. There was no prior history of thyroid disease, but she had undergone an incomplete colonoscopy six months earlier due to poor bowel preparation, during which mild erythematous changes in the transverse colon were noted but not biopsied.

On physical examination, the patient appeared cachectic and anxious. Vital signs revealed a temperature of 38.6°C, heart rate of 138 beats per minute (sinus tachycardia on ECG), blood pressure of 156/88 mmHg, respiratory rate of 22 breaths per minute, and oxygen saturation of 96% on room air. Neck examination revealed diffuse goiter without bruits or nodules. Cardiopulmonary auscultation showed tachycardia with a regular rhythm and no murmurs. Abdominal examination revealed marked distension with visible peristalsis, diffuse tenderness, and tympany on percussion. Bowel sounds were hyperactive. There was no hepatosplenomegaly or palpable abdominal mass. Neurological examination demonstrated fine hand tremors and hyperreflexia.

Initial laboratory investigations showed hemoglobin of 9.8 g/dL, white blood cell count of 12.4×10^9/L, and C-reactive protein of 48 mg/L. Liver and renal function tests were within normal limits. Thyroid function tests revealed a suppressed TSH level of < 0.01 mIU/L, free T4 of 5.8 ng/dL (normal: 0.8–1.8), and free T3 of 12.4 pg/mL (normal: 2.3–4.2), confirming severe thyrotoxicosis. The Burch-Wartofsky Point Scale score was calculated at 65, strongly supporting a diagnosis of thyroid storm.

Abdominal CT scan demonstrated marked thickening of the transverse colon wall with extensive soft tissue infiltration into the surrounding mesentery and regional lymphadenopathy, consistent with a locally advanced neoplasm. There was no evidence of distant metastasis. Colonoscopy was deferred due to the risk of perforation, but the imaging findings, combined with the patient's severe gastrointestinal symptoms and weight loss, raised a strong suspicion for malignancy.

Management of thyroid storm was initiated immediately with high-dose methimazole (30 mg/day), potassium iodide (5 drops every 8 hours after 1 hour post-methimazole), intravenous propranolol (1 mg every 4 hours, titrated to heart rate), and dexamethasone (1 mg every 6 hours). Supportive measures included fluid resuscitation, cooling blankets, and close hemodynamic monitoring in the intensive care unit. Within 72 hours, the patient's tachycardia, fever, and agitation improved significantly.

Once clinically stabilized, she underwent diagnostic laparoscopy, which confirmed a circumferential tumor in the transverse colon causing partial obstruction and extensive serosal involvement. A formal right hemicolectomy with complete mesocolic excision and regional lymph node dissection was performed. Intraoperative findings included enlarged pericolic and mesenteric lymph nodes but no distant metastases.

Histopathological examination revealed a poorly differentiated adenocarcinoma characterized by more than 50% of tumor cells exhibiting intracytoplasmic mucin with nuclear displacement, hallmark features of signet ring cell carcinoma. Immunohistochemistry showed positive staining for CK20 and CDX2, with negative CK7, supporting a colorectal primary. Final staging was pT4aN2aM0 (Stage IIIB) based on the AJCC 8th edition.

The patient recovered well postoperatively and was referred to medical oncology for adjuvant therapy. She began a FOLFOX regimen after multidisciplinary discussion. At six-month follow-up, she remained free of disease recurrence and euthyroid on low-dose levothyroxine, with no clinical evidence of Graves' disease recurrence.

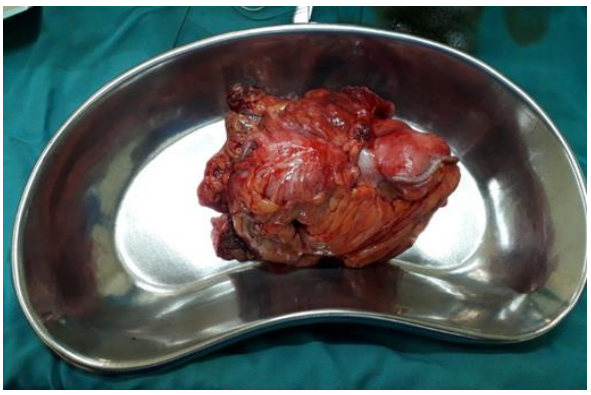

FIGURE 1: Primary Singnet Ring Cell Carcinoma.

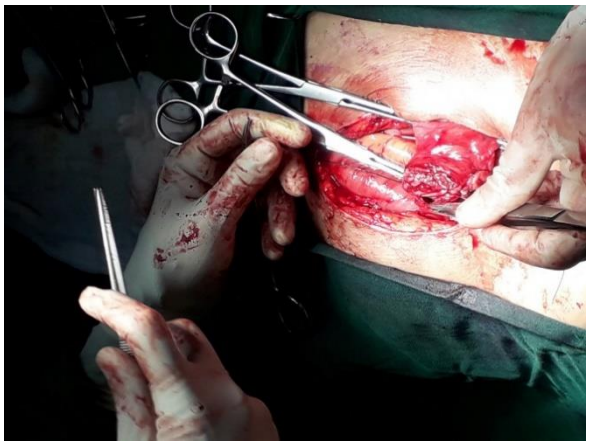

FIGURE 2: The tumor was removed, ready to be stitched and connected to the intestines.

DISCUSSION

This case illustrates the confluence of two rare and severe conditions: primary signet ring cell carcinoma of the colon and thyroid storm, both of which significantly impact patient outcomes and require urgent, coordinated interventions. Colorectal SRCC is known for its aggressive biology, with studies consistently reporting worse survival outcomes compared to conventional adenocarcinomas, even when matched for stage [1,5,6]. The 5-year overall survival rate for colorectal SRCC ranges from approximately 9% to 30%, with median survival reported between 12 and 14 months in multiple cohort studies. A 2024 retrospective analysis of national cancer registries further emphasized that early-stage SRCC (T1–T2) may have relatively favorable outcomes following complete resection; however, most patients present with T3 or T4 disease, where the 5-year survival drops dramatically to 0–12%, reflecting the tumor's rapid progression and high metastatic potential. The delayed diagnosis commonly seen in SRCC stems from its unique growth pattern: rather than forming an exophytic mass that is easily visualized endoscopically, SRCC cells infiltrate beneath the mucosa while preserving its integrity, leading to subtle or misleading endoscopic appearances such as mild erythema or edema that can be mistaken for inflammatory bowel disease or diverticulosis [7,9]. Consequently, the initial clinical suspicion may be low, especially in younger patients without traditional risk factors for colorectal cancer, resulting in missed opportunities for early intervention [12,14].

In our patient, the tumor was located in the transverse colon and associated with regional lymphadenopathy, consistent with at least T3N1 staging, which further aligns with the typical advanced presentation. Surgical resection remains the cornerstone of curative treatment, and in this case, successful resection via right hemicolectomy with lymphadenectomy provided symptomatic relief and removed the obstructive lesion. However, despite achieving R0 resection in many cases, recurrence rates remain high, indicating the need for adjuvant chemotherapy. Regimens such as FOLFOX (5-fluorouracil, leucovorin, and oxaliplatin) are commonly used, although evidence supporting their efficacy specifically in SRCC is limited due to the rarity of the disease and exclusion of SRCC patients from large clinical trials. Some studies suggest that SRCC may be less responsive to standard chemotherapeutic agents, possibly due to intrinsic resistance mechanisms linked to mucin production and epithelial-mesenchymal transition pathways. Therefore, individualized treatment plans, possibly incorporating molecular profiling and targeted therapies, are increasingly being explored [12,13].

Of equal clinical significance in this case was the concurrent presentation of thyroid storm, a critical endocrine emergency characterized by exaggerated signs of hyperthyroidism, including fever, tachycardia, agitation, and potential multiorgan dysfunction. The Burch-Wartofsky Point Scale was instrumental in confirming the diagnosis, with our patient scoring well above the threshold for thyroid storm. Laboratory results revealed markedly elevated free T4 and T3 levels, consistent with thyrotoxicosis [6,9,14]. The pathophysiological link between colorectal SRCC and thyroid storm is not direct, but several mechanisms may have contributed to this occurrence. First, the systemic inflammatory response induced by advanced malignancy could have exacerbated underlying thyroid dysfunction, potentially unmasking previously undiagnosed Graves' disease. Second, perioperative stress from bowel obstruction and the anticipation of surgery likely acted as a trigger for thyroid storm, as surgical intervention is a well-known precipitant in susceptible individuals. The management followed established protocols: initiation of methimazole to inhibit thyroid hormone synthesis, administration of potassium iodide to block further hormone release, propranolol to control adrenergic symptoms, and glucocorticoids to reduce peripheral conversion of T4 to T3 and support adrenal function. Importantly, stabilization of the thyroid status was essential before proceeding with definitive cancer surgery, as uncontrolled thyrotoxicosis increases the risk of perioperative complications, including arrhythmias, heart failure, and death [12,13].

The coexistence of these two conditions poses significant challenges in clinical decision-making. On one hand, delaying surgery to optimize thyroid function may allow tumor progression; on the other, operating in the setting of uncontrolled thyroid storm carries unacceptably high morbidity and mortality. Thus, a multidisciplinary approach involving endocrinology, oncology, surgery, and critical care was crucial to achieve a favorable outcome [9,10,12]. Additionally, this case raises the question of whether there might be an underrecognized association between gastrointestinal malignancies and thyroid dysfunction. While paraneoplastic hyperthyroidism is exceedingly rare, some case reports have described ectopic hormone production or autoimmune stimulation due to tumor-induced immune modulation. Although no definitive paraneoplastic mechanism was confirmed in this instance, the temporal association warrants vigilance in future cases. Long-term follow-up will include surveillance

for tumor recurrence via imaging and tumor markers, as well as ongoing endocrine monitoring for thyroid function stability. Given the poor prognosis of colorectal SRCC, palliative care discussions should also be integrated early into the treatment plan [12].

CONCLUSION

In brief, Thyroid storm is an endocrine emergency that is characterized by multiple organ failure due to severe thyrotoxicosis, often associated with triggering illnesses. Early suspicion, prompt diagnosis, and intensive treatment will improve survival in thyroid storm patients.SRCC should not be excluded based on the location of the mass lesion. More studies and cases are needed to determine at-risk patient populations with primary SRCC for the high mortality benefit of early detection. In the case report, we described a rare case of primary signet ring cell carcinoma of the tranfersum colon with hyperthyroidism caused by thyroid storm.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest related to the publication of this research article.

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