TMSJ
TURKISH MEDICAL STUDENT JOURNAL

Turk Med Stud J 2026;13(2):39-43
DOI: 10.4274/tmsj.galenos.2026.2025-12-3

CASE REPORT

CASE REPORT: SYNCHRONOUS LUNG ADENOCARCINOMA AND PRESUMPTIVE ANAL/RECTAL CARCINOMA IN A 67-YEAR-OLD MALE

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ABSTRACT

Multiple primary malignant neoplasms pose significant challenges in staging and treatment, particularly when they present synchronously with widespread metastatic burden. This report details the rare case of a 67-year-old male with a significant smoking history who was diagnosed with synchronous, advanced-stage malignancies: lung adenocarcinoma and a highly suspicious second primary tumor in the anal canal/rectum. Initial evaluation the lung cancer was Stage IVB with extensive metastases (liver, brain, adrenal, lymph nodes). Crucially, the ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography indicated a distinct, highly active lesion in the anorectal region, necessitating definitive pathological distinction from metastasis. The management plan initiated palliative radiotherapy for cerebral metastases, reflecting the complexity of treating two concurrent primary cancers.

Keywords: Adenocarcinoma, anal, cancer, lung, multiple, synchronous, tumor

INTRODUCTION

The diagnosis of multiple primary malignant neoplasms (MPMN), particularly those presenting synchronously, represents a significant and complex clinical challenge (1). These conditions, defined by two or more histologically distinct cancers in one patient, are broadly classified as synchronous (diagnosed within six months) or metachronous (diagnosed after six months). Clinical analyses of large patient cohorts, some numbering over 15,000 individuals, have highlighted a clear increase in the incidence of MPMN (2, 3). This trend poses diagnostic and therapeutic dilemmas, as the detection of a second, or even a third, unexpected primary malignancy profoundly impacts staging, prognosis, and therapeutic selection (4). This rising incidence is often attributed to a combination of longer patient survival, the effects of carcinogens, genetic predispositions, and the increased sensitivity of modern diagnostic imaging (5).

The simultaneous presentation of a primary lung malignancy and a secondary lesion in the gastrointestinal tract, particularly the anorectum, represents a clinically significant subset of synchronous MPMN (SMPMN). A new lesion discovered in the colorectum or anal canal of a patient with established primary lung cancer is conventionally presumed to be an aggressive pulmonary metastasis until proven otherwise.

This presumption, however, carries a significant risk of misdiagnosis, which can lead to inappropriate clinical staging and suboptimal patient care. This is because the treatment for a single widely metastatic cancer differs drastically from that for two concurrent, independent primary malignancies. This diagnostic challenge is bidirectional; for example, cases of primary colorectal adenocarcinoma metastasizing to the lung can mimic a new primary lung adenocarcinoma, further underscoring the need for definitive pathology (6). The specific pairing of synchronous lung adenocarcinoma and colorectal cancer presents its own set of clinicopathological

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Received: 19.12.2025 Accepted: 29.06.2026 Publication Date: 30.06.2026

Cite this article as: Çetin YA, Tekin A. Case report: synchronous lung adenocarcinoma and presumptive anal/rectal carcinoma in a 67-year-old male. Turk Med Stud J. 2026;13(2):39-43.

characteristics and prognostic challenges, which must be carefully analyzed to guide appropriate care (7).

To resolve this critical diagnostic dilemma, advanced imaging and pathology are indispensable. ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) has emerged as a crucial tool, specifically validated for the evaluation of synchronous or metachronous colorectal cancers in patients who already have a known lung cancer. By quantifying metabolic activity (SUV_{max}) and delineating anatomical spread, PET/CT findings that demonstrate a distinct, highly-avid lesion, as opposed to a typical metastatic pattern, can strongly suggest an independent primary tumor (8). Ultimately, however, immunohistochemistry (IHC) remains the gold standard for definitive diagnosis.

Immunohistochemistry profiling, which confirms distinct cellular origins (e.g., lung adenocarcinoma typically staining thyroid transcription factor-1 (TTF-1); anal/rectal adenocarcinoma typically staining.

Cytokeratin20 (CK20) and caudal homeobox2 (CDX2), is essential to confirm the diagnosis of SMPMNs.

This pathological confirmation is non-negotiable, as it is the only method to rule out metastatic spread and is critical in complex cases, such as the rectum presenting with mixed histologies like squamous cell carcinoma and adenocarcinoma components (9).

This case report details the rare and clinically demanding presentation of a 67-year-old male with a heavy smoking history who was diagnosed with Stage IVB lung adenocarcinoma and a highly suspicious second primary tumor in the anal canal/rectum. The case specifically highlights the decisive role of ^{18}F-FDG PET/CT in suggesting the SMPMN diagnosis in the face of extensive metastatic burden, underscoring the necessity of a rigorous, multidisciplinary approach to avoid misstaging and ensure that highly individualized treatment plans are established for patients with this complex synchronous disease.

CASE REPORT

The case is characterized by an extensive metastatic burden confirmed at the time of initial diagnosis in late 2025. The 67-year-old male patient first presented to the clinic in October 2025 with the primary complaint of a persistent, debilitating cough that had been worsening over time. The patient's epidemiological risk profile was significant: he was an ex-smoker with a substantial history totaling 35 pack-years, having ceased smoking approximately fifteen years prior to presentation. This heavy smoking history provided a strong index of suspicion for the pulmonary malignancy that was subsequently diagnosed. Furthermore, a family history of malignancy was noted, specifically lung cancer (brother) and stomach cancer (mother).

A crucial element of the presentation, which later complicated the differential diagnosis, was the patient's secondary complaints of dysuria and persistent anal pain. The anal discomfort, a highly relevant symptom, was initially investigated and clinically attributed to internal thrombosed hemorrhoids by a general surgeon, temporarily diverting attention away from an underlying anorectal malignancy. Despite the advanced stage of the disease discovered shortly thereafter, the initial physical examination was largely unremarkable for generalized lymphadenopathy or organomegaly.

The advanced-stage diagnosis was rapidly confirmed following a comprehensive staging workup initiated in October 2025 (Table 1). The clinical data and serology findings, documented in the electronic medical record, characterized an aggressive, systemic disease process.

Table 1: Staging workup.

Category	Date	Test/location	Key finding/dimension	Clinical significance
Anatomical correlate	Post-PET MRI	Rectal wall	70 mm mass (left lateral wall)	Supports suspicion of independent anorectal carcinoma
Tumor marker 1	10.06.2025	Serology	CEA:776 ng/mL	Markedly elevated; common in GI and lung primaries
Tumor marker 2	10.06.2025	Serology	PSA:6 ng/mL	Mildly elevated; contributes to benign prostate hyperplasia
Inflammatory marker	10.06.2025	Serology	CRP:100 mg/L	Reflects significant systemic inflammation/stress
Primary lung mass	10.10.2025	CT/PET (RUL)	46×46×50 mm mass	Histology: lung adenocarcinoma
Metastasis (widespread)	10.16.2025	MRI/PET/CT	Involvement of brain, liver, left adrenal gland	Establishes Stage IVB status
Lymphadenopathy	10.16.2025	PET/CT	Extensive nodal burden (3-4 cm nodes)	Includes mediastinal, paraaortic, celiac, hilar
Primary diagnosis	10.24.2025	Biopsy/staging	Stage IVB lung disease confirmed	Initial definitive classification (EMR)
Pulmonary histology	10.24.2025	IHC (lung biopsy)	TTF-1 positive	Confirms pulmonary origin
Suspicion of SMPMN	10.24.2025	PET/CT (anal canal)	Highly FDG-avid focus	Explicitly indicative of a second primary

EMR: Electronic medical record, CT: Computed tomography, PET: Positron emission tomography, RUL: Right upper lobe, IHC: Immunohistochemistry, MRI: Magnetic resonance imaging, FDG: Fluorodeoxyglucose, CEA: Carcinoembryonic antigen, GI: Gastrointestinal, PSA: Prostate-specific antigen, CRP: C-reactive protein, TTF-1: Thyroid transcription factor-1, SMPMN: Synchronous multiple primary malignant neoplasms, GI: Gastrointestinal.

The initial focus on the large pulmonary mass (SUV_{max}:17.6) in the right upper lung led to a biopsy confirming lung adenocarcinoma. The tumor's aggressive nature was evident in the rapid staging to Stage IVB disease confirmed on October 24, 2025. The metastatic survey detailed a substantial nodal and distant burden. Lymphadenopathy was extensive, with large 3-4 cm nodes observed in the mediastinal and para-aortic chains, confirming high-volume lymphatic involvement. Distant visceral spread included confirmed lesions in the liver (specifically noted in segments 2 and 7) and a metastasis to the left adrenal gland. Crucially, the presence of symptomatic cranial metastases was a key factor in determining the immediate palliative strategy.

Pathological analysis of the lung primary confirmed the adenocarcinoma phenotype, exhibiting characteristic positive staining for the transcription factor TTF-1. This IHC profile established the cell of origin and became the essential reference marker for differentiating this tumor from the second suspicious lesion (6).

The most significant diagnostic challenge presented by the case was the presence of a second, highly metabolically active lesion in the lower GI tract (6). The whole-body ^{18}F-FDG PET/CT identified a distinct, highly FDG-avid focus in the anal canal (Figure 1) (8).

This finding was not casually dismissed as a potential metastasis; instead, the interpreting radiologist highlighted its atypical nature by explicitly labeling it as indicative of a second primary tumor (1, 8). This was supported by subsequent abdomen/pelvic magnetic resonance imaging, which provided the anatomical correlate: a large 70 mm mass fixed to the left lateral wall of the rectum.

The clinical and therapeutic ramifications are profound (2). If the rectal lesion is confirmed as a distinct primary (e.g., anal/rectal squamous cell carcinoma or adenocarcinoma), the patient would require two independent, potentially curative treatment protocols (7). Conversely, if it represents a metastasis from the lung, management must adhere to a palliative strategy for the single, widespread disease. The final distinction hinges entirely on obtaining pathological confirmation via IHC (colonoscopy images are shown in the Figure 2), seeking to contrast the TTF-1-positive lung primary with potential CK20/CDX2 positivity in the rectal lesion. The inability of non-invasive imaging techniques to reliably differentiate between metastasis and a synchronous primary necessitates this biopsy-based confirmation, which represents the gold standard in oncology (6). The pathology report confirms the diagnosis of multiple adenomatous polyps with different degrees of dysplasia (p53

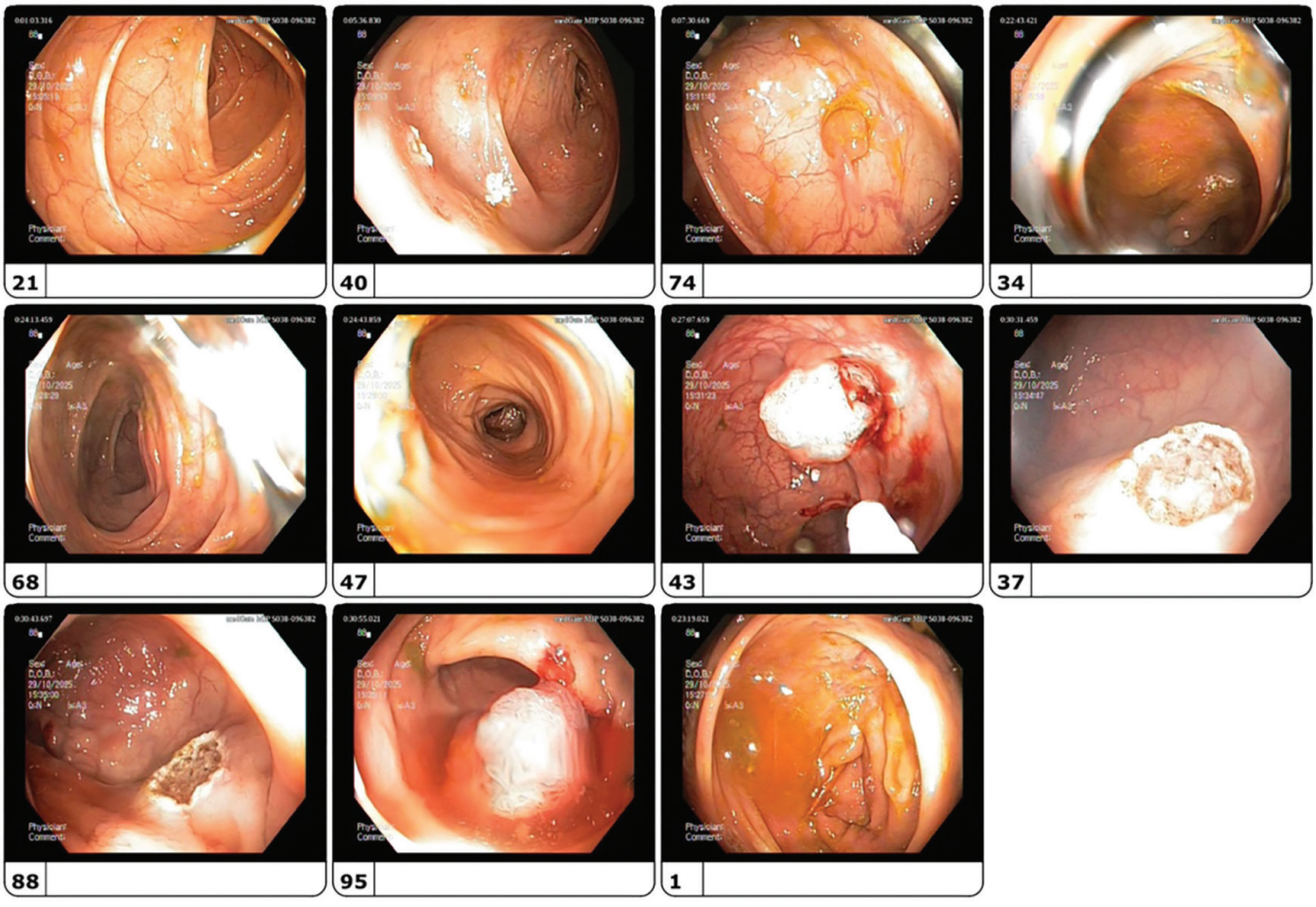

Figure 1: Colonoscopy images.

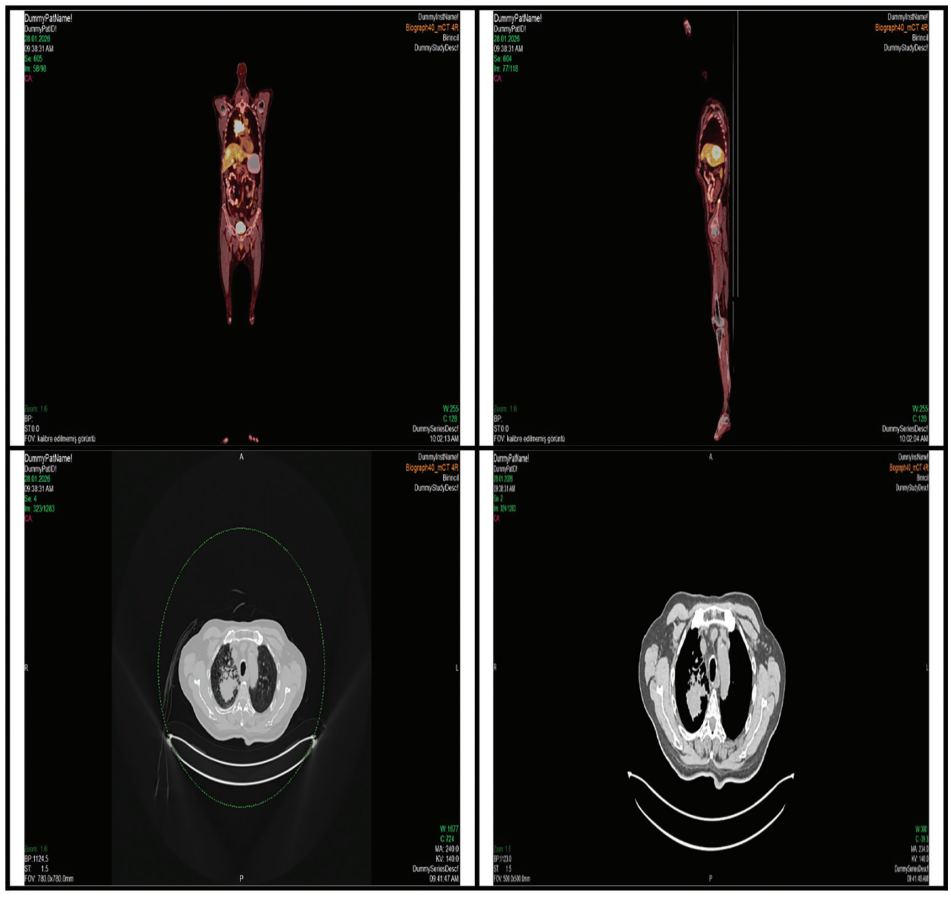

Figure 2: PET/CT images.
PET/CT: Positron emission tomography/computed tomography.

negative, increased Ki-67 proliferation index) removed from the colon and rectum. The final assessment confirms the removal of multiple polyps showing high-grade dysplasia. The patient will require close follow-up and monitoring due to the presence of high-grade dysplasia, which is a significant precursor to colorectal carcinoma.

The most time-sensitive intervention was dictated by the symptomatic cranial metastasis. Given the high-risk of neurological morbidity (including seizures, focal deficits, and rapid deterioration), the immediate clinical priority was the initiation of palliative radiotherapy for the cerebral metastases.

Further definitive therapeutic decisions for the lesions were critically dependent on the histological confirmation of the anal/rectal mass. Systemic therapy for the lung adenocarcinoma (e.g., targeted therapy based on molecular profiling or chemotherapy) and local surgical treatment for the anorectal lesions are planned along two separate, individualized oncological pathways (7). This case highlights the paradigm shift required in managing SMPMN, where the indispensable role of IHC transforms the patient's clinical course from a single palliative journey into a complex, dual-treatment strategy (1, 7). The distinction between metastasis and a second primary must be established, as it fundamentally dictates the selection of two parallel, individualized oncological treatment pathways rather than a single palliative approach for one widespread cancer (6). An informed oral consent was obtained from the patient.

DISCUSSION

This case highlights the complexities in the diagnosis and management of synchronous primary malignancies, especially lung adenocarcinoma and anorectal cancer, in a patient with extensive metastatic disease.

While ^{18}F-FDG PET/CT confirmed the extent of the Stage IVB lung adenocarcinoma and its metastases, the FDG-positive region in the anal canal is the crucial finding that shifts the diagnosis from a solitary primary with metastasis to SMPMN. In published cases of synchronous lung and colorectal adenocarcinomas,

PET/CT has been shown to assist in differentiation, particularly when the two lesions exhibit distinct SUV_{max} values or unique anatomical patterns not typical of hematogeneous spread (4). A definitive diagnosis requires IHC analysis of the anal mass to prove distinct cellular origins. For example, lung adenocarcinoma is typically TTF-1, while anal adenocarcinoma is typically CK20 and CDX2.

The patient possesses multiple risk factors for cancer, including heavy smoking and a strong family history of cancer. The simultaneous presence of two primary tumors, coupled with adverse prognostic factors like male gender, symptomatic disease (cough, anal pain), elevated carcinoembryonic antigen, and extensive nodal and distant metastasis (brain, liver, adrenal), dictates a guarded prognosis.

Management must simultaneously address two distinct cancers. The immediate priority was palliative radiotherapy for symptomatic cranial metastasis. Subsequent systemic therapy should be selected based on the molecular profile of the lung adenocarcinoma, while the anal/rectal primary requires specific local treatment (e.g., chemoradiation for anal squamous cell carcinoma, or surgery/chemotherapy for anal/rectal adenocarcinoma) once its independent histology is confirmed.

CONCLUSION

This case of a 67-year-old male presenting with synchronous, highly aggressive lung adenocarcinoma and a highly suspicious anal/rectal primary tumor underscores the necessity of a rigorous diagnostic protocol in patients with multiple lesions.

^{18}F- FDG PET/CT served as a vital tool in suggesting the possibility of a second primary. This modality is often crucial for identifying synchronous lesions, such as colorectal cancers in patients with lung cancer, where metabolic differences can aid in differentiation (4). Final pathology and IHC results are indispensable for confirming SMPMNs.

Specifically, IHC is the only way to prove distinct cellular origins (e.g., TTF-1 vs. CK20) and distinguish a second primary from a metastasis, which is critical, particularly given the known clinicopathological challenges when lung and colorectal cancers co-exist (7). The diagnosis of SMPMNs is essential for accurate prognostication and highly individualized, multimodal oncological management.

Large-scale clinical analyses of MPMNs demonstrate the high level of complexity involved, noting that these patients often present with advanced disease and require highly tailored management strategies, as highlighted by reports on diverse synchronous presentations including breast, kidney, and thyroid primaries (4, 9). The presence of SMPMNs dictate a guarded prognosis, reflecting the substantial therapeutic challenge of addressing two concurrent malignancies that impact multiple organ systems, requiring close consideration of the overall survival benefits versus the cumulative toxicity of dual treatments. Ultimately, this case contributes to the understanding of rare presentations in oncology, reaffirming that multiple lesions must always be approached with a low threshold for pursuing definitive pathological evidence of distinct primary origins before initiating therapy.

Ethics

Informed Consent: *An informed oral consent was obtained from the patient.*

Footnotes

Conflict of Interest: *The authors declared no conflict of interest*

Author Contributions: *Surgical and Medical Practices: Y.A.Ç., A.T., Concept: Y.A.Ç., A.T, Design: Y.A.Ç., A.T., Data Collection or Processing: Y.A.Ç., A.T., Analysis and/or Interpretation: Y.A.Ç., A.T., Literature Search: Y.A.Ç., A.T., Writing: Y.A.Ç., A.T.*

Financial Disclosure: *The authors declared that this study received no financial support.*

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