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Case Report

The Triple Challenge of Managing Anticoagulant Therapy in a Patient with Concurrent Colorectal Cancer, Thromboembolism, and Renal Failure: A Case Report

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Abstract

Introduction: The management of anticoagulation in patients with gastrointestinal cancer is complicated by the elevated risk of bleeding, which is amplified by concomitant renal failure affecting the pharmacokinetics of anticoagulant drugs. This case report illustrates the complexities of selecting a safe and effective anticoagulant regimen in this high-risk scenario.

Case Presentation: A 77-year-old male patient with a history of colorectal cancer and chronic kidney disease (creatinine level 2.3 mg/dL) presented with acute dyspnea. Doppler ultrasound confirmed deep vein thrombosis in the left femoral vein. Due to renal impairment, computed tomography pulmonary angiography was contraindicated; a ventilation-perfusion (V/Q) lung scan was performed instead, which diagnosed pulmonary embolism. The primary dilemma was selecting an appropriate anticoagulant that could balance the high risk of recurrent thromboembolism against the heightened risks of drug accumulation and catastrophic gastrointestinal bleeding.

The selection of the therapeutic regimen required a multidisciplinary evaluation involving cardiology, nephrology, and clinical pharmacy experts. To mitigate the risk of drug accumulation while ensuring efficacy, subcutaneous enoxaparin was initiated at a renal-adjusted dose of 60 mg subcutaneously once daily. This approach aimed to provide effective treatment for cancer-associated thrombosis while carefully monitoring the patient's clinical status in the setting of severe renal impairment.

The patient was discharged on this regimen and completed a full 6-month course of enoxaparin without any thromboembolic or bleeding complications. At the 9-month follow-up, the patient remains asymptomatic and off anticoagulants. Based on recent colonoscopy findings showing no active disease or residual mass, the patient requires no further surgical intervention or anticoagulant therapy, demonstrating an excellent clinical outcome.

Conclusion: This case underscores the need for a tailored, multidisciplinary approach to anticoagulation in patients with gastrointestinal cancer, thromboembolic disease, and renal insufficiency. Low-molecular-weight heparin (LMWH), alongside careful dose adjustment and continuous monitoring, represents a viable therapeutic option in this complex patient population.

Keywords: Colorectal neoplasms, Venous thromboembolism, Pulmonary embolism, Renal insufficiency, Anticoagulants, Enoxaparin

Introduction

Colorectal cancer is one of the most significant and rapidly increasing medical problems globally. It is the third most common cancer and the fourth leading cause of cancer-related deaths worldwide, including Iran, where it accounts for approximately 8% of all cancer deaths. In Iran, colorectal cancer is the third most common type of cancer in men and the fourth in women and poses numerous challenges in treatment (1).

Cancer patients have a significantly elevated risk of venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), compared to the general population. Cancers are categorized based on the incidence of VTE into three groups: high risk (e.g., pancreatic, ovarian, brain, gastric, and hematologic malignancies), intermediate risk (e.g.,

colorectal and lung cancers), and low risk (e.g., breast and prostate cancers) (2).

The treatment of VTE in cancer patients is particularly challenging due to their elevated risks of VTE recurrence and major bleeding complications during anticoagulant therapy. The selection of an appropriate anticoagulant is influenced by several factors such as patient age, cancer stage, tumor type, and active cancer treatments (3) (Figure 1).

The management of anticoagulation therapy in patients with chronic kidney disease (CKD) also requires a delicate balance between the risks of bleeding and thrombosis. These patients are in a particularly sensitive position due to impaired platelet function and systemic disturbances in their coagulation system, necessitating careful adjustment of drug dosages and rigorous monitoring. This is especially critical given the pharmacokinetic changes in CKD, which can lead to prolonged drug elimination and an increased risk of adverse effects (4).

In this article, we present the case of a patient with active colorectal cancer and concomitant chronic kidney disease who was hospitalized due to acute pulmonary embolism. A significant challenge in the management of this patient was the selection of an optimal anticoagulant therapy regimen. This case report will detail this challenging clinical dilemma.

Case Presentation

A 77-year-old man with a history of rectal adenocarcinoma initially presented with rectorrhagia and underwent a diagnostic workup, which revealed a rectal malignant lesion. According to the PET-CT report obtained during initial staging, intense hypermetabolic activity was noted in the rectum with circumferential mural thickening, highly suggestive of primary rectal malignancy. In addition, a hypermetabolic focus was detected in the descending colon, warranting further clinical and endoscopic evaluation. The PET-CT also demonstrated multiple bilateral pulmonary nodules. Initial interpretation raised concern for possible metastatic disease; however, subsequent chest CT findings were more consistent with an infectious or inflammatory process, including a tree-in-bud pattern, ground-glass opacities, bronchial narrowing, and pleural effusion, which alleviated the initial concern.

He completed a treatment protocol consisting of eight cycles of chemotherapy and one cycle of neoadjuvant chemoradiotherapy, which concluded on October 31, 2024. Three weeks after treatment completion, he presented to the emergency department with acute-onset dyspnea. His medical history was significant for hypertension of ten years' duration and Stage 4 chronic kidney disease (CKD) diagnosed three years earlier. His family history was notable for colon cancer in his brother (deceased in 2022 due to liver metastases); his father died at age 95 from a stroke, and his mother died at age 75 from pneumonia. Other siblings remain alive and healthy.

On initial assessment, the patient's blood pressure was 120/80 mmHg, heart rate was 80 beats per minute, oxygen saturation was 95% on room air, and respiratory rate was 30 breaths per minute. Clinical examination revealed tachypnea and normal heart and lung auscultation. Limb circumference measurements showed symmetry, with the legs and thighs measuring 36 cm and 46 cm bilaterally. Laboratory tests indicated a hemoglobin level of 10.7 g/dL,

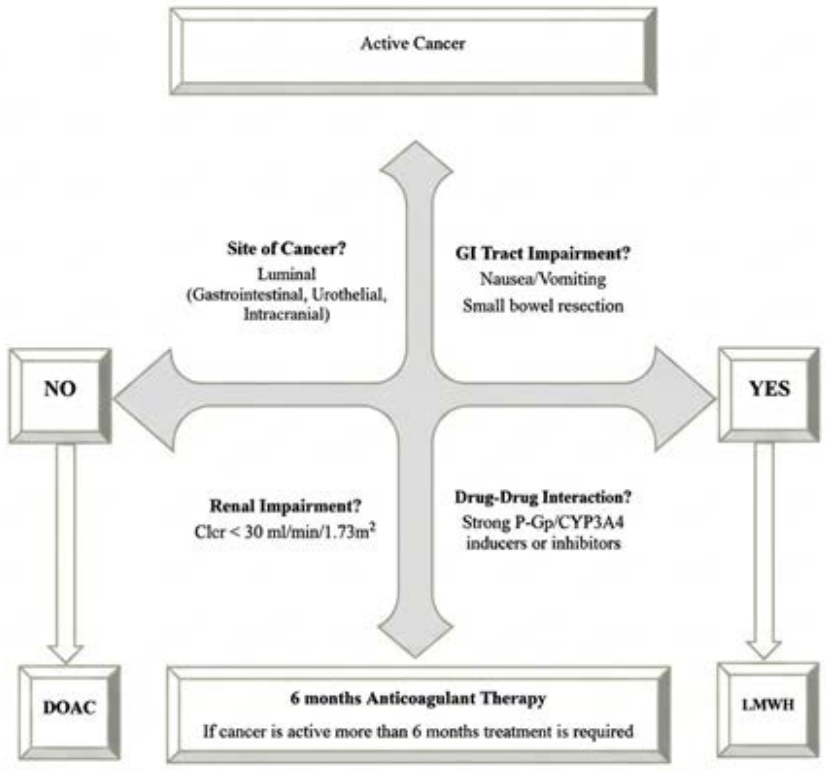

Figure 1. Algorithm for selecting an anticoagulant medication in patients with active cancer (Reference 3)

hematocrit of 31%, potassium of 4.7 mEq/L, and normal liver enzymes. Serum creatinine was 2.25 mg/dL and urea was 72 mg/dL, resulting in an estimated glomerular filtration rate (eGFR) of 21.78 mL/min/1.73m^2. The echocardiogram was within normal limits, showing a left ventricular ejection fraction of 55% and a pulmonary artery pressure of 35 mmHg.

Given the active cancer and the sudden onset of symptoms, the patient underwent venous Doppler ultrasound of the lower extremities, which revealed a focal echogenic thrombus in the left common femoral vein, superficial femoral vein, and popliteal vein, confirming deep vein thrombosis (DVT). Because of the high clinical suspicion for pulmonary embolism (PE) and the contraindication to computed tomography pulmonary angiography (CTPA) due to advanced renal dysfunction, a ventilation-perfusion (V/Q) lung scan was performed, the results of which were highly consistent with pulmonary embolism. Following a multidisciplinary consultation, anticoagulation was initiated with enoxaparin 60 mg subcutaneously once daily as a renal-adjusted therapeutic regimen.

The patient was discharged on this treatment and completed a total of 6 months of anticoagulation without hemorrhagic or recurrent thrombotic complications. At the 9-month follow-up, repeated Doppler ultrasound showed complete recanalization, and surveillance colonoscopy revealed no residual mass. The detailed clinical timeline of the patient's diagnosis and management is summarized in Table 1.

Discussion

This case illustrates a highly complex clinical scenario in which malignancy-associated thrombosis and renal dysfunction coexisted in a patient with rectal adenocarcinoma. Pulmonary embolism is a serious and life-threatening complication in patients with cancer. This complication is dangerous not only because of the clot itself but also because it is directly associated with a worse prognosis and reduced survival rates. The risk of clot formation in these patients is significantly increased due to the nature of the cancer itself and certain treatments (5) .

Currently, the annual incidence of venous thromboembolism (VTE) in cancer patients is estimated to be 0.5%, which is substantially higher than the 0.1% incidence in the general population. Active cancer accounts for 20% of all VTE cases (6). The risk of recurrent VTE in cancer patients is at least twice that of non-cancer patients, and those undergoing anticoagulant therapy face an increased risk of bleeding (7).

The diagnostic and therapeutic approach was complicated by chronic kidney disease. Imaging showed bilateral renal atrophy and increased cortical echogenicity, confirming underlying chronic renal impairment. This finding had direct implications for anticoagulant selection. Computed tomographic pulmonary angiography was avoided because of the risk of contrast-induced nephrotoxicity. In addition, direct oral anticoagulants (DOACs) were considered less suitable in the setting of advanced renal function impairment and potential gastrointestinal bleeding risk. For these reasons, enoxaparin was selected as the most appropriate anticoagulant, balancing efficacy and safety in this high-risk patient (8).

The importance of appropriate VTE management in cancer patients is underscored by clinical guidelines such as those from the American Society of Hematology (ASH). The 2021 ASH guidelines emphasize a risk-benefit balance, incorporating individual patient factors and available therapeutic options. They recommend low molecular weight heparin (LMWH) and DOACs as first-line treatments (8). Similarly, the American Society of Clinical Oncology (ASCO) guidelines highlight personalized therapy based on cancer type, bleeding risk, and patient preferences. While DOACs are first-line for many patients, LMWH remains crucial for high-risk subgroups, such as those with gastrointestinal cancers. Regular reassessment of anticoagulation therapy is essential to balance thrombotic and bleeding risks (9, 10).

The 2024 National Comprehensive Cancer Network (NCCN) guidelines also recommend LMWHs like enoxaparin as first-line therapy for cancer-associated thrombosis, particularly in gastrointestinal malignancies, due to their efficacy and favorable bleeding profile. DOACs such as apixaban are effective alternatives but carry a higher bleeding risk in upper GI cancers. Warfarin is considered a last resort due to inferior efficacy and

Table 1. Timeline of Clinical Events and Management

Date	Event / Intervention	Details
April 2024	Initial diagnostic procedure	Urgent colonoscopy due to severe rectorrhagia; diagnosis of rectal adenocarcinoma
April -Oct 2024	Oncologic treatment	Eight cycles of chemotherapy and neoadjuvant chemoradiotherapy
Oct 31, 2024	Final treatment session	Completion of neoadjuvant therapy
Nov 2024	Acute presentation	Sudden-onset dyspnea; ED admission
Nov 2024	Thromboembolic diagnosis	PE confirmed via V/Q scan; DVT confirmed via Doppler ultrasound
Nov 2024	Anticoagulation initiation	Enoxaparin 60 mg SC once daily (renal-adjusted dose)
May 2025	Anticoagulation completion	6-month course completed without complications
Aug 20225	Vascular follow-up	Complete recanalization on Doppler ultrasound
Recent 2025	Oncologic surveillance	No residual mass on colonoscopy; stable inflammatory/calcified pulmonary nodules

higher recurrence risk, while fondaparinux is reserved for cases with heparin-induced thrombocytopenia, though caution is advised in renal impairment (11).

Our patient was treated with enoxaparin for pulmonary embolism in the setting of colorectal cancer, aligning with all three major guidelines. According to a review by Yhim et al., cancer patients with pulmonary embolism should receive anticoagulation for at least six months, with continuation considered if cancer remains active and bleeding risk is low (12).

Patients with chronic kidney disease (CKD) exhibit a "hypercoagulability paradox," characterized by simultaneous increased risks of thrombosis and bleeding (13). This arises from abnormalities in coagulation and platelet function, alongside altered metabolism and clearance of anticoagulants, necessitating careful management (14).

Anticoagulant selection in CKD requires precision. Warfarin has a narrow therapeutic window and risks such as bleeding and nephropathy, while DOACs like apixaban and rivaroxaban require dose adjustments and carry specific risks in renal impairment (14). Enoxaparin is often preferred in renal failure due to its predictable anti-factor Xa activity and tailored dosing, offering an improved safety profile and reduced need for monitoring (15).

Given our patient's significant renal impairment (GFR 21.78 mL/min), a dose adjustment of enoxaparin was imperative. Enoxaparin, an LMWH commonly used for VTE treatment and prophylaxis, undergoes primarily renal elimination. In patients with chronic kidney disease, its renal clearance is reduced and its elimination half-life is prolonged, increasing the risk of drug accumulation and bleeding. Therefore, the recommended dose for patients with a creatinine clearance (CrCl) less than 30 mL/min is 1 mg per kg per day (16). Based on this guideline, a dose of 60 mg SC once daily was initiated, which was appropriate for the patient's weight of 56 kg. The patient completed six months of enoxaparin without complications—no bleeding or thrombotic events. Post-treatment colonoscopy revealed complete resolution and inactivity of the cancer, confirming no need for continued anticoagulation or surgery. Currently, nine months post-discharge, the patient remains asymptomatic, fully active, and under regular follow-up, demonstrating excellent disease control.

Conclusion

In conclusion, the management of venous thromboembolism in patients with active cancer and concomitant renal failure is a complex clinical challenge requiring a careful balance between thrombosis prevention and bleeding risk. This case demonstrates that a renal-adjusted enoxaparin regimen may provide an effective and safe treatment option in a patient with colorectal cancer, pulmonary embolism, deep vein thrombosis, and advanced chronic kidney disease. The favorable clinical outcome in this case underscores the importance of individualized decision-making and interdisciplinary collaboration.

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Authors' Contribution

Conceptualization: Shima Jafari and Toba Kazemi
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Drafting of the Manuscript: Shima Jafari and Toba Kazemi
Review and Critical Revision: All authors

Competing Interests

None.

Ethical Approval

This study was approved by the Ethics Committee of Birjand University of Medical Sciences (approval code: IR.BUMS.REC.1403.349). All ethical principles were observed throughout the study.

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References

1. Mansori K, Solaymani-Dodaran M, Mosavi-Jarrahi A, Motlagh AG, Salehi M, Delavari A, et al. Spatial inequalities in the incidence of colorectal cancer and associated factors in the neighborhoods of Tehran, Iran: Bayesian spatial models. J Prev Med Public Health 2018;51(1):33-40. doi:10.3961/jpmph.17.167
2. Tatsumi K. The pathogenesis of cancer-associated thrombosis. Int J Hematol 2024;119(5):495-504. doi:10.1007/s12185-024-03735-x
3. Bazarbashi S, El Zawahry HM, Owaidah T, AlBader MA, Warsi A, Marashi M, et al. The role of direct oral anticoagulants in the treatment of cancer-associated venous thromboembolism: review by middle East and North African experts. J Blood Med 2024;15:171-89. doi:10.2147/jbm.S411520
4. Montomoli M, Candía BG, Barrios AA, Bernat EP. Anticoagulation in chronic kidney disease. Drugs 2024;84(10):1199-218. doi:10.1007/s40265-024-02077-6
5. Khorana AA, Mackman N, Falanga A, Pabinger I, Noble S, Ageno W, et al. Cancer-associated venous thromboembolism. Nat Rev Dis Primers 2022;8(1):11. doi:10.1038/s41572-022-00336-y
6. Fernandes CJ, Morinaga LT, Alves JL Jr, Castro MA, Calderaro D, Jardim CV, et al. Cancer-associated thrombosis: the when, how and why. Eur Respir Rev 2019;28(151):180119. doi:10.1183/16000617.0119-2018
7. Keskin HV, Ozcelik N, Senturk Topaloglu E, Ozyurt S, Gumus A, Sahin U. Which is more valuable in the diagnosis of pulmonary thromboembolism? The wells score, the revised Geneva score, or the Padua score? Life (Basel) 2025;15(7):1115. doi:10.3390/life15071115
8. Lyman GH, Carrier M, Ay C, Di Nisio M, Hicks LK, Khorana AA, et al. American Society of Hematology 2021 guidelines for management of venous thromboembolism: prevention and treatment in patients with cancer. Blood Adv 2021;5(4):927-74. doi:10.1182/bloodadvances.2020003442
9. Key NS, Khorana AA, Kuderer NM, Bohlke K, Lee AY, Arcelus JI, et al. Venous thromboembolism prophylaxis and treatment in patients with cancer: ASCO guideline update. J Clin Oncol 2023;41(16):3063-71. doi:10.1200/jco.23.00294
10. Key NS, Khorana AA, Kuderer NM, Bohlke K, Lee AYY, Arcelus

JI, et al. Venous thromboembolism prophylaxis and treatment in patients with cancer: ASCO clinical practice guideline update. J Clin Oncol 2020;38(5):496-520. doi:10.1200/jco.19.01461
11. Streiff MB, Holmstrom B, Angelini D, Ashrani A, Buckner T, Diep R, et al. Cancer-associated venous thromboembolic disease, version 2.2024, NCCN clinical practice guidelines in oncology. J Natl Compr Canc Netw 2024;22(7):483-506. doi:10.6004/jnccn.2024.0046
12. Yhim HY. Proper application of anticoagulation therapy on cancer-associated venous thrombosis. Blood Res 2024;59(1):25. doi:10.1007/s44313-024-00029-3
13. Caruana J, Riva N, Vella K, Davenport A, Gatt A. Navigating through the haemostatic paradox in kidney failure: a practical overview. Br J Haematol 2023;202(2):230-47. doi:10.1111/bjh.18903
14. Parul F, Ratnani T, Subramani S, Bhatia H, Ashmawy RE, Nair N, et al. Anticoagulation in patients with end-stage renal disease: a critical review. Healthcare (Basel) 2025;13(12):1373. doi:10.3390/healthcare13121373
15. Damiani A, De Menezes Caceres V, Roberts G, Coddo J, Scarfo N, Willliams DB, et al. A clinical practice-based comparison of conventional and individualized dosing strategies for therapeutic enoxaparin. Pharmacol Res Perspect 2025;13(1):e70039. doi:10.1002/prp2.70039
16. Corona CM, Melero EL, Triska EL, León M, Roldán D, Gruss E, et al. #2147 Enoxaparin dosing in advanced chronic kidney disease: importance of monitoring with anti-Xa levels. Nephrol Dial Transplant 2024;39(Suppl 1):gfae069-1446-2147. doi:10.1093/ndt/gfae069.1446