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Case Report

# Unveiling the uncommon: Disseminated intravascular coagulation as an unusual presentation of metastatic carcinoma prostate

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ABSTRACT

We present a rare case of disseminated intravascular coagulation (DIC) as the initial manifestation of metastatic carcinoma of the prostate. DIC is a life-threatening condition characterized by systemic activation of coagulation and widespread microvascular thrombosis, leading to organ dysfunction. Although DIC is commonly associated with hematological malignancies and sepsis, its occurrence as a paraneoplastic syndrome in solid tumors is extremely rare. Our case highlights the importance of considering DIC as a potential complication in patients with advanced prostate cancer, even in the absence of typical symptoms.



## 1. Introduction

Disseminated intravascular coagulation (DIC) is a complex disorder characterized by widespread activation of coagulation, leading to microvascular thrombosis, organ dysfunction, and consumption of clotting factors.[1] DIC is commonly associated with hematological malignancies, sepsis, trauma, and obstetric complications. However, it is considered an uncommon manifestation in solid tumors.[2] Here, we describe a case of DIC as the initial presentation of metastatic carcinoma of the prostate. This case report highlights the importance of recognizing DIC as a potential complication in solid tumors and emphasizes the need for prompt diagnosis and appropriate management to improve patient outcomes.

## 2. Case Presentation

A 60-year-old male, presented with history of gum bleeding, hematuria and spontaneous diffuse ecchymoses for 3 days. His history was not suggestive of any bleeding diathesis. He had never smoked or consumed alcohol. At presentation his pulse rate was 94 beats/ min and blood pressure was 142/ 86 mm of Hg. No lymphadenopathy or hepatosplenomegaly was noted. Echymotic patches were noted over all 4 limbs and trunk.

His CBC reported hemoglobin of 7.3 g/dL with TLC 10540/ cu mm and platelet count of 144000/ cu mm. His coagulation profile was grossly deranged. PT was 26.0 s and INR of 2.1 and aPTT/ PTTK 37.8s. His plasma fibrinogen level was 61.6 mg/dl. Fibrin degradation products were 22.0 ug/ml. The peripheral blood smear showed normocytic normochromic blood picture with reduced number of platelets, schistocytes, confirming the presence of microangiopathic hemolytic anemia.

USG of abdomen and pelvis showed mild prostatomegaly with left vesico-ureteric junction calculus with upstream moderate hydroureteronephrosis. Whole body PET CT scan showed prostatomegaly with FDG avid retroperitoneal lymphadenopathy and right pubic bone lesion. His serum PSA was found to be 240 ng/

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ml. Bone marrow biopsy showed metastatic malignant cell infiltration. TRUS guided prostate biopsy showed adenocarcinoma, Gleason pattern 3+4= 7 and Gleason group 2. On IHC, the tumor cells expressed PSAP and NKX3.1.

The differential diagnoses were DIC, thrombotic thrombocytopenic purpura, dysfibrinogenemia and metastatic cancer. Based on the clinical presentation, laboratory findings, and imaging results, a diagnosis of disseminated intravascular coagulation secondary to metastatic carcinoma of the prostate was made. Patient was treated intensively for DIC with platelet, cryoprecipitate and blood transfusion, sensitive antibiotics. After stabilization he was started on combination of Biculatamide and monthly Degarelix injection, prednisolone tablets 5mg twice a day. Zoledronic acid was administered in view of skeletal metastases. Abiraterone was subsequently added in view of rising PSA. Steroid induced hyperglycemia was treated with metformin. He was subsequently evaluated for bladder outlet obstruction. He underwent cystoscopy + TURP and removal of bladder neck calculus. He developed metabolic progressive disease after a year of initiation of ADT. He was switched to docetaxel based palliative chemotherapy. Post 6 cycles, in view of rising PSA and based on decision of institutional tumor board, patient was switched to cabazitaxel based chemotherapy.

## 3. Discussion

Disseminated intravascular coagulation is a life-threatening condition characterized by systemic activation of coagulation pathways and microvascular thrombosis. It is most commonly associated with hematological malignancies, sepsis, and obstetric complications. The underlying mechanism involves the release of procoagulant factors and activation of endothelial cells, leading to thrombin generation, platelet activation, and fibrinolysis.[1]

DIC is a syndrome that occurs when coagulation pathways become activated throughout the body, leading to excessive and uncontrolled clot formation as well as a consumptive coagulopathy, which increases the risk of bleeding. The understanding of DIC's pathogenesis has been a subject of extensive research since its initial clinical observation in the 19th century. Some of the key pathological mechanisms involve an excessive generation of fibrin, inadequate regulation of anticoagulation and fibrinolysis, and concurrent activation of inflammatory processes. These processes are triggered by factors such as the overexpression of tissue factor, heightened platelet activation, and impaired natural anticoagulation due to deficiencies in tissue factor pathway inhibitor (TFPI), antithrombin (AT), and protein C (PC).

The clinical presentation of DIC is influenced by the underlying disease, the degree of coagulation activation, and the deficiency of natural anticoagulation mechanisms. When coagulation activation is latent or compensated, there may be subtle abnormalities in hemostatic function and an increased risk of thrombosis, but no obvious clinical symptoms. In overt DIC, patients exhibit both bleeding and thrombotic manifestations. Thrombosis can affect small or large blood vessels, leading to dysfunction in multiple organs. The bleeding observed in DIC is a result of reduced clotting capacity due to the excessive consumption of clotting factors and platelets, known as consumption coagulopathy.

Disseminated intravascular coagulation is considered a rare paraneoplastic syndrome in solid tumors, and its occurrence in metastatic carcinoma of the prostate is even rarer.[3,4] DIC in solid tumors is often associated with advanced disease, extensive tumor burden, and poor prognosis. The exact mechanism of DIC in prostate cancer is not fully understood.[5]

However, several factors may contribute to the development of DIC in this malignancy:

1. Tumor Cell Activation: Prostate cancer cells can release procoagulant factors that activate the coagulation cascade, leading to systemic activation of clotting pathways. These factors may include tissue factor (TF), a protein involved in initiating the coagulation process.
2. Microvascular Tumor Invasion: Prostate cancer cells can invade blood vessels, disrupting the vascular endothelium and exposing tissue factor to circulating blood. This exposure triggers clot formation and consumption of clotting factors, leading to the development of DIC.
3. Angiogenesis: Prostate tumors require the formation of new blood vessels (angiogenesis) to support their growth and metastasis. Abnormal and disorganized blood vessel formation can contribute to endothelial dysfunction, platelet activation, and the release of procoagulant substances, all of which can promote DIC.
4. Inflammatory Response: Prostate cancer is associated with an inflammatory microenvironment. Inflammation can lead to the activation of the coagulation system and endothelial dysfunction, contributing to the development of DIC.
5. Bone Metastases: Prostate cancer frequently metastasizes to the bones, resulting in bone destruction and the release of procoagulant factors from the tumor and the bone microenvironment. These factors can further activate the coagulation system and contribute to DIC development.

The management of prostate cancer with DIC requires a multidisciplinary approach involving oncologists, hematologists, and critical care specialists, among others.[6,7] Here are some general strategies that may be employed:

1. Treating the underlying prostate cancer: The primary goal is to control and treat the prostate cancer itself. The specific treatment approach depends on the stage and characteristics of the cancer. Options may include surgery, radiation therapy, hormone therapy, chemotherapy, immunotherapy, or a combination of these treatments. Consultation with an oncologist or urologist is crucial to determine the best course of action.[8]
2. Addressing the coagulation disorder: DIC is a result of abnormal blood clotting and bleeding. Treatment aims to balance the clotting and bleeding tendencies. This typically involves the following measures:
   (a) Replacement of blood components: Patients with DIC often require transfusion of blood products such as packed red blood cells, platelets, and fresh frozen plasma to replace the depleted clotting factors and correct the coagulation abnormalities.
   (b) Administration of clotting factors: In severe cases of DIC, administration of specific clotting factors, such as recombinant activated factor VII (rFVIIa), may be considered to help control bleeding.
   (c) Anticoagulation therapy: In some cases, heparin or other anticoagulant medications may be used to prevent further blood clot formation. However, the decision to initiate anticoagulation in DIC is complex and depends on the patient's condition and underlying cause of DIC. The potential risks and benefits should be carefully evaluated.
   (d) Treatment of underlying triggers: DIC is often secondary to an underlying condition, such as infection or malignancy. Treating the underlying cause can help resolve the coagulation disorder. In the case of prostate cancer, aggressive management of the cancer itself is essential.
3. Supportive care: DIC can have significant systemic effects, including organ dysfunction. Supportive care measures such as maintaining fluid and electrolyte balance, ensuring adequate oxygenation, and monitoring vital signs are crucial. Close monitoring of laboratory parameters, including platelet count, fibrinogen levels, and coagulation profile, is essential to guide treatment and evaluate response.

However, due to the aggressive nature of metastatic carcinoma of the prostate and the presence of multiorgan failure, the patient's condition deteriorated rapidly, resulting in a fatal outcome. Anticoagulation therapy remains controversial, as it may increase the risk of bleeding in patients with DIC.

In our case, the patient presented with classic features of DIC, including thrombocytopenia, prolonged PT and aPTT, elevated D-dimer levels, and evidence of end-organ damage. The diagnosis of DIC associated with carcinoma was supported by the presence of hepatic involvement, skeletal metastases, and markedly elevated PSA levels, which indicated advanced disease progression.

## 4. Conclusion

This case highlights the rare presentation of disseminated intravascular coagulation in metastatic carcinoma of the prostate. Clinicians should maintain a high index of suspicion for DIC in solid tumors, especially in the setting of advanced disease, even in the absence of typical symptoms. Prompt recognition and management are crucial for improving patient outcomes. Further research is needed to understand the pathophysiological mechanisms underlying DIC in solid tumors and to develop targeted therapeutic approaches for this rare but potentially devastating complication.

## 5. Conflicts of interest

There are no conflicts of interest.

## 6. Source of Funding

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