

A case of Avascular Necrosis in a patient with Adrenocortical Carcinoma and Disseminated Metastasis

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Abstract

28 years old, male patient was diagnosed with Metastatic Adrenocortical Carcinoma after extensive investigation. Patient's primary concern was only his right hip and right shoulder pain. On imaging investigations, the patient was diagnosed with Avascular Necrosis of the right hip joint. Further laboratory work-up for avascular necrosis showed Primary Hypercortisolism and eventually patient was found to have Adrenocortical Carcinoma base on CT and bone scan results,

Avascular Necrosis usually presents with pain in the affected area, mostly involving shoulder, knee or hip joint. Among many of the causes of Avascular necrosis, one rare cause is hormone secreting Adreno cortical Carcinoma, a rare and a highly malignant tumour. Patients can present with Cushing's syndrome or can have atypical presentation like this patient. This patient did not have any symptoms related to malignancy such as loss of appetite and weight loss.

Keywords: Adrenocortical carcinoma, cortisol, metastases, Avascular necrosis.

Introduction

Avascular Necrosis of the bone is a pathological process which results from interruption of blood supply to the bone resulting in ischaemic death of bone cells. The bone might collapse and this can lead to severe disability.¹ In this disease process, pain is the first symptom to arise and if thoroughly investigated with appropriate imaging techniques like MRI, it can be diagnosed at an early stages.²

AVN can affect any bone but most cases affect the joints at the shoulder, knee and hip. There are a number of causes of avascular necrosis, corticosteroid therapy being a major. In a study done in the United States, corticosteroid therapy was of the most frequent risk factors for AVN comprising 35%-40% of the cases.³

However, patients with hormone producing

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adrenocortical carcinoma can also have a similar presentation including avascular necrosis of the bones. This is a very rare malignancy with a very poor prognosis.⁴ Cortisol is the most commonly secreted hormone from hormonally active adrenocortical carcinomas.⁵ It has also been shown that 30%-35% of the patients present with metastases at the time of diagnosis⁶ as this patient who came with bone pain for the past 6 months.

Case Description

A 28 years old male was admitted to the Medicine Department Ward 6 in Jinnah Postgraduate Medical Center on 31st January 2017, with a history of right hip joint and right shoulder joint pain since 7 months. Patient reported having sudden onset of right hip joint pain and right shoulder pain which progressively increased. Patient is now unable to work and has limited physical activity. There was no history of tuberculosis, blood transfusion or trauma. Physical examination of the patient revealed conscious bed ridden male in moderate stress refusing to move right upper and lower limbs because of pain. The physical examination showed pulse 78 beats per minute, blood pressure of 140/90 mm Hg, respiratory rate of 22, random blood sugar of 174 mg/dl and normal body temperature. No tenderness was found on abdominal examination. Neuromuscular examination exhibited a reduced tone and power in right lower limb but normal bulk and reflexes. Laboratory work-up showed Urinary Cortisol of 1165.5 ug/24hr (Figure-1) which is above normal range and plasma ACTH 8.29 pg/ml indicating primary hypercortisolism. Other laboratory work-up showed anaemia (Hb 10.3 g/dl), normal platelet count ($167 \times 10^9/L$), white blood cells ($3.6 \times 10^9/L$) with neutrophilia (82%), random blood glucose 230 mg/dl, hypokalaemia (K 2.2 mEq/L), and albumin slightly below normal (3.4 g/dl). Thyroid and liver function tests were all in the normal range. Urinary VMA was 5.0 mg/24hr (normal <13.6 mg/24hr) performed by column Method (Quantitative). Serum aldosterone was 19.34 ng/dl (normal 1.5-13.3 ng/dl) and plasma renin 4.2 uIU/ml (normal 2.8-39.9 uIU/ml).

CT scan chest and abdomen showed multiple soft tissue nodules scattered in all segments of both lungs,

Specimen ID : 03022017:CU0058R		Age / Gender : 2017 / Male	
Clinical Information / Comments:		Location : ALST	
VOL=2100ML		Requesting Physician : C/O JPMC	
		Account # : C22739895 - OSR	
		Requested on : 03/02/2017 - 10:53	
		Collected on : 03/02/2017 - 10:53	
		Reported on : 04/02/2017 - 15:16	

Test	Current Result	Previous Results & Date	Unit	Ranges
URINE CORTISOL	1165.5		ug/24hr	(55.5-286)

Note : Please note the change in reference range effective from 07/03/2012

Figure-1: Urine Cortisol level.

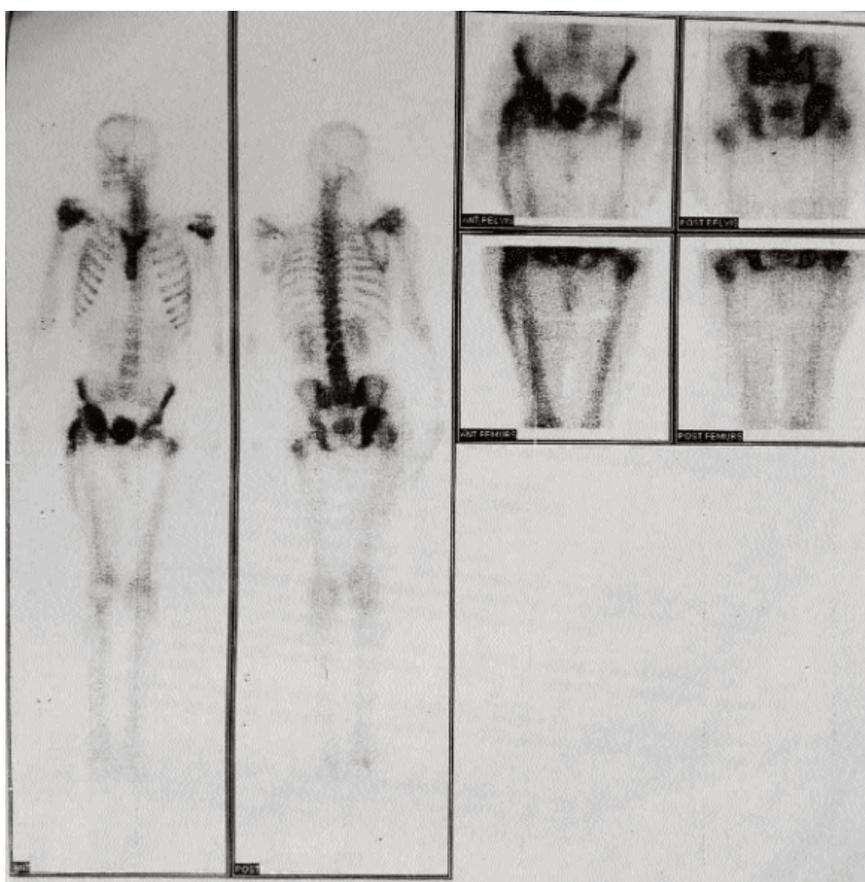


Figure-2: Bone Scan.

consistent with metastatic pulmonary deposits. Heterogeneously enhancing soft tissue density mass lesion measuring approximately 11.1 x 8.0 cm was seen involving lateral limb of left adrenal gland. Erosion of right humeral head was noted likely representing metastatic deposit. Right axillary metastatic lymphadenopathy was

also observed. The scan also showed flattening of right femoral head with reduced joint space. Ultrasound abdomen showed hepatomegaly with fatty changes and splenomegaly.

Bone scan was ordered and was done at Atomic Energy Medical Center in Karachi (Figure-2): Three phase bone scintigraphy was performed by injecting 20 mCi of Tc-99m MDP intravenously and acquiring dynamic images for one minute followed by one minute static blood pool images for 5 minutes. Whole body static images taken at 3-hours showed increased perfusion of radiotracer over right hip joint suggestive of arthritic changes. The scan also showed bilateral symmetrical uptake in both axial and appendicular skeleton suggestive of metastases. Diagnosis of Metastatic Adrenocortical Carcinoma was made. Patient refused surgery.

Discussion

Adrenocortical carcinoma is a very rare malignancy and these tumours maybe functional or non-functional. According to a research published in 2009, it constitutes about 0.05% to 0.2% of all malignancies and accounts for 0.2% of all cancer related deaths.⁷ These tumours have a very poor prognosis, as these cases have metastases present at the time of diagnosis. In our case, the patient had skeletal and pulmonary metastases at the time of diagnosis. As

mentioned in a research paper published in British Journal of Cancer, low survival from cancer can be due to late stage of cancer at the time of presentation. It is imperative to thoroughly understand the risk factors so that diagnosis of these cases is made at an early stage.⁸

Another notable point about this unusual case is the fact that patient presented with pain but no other typical symptom of cancer and metastases. Patient had no history of recent weight loss, appetite changes which could point towards carcinoma. This is an unusual presentation which could have delayed the diagnosis and such cases tell us about how atypically a carcinoma can present. While there are many reasons which could have been responsible for the delayed diagnosis in our patient, one important factor which is often neglected is that our patients come from a low socioeconomic status and it has been shown in numerous research articles that the socio-economic status and education plays a role in delay in diagnosis of patients with carcinoma. This was pointed out in a study published in The British journal of cancer in 2006 on factors resulting in delay in diagnosis of gastrointestinal cancer.⁹ These important points are often neglected but they play an important role.

Patients with Cushing's syndrome due to a tumour usually present with rapidly developing features of hypercortisolism. However, our patient did not present with any typical features of Cushing's syndrome except avascular necrosis of the right hip joint. There were no physical findings which could initially point towards hypercortisolism until after the laboratory work detected a very high 24 hour urine cortisol which helped in making a diagnosis. The avascular necrosis of the hip joint in this patient was the key symptom which led to this diagnosis. High blood cortisol itself is a known risk factor for AVN of bone and the metastases could have speeded up the process.

The treatment for AVN of the bone involves both medical and surgical management depending on the progression of the disease. However, one study suggested that majority of cases of AVN due to hypercortisolaemia ended up requiring surgical intervention.¹⁰ Medical treatment alone of hypercortisolism cannot reverse the process of avascular necrosis of the bone. For this reason, a surgical consult was requested to determine if surgery was indicated for de-bulking of the tumour and AVN of hip joint of our patient.

Conclusion

Adrenocortical carcinoma is a rare malignancy which can have an atypical presentation. These hormone producing tumour can have symptoms and signs of respective hormones that are being produced. Just like our case which presented with avascular necrosis of the hip joint due to Cushing's Syndrome. This is a rare presentation and requires more data on different presentations of these tumours to help in early diagnosis and management of the cases.

Ethical Approval: For the Case Publication, Ethical Approval has been taken from the Head of the Department, Ward 6, JPMC, Karachi.

Disclaimer: The abstract has not been previously presented or published in any conference. The manuscript was not a part of any research, PhD or thesis project.

Conflict of Interest: There were no financial, professional or personal interest that could have influenced the work.

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