Case Report

Endogenous Cushing Syndrome with Impaired Immunity and Multiple Concurrent Opportunistic Infections

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Abstract

Cushing’s syndrome results from chronic exposure to excessive circulating levels of glucocorticoids. Excess production of corticosteroid may lead to immunosuppression. Immunosuppression in Cushing syndrome may favor Opportunistic infections. In the literature, there are reports that have described cases of Cushing Syndrome with opportunistic infections due to immunosuppression. Cushing syndrome can be exogenous or endogenous. Compare to exogenous Cushing syndrome, endogenous Cushing Syndrome causes fewer but highly fatal cases of opportunistic infections. In this case, a 57-year-old female with endogenous Cushing’s syndrome complained of dyspnea, chills, dry cough, along with generalized petechiae, generalized weakness. She was diagnosed with Sepsis secondary to E coli and MRSA bacteremia, Pneumonia with legionella and Pneumocystis jirovecii in the setting of Cushing syndrome due to immunosuppression on admission to medical intensive care Unit.

Keywords: Endogenous Cushing Syndrome, Immunity, Opportunistic infection.

Introduction

Cushing’s syndrome results from chronic exposure to excessive circulating levels of glucocorticoids. Reports have shown that both exogenous and endogenous Cushing Syndrome can impair the immune state of an individual and lead to opportunistic infections. We report a case with 4 concurrent infections in a patient with endogenous Cushing’s syndrome.

Case Report

A 57-year-old female with a known past medical history Diabetes Mellitus(DM) and Hypertension(HTN), was referred to pulmonary care with the complaint of fever, cough, respiratory distress and generalized weakness. Three months prior, the patient was admitted for hyperglycemia, and discharged from the hospital with the diagnosis of Hypercortisolism and new onset DM. He followed up to New York University Hospital for further studies. At the current admission, the patient denied having any chest pain, weight loss, diarrhea, constipation, and abdominal pain. Human Immunodeficiency Virus (HIV) status was negative. Subsequently, the patient was found to have hypoxia, saturation in low 80s, tachypneic. He was placed on BiPAP with the diagnosis of Respiratory Failure and maintained on mechanical ventilation throughout the hospital course. Arterial blood gas done at room air showed Alkalosis: pH:7.50, PCO2: 33 mmHg, PO2: 59 mmHg.

Imaging findings were the following:

Chest x-ray: extensive bilateral lung infiltrates /edema consistent with bilateral pneumonia with nodular component, somewhat worsened when compared to study obtained the previous day.

CT angiogram of Chest with contrast: Bilateral extensive diffuse multifocal sub segmental ground glass infiltrates with concomitant pulmonary nodules predominantly in the right upper lobe measuring up to 9 mm and nonspecific. Bilateral adrenal hyperplasia. Right thyroid lobe heterogeneous 1.7 cm nodule with peripheral calcifications probably benign.

CT scan of the Head without contrast: No abnormal findings.

Ultrasonography of Abdomen: Gallstones and gallbladder wall thickening but negative sonographic Murphy’s sign.

CT Abdomen and Pelvis without contrast: Extensive bilateral lower lobes consolidation and ground glass infiltrates of Lungs, Gallstones versus porcelain gallbladder. No evidence of cholecystitis. Severe
bilateral adrenal glands thickening. Severe bilateral adrenal hyperplasia. Sigmoid colon diverticulosis.

**Relevant laboratory test results were as follow:**

**Complete blood count:** White Blood Cells: 11,000-13,000 10x9/L, Thrombocytopenia, Reticulocyte Count: 29% high, Reticulocyte Count Absolute number: 0.867 normal values (0.22-0.902).

**Comprehensive metabolic panel:** Blood glucose: 190-404 mg/dL. Sodium 150 mEq/L. Serology: ANA Screen Positive, ANA titer 1:40, Legionella Antigen was detected.

**Complement studies:** Complement C3 normal, Complement C4 =12 mg/dL, normal values (15-57 mg/dL).

**Microbiology:** Blood Culture: positive for Escherichia coli and Methicillin-Resistant Staphylococcus aureus (MRSA) Sputum. **Polymerase Chain Reaction:** positive for Pneumocystis jirovecii DNA.

**Discussion**

Endogenous Cushing Syndrome with immunosuppression and Opportunistic Infections is a condition that has been described in the medical literature. In general, the patient presentation has highly variable symptoms and may include obesity or weight gain, rounded face (moon face), supraclavicular/dorsal cervical fat pads (buffalo hump), hirsutism/alopecia, facial plethora, violaceous striae, acne, easy bruising, menstrual irregularity, decreased libido, emotional lability/depression, psychosis, mania, cognitive dysfunction/short term memory loss, muscle weakness/atrophy, osteopenia or fracture, decreased linear growth in children, hypertension, glucose intolerance, hyperlipidemia, hepatic steatosis, and nephrolithiasis. The auscultation of these patients may find crackles and rales in lungs due to infections [1-4]. Laboratory investigations demonstrates hypercortisolism, increased plasma ACTH level, hyperglycemia. Microbiology tests may bring evidences of opportunistic infections. In our case, Cultured specimens showed E coli and MRSA, PCR identified Pneumocystis jirovecii, and serology was positive for Legionella.

Usually, endogenous Cushing Syndrome with Opportunistic Infections due to immunosuppression warrants the introduction of an inhibitor of cortisol synthesis or surgery, and multiple antibiotics for opportunistic infection [5]. The inhibitor of cortisol synthesis will also prevent the continued development of metabolic syndrome and other complications. Although the prevalence and incidence of endogenous Cushing Syndrome with Opportunistic Infections is unknown, it is believed that up to 33 % of patients treated with this medication will have resolved symptoms. Cushing syndrome with multiple opportunistic infection has high mortality rate [6-10].

Although limited information is available regarding direct links of endogenous Cushing Syndrome with Opportunistic Infections, many case series and reports have identified that the prolonged endogenous exposure to pathologic Glucocorticoid levels induces a alterations of the white blood cell count and function with granulocytosis, increased monocytes, and a reduced number of lymphocytes with a decreased CD4/CD8 T ratio and Natural killer (NK) cell activity [11-14]. Immune dysregulation in Cushing Syndrome patients can be explained in part by an increase in HPA-axis hormones. Cushing's syndrome with a very high plasma cortisol concentration causes a severe immunocompromised state. Sometimes Cushing's syndrome might be considered as a transitory immune deficiency state. In Cushing Syndrome with immunosuppression leads to multiple opportunistic infection that can cause Skin abscess, Pneumonia and other infections in most of the body system. Primary prophylaxis for Pneumocystis carinii infection when plasma cortisol exceeds 2500 nmol and a search for concomitant infectious disease is recommended [15-17].

Endogenous Cushing syndrome is associated with a lower incidence of opportunistic infection than exogenous Cushing syndrome. However, the prognostic of opportunistic infections in the setting of Endogenous Cushing syndrome is more severe. Early diagnose, and Treatment of Endogenous Cushing Syndrome have contributed to decreasing the occurrence of opportunistic infections. Still, Endogenous Cushing syndrome causes a more significant increase in serum cortisol level than exogenous Cushing syndrome, thus more important immunosuppression [18,19].

**Conclusion**

In the setting of endogenous Cushing Syndrome and opportunistic infections, lungs involvement may include Pneumocystis jirovecii Pneumonia which can progress to sepsis. Without treatment, opportunistic infections are life-threatening. Both clinical and diagnostic workups should exclude aggressively pathologies that are consistent with Opportunistic Infections. Different case reports and the current medical literature have provided insight for other site and types of opportunistic infections in endogenous Cushing Syndrome that should be also looked for and treated. To our knowledge, we report the first case of endogenous Cushing syndrome with four concomitant opportunistic infections.
Footnotes

- **Peer Review:** peer reviewers contributed to the peer review report. Reviewers’ reports totaled 946 words, excluding any confidential comments to the academic editor.
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References


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