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Case Report

A Case Report on Multiple Adverse Events Associated with Systemic Usage of Dexamethasone

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Abstract

Dexamethasone is a corticosteroid used in the management of various allergic conditions, inflammatory and autoimmune disorders such as rheumatoid arthritis, nausea and vomiting associated with cancer chemotherapy, multiple sclerosis and cerebral edema. Adverse Drug Reactions (ADRs) associated usage of corticosteroids include steroid-induced hyperglycemia, osteoporosis, dyslipidemia, steroid-induced Cushing syndrome, cataracts, increased risk of infections, and thinning of the skin. Cushing's syndrome is a hormonal disorder triggered due to chronic exposure of body tissues to high levels of cortisol. As corticosteroids are widely used by physicians for the management of various inflammatory disorders, patients must be warned about the possible ADRs associated with chronic use. In summary, this is a case of a patient who developed multiple adverse events after usage of dexamethasone that is evident by clinical features and laboratory investigations for which the patient was successfully provided with symptomatic and supportive care.

Keywords: Adverse Drug Reaction, Buffalo hump, Hyperglycemia, Osteoporosis.

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INTRODUCTION:

Dexamethasone is a corticosteroid used in the management of allergic conditions, inflammatory and autoimmune disorders such as rheumatoid arthritis, nausea, and vomiting associated with cancer chemotherapy, multiple sclerosis and cerebral edema. Dexamethasone got approval in 1958 for medical use by FDA (Food and Drug Administration). Based on the condition being treated, The initial dose ranges between 0.75-9 mg per day. ADRs (Adverse Drug Reactions) associated with long-term usage of corticosteroids include steroid-induced hyperglycemia, osteoporosis, steroid-induced Cushing syndrome, dyslipidemia, increased risk of infections, and thinning of skin¹. Most of the reported cases in the literature emphasize only on single ADR whereas this case report emphasizes multiple ADRs associated with corticosteroid usage.

Cushing syndrome is a hormonal disorder triggered due to chronic exposure of body tissues to elevated levels of cortisol. This is also called hypercortisolism. Cortisol is also known as the stress hormone and is secreted by adrenal glands and is majorly involved in glucose metabolism, release of insulin, immune function, and response to inflammation. Cushing syndrome was first discussed by neurosurgeon Harvey Cushing in 1912. The incidence of Cushing syndrome is 0.7-2.4 per million population per year. Signs and symptoms of Cushing syndrome include the rounded face, increased neck fat (buffalo hump), fatigue, thinning of the skin, osteoporosis,

increased risk of infections, hyperglycemia, increased blood pressure, and sleep disorders. Women affected with Cushing syndrome may have different clinical manifestations such as hirsutism and menstrual abnormalities whereas men generally suffer from decreased libido, decreased fertility, and erectile dysfunction. Exogenous causes of Cushing syndrome include pituitary tumors such as pituitary adenoma, adrenal tumors, and ACTH (Adrenocorticotropic hormone) secreting tumor whereas the endogenous cause of Cushing syndrome is taking a high dose of corticosteroid medications for a chronic period. Some studies revealed that exogenous Cushing syndrome is more prevalent in women than in men and is highly seen in the age group 30-40 years.

CASE REPORT:

A 55-year-old female patient was admitted to the general medicine department with complaints of facial puffiness for one year, neck pain for three days, giddiness, headache, eye pain, exertional dyspnoea, generalized weakness, decreased sleep, and constipation. The patient was asymptomatic one year back then she developed facial puffiness which is insidious in onset, gradually progressive, and also complaints shortness of breath during exertion. The patient had a past medical history of hypothyroidism and hypertension for which she was advised to take Tab Thyronorm (25mcg) and Tab Telma H (1 tab) respectively. The patient also had past medication history of taking Tab Dexamethasone (0.5 mg) for right knee pain advised by a local physician. No known drug

allergies or food allergies. On local examination facial puffiness +ve, buffalo hump present, B/L pitting type of edema. All the vitals were found normal. Complete blood picture and complete urine examination were also found to be normal. All other laboratory investigations were shown in the table-1. Random blood sugar, fasting blood sugar, and HbA1c (glycated haemoglobin) were increased which indicates that the patient is suffering from steroid-induced hyperglycemia. Abnormalities in the lipid profile test indicate that patient is suffering from dyslipidemia. 25-OH (25-hydroxy) vitamin D levels are also decreased which shows that patient is suffering from vitamin D deficiency. Ultrasound abdomen reveals fatty changes in liver and hepatomegaly. Based on the above laboratory investigations the patient was finally diagnosed with multiple adverse events associated with usage of dexamethasone along with hypothyroidism and hypertension.

Table 1 Laboratory Investigations

Parameter	Observed value	Reference value
Random blood glucose	270 mg/dl	< 200 mg/dl
Fasting blood glucose	166 mg/dl	70-110 mg/dl
HbA1c	7.4 %	Less than 5.4%
Total cholesterol	305 mg/dl	< 200 mg/dl
High-Density Lipoprotein (HDL)	59 mg/dl	> 60 mg/dl
Low-Density Lipoprotein (LDL)	179 mg/dl	< 130 mg/dl
Very Low-Density Lipoprotein (VLDL)	6.6 mg/dl	< 30 mg/dl
Triglycerides	277 mg/dl	< 150 mg/dl
25- Hydroxy Vit D test	13.69 ng/ml	20-50 ng/ml

The following treatment was initiated: tablet prednisolone (used as an alternative to dexamethasone) 10 mg once daily, tablet thyroxine sodium (used as thyroid hormone analog) 25 mcg once daily, tablet telmisartan+hydrochlorothiazide (used as anti-hypertensive agent) once daily, syrup cremaffin (used as a laxative) 15 ml once daily in the night, tablet atorvastatin (used as lipid-lowering agent) 20 mg, capsule shelcal (used as calcium supplement) and insulin injection which is administered according to the sliding scale and patient condition was ameliorating progressively and the patient got discharged after 6 days. At the time of patient counseling, she was advised to limit the intake of salt and sugars and recommended to increase the intake of foods rich in calcium and vitamin D.

DISCUSSION:

Corticosteroids majorly act as an anti-inflammatory in low doses whereas in higher doses they act as an immunosuppressant. Hydrocortisone is the least potent short-acting corticosteroid whereas prednisone is five times more potent than hydrocortisone and dexamethasone is long-acting and is twenty-five times more potent than short-acting corticosteroids. Steroids mainly act by decreasing the synthesis of proinflammatory cytokines, T- lymphocyte activity, and antibody receptor function that leads to activation of anti-inflammatory and immunosuppression pathways.

ADRs associated with the use of corticosteroids can be classified into three groups namely immediate, gradual and

idiosyncratic. Weight gain, fluid retention, blurred vision, and insomnia are the ADRs which are categorized under immediate ADRs whereas hyperglycemia, osteoporosis, dyslipidemia, and Cushing syndrome are classified under gradual ADRs. Idiosyncratic ADRs associated with the use of corticosteroids include cataracts and open-angle glaucoma ^{2,3}.

Cushing syndrome is characterized by the laboratory findings such as increased blood cholesterol levels, elevated blood glucose levels, lower bone density, lack of response to ACTH stimulation test, and buffalo hump. Management of Cushing syndrome is generally done by gradually decreasing the dose of corticosteroid medication as sudden stoppage after long-term usage may lead to adrenal crisis. A gradual decrease of dose aids in reversing the effects of adrenal atrophy ⁴.

Hyperglycemia associated with the usage of corticosteroids can be explained by various mechanisms. Some of them include inhibition of glyceroneogenesis, Decreased insulin sensitivity, Pancreatic cell damage, and Increased glucose production ⁵.

Hyperglycemia for a longer duration leads to excessive VLDL production, increased lipogenesis, and inhibition of fatty acid oxidation which all precipitates dyslipidemia. Few studies also concluded that steroid medications can inhibit the absorption of calcium and enhances the excretion of calcium through urine ⁶. Results of various investigations also revealed that there is a reduction in 25-(OH) D levels due to an increase in the 24-hydroxylase activity in patients treated with corticosteroids^{7,8}. This increases the possibility of developing osteoporosis which further potentiates the risk of fractures. As the patient is also a post-menopausal woman, there is a higher risk for the occurrence of osteoporosis.

CONCLUSION:

- As corticosteroids are widely used for the management of various inflammatory disorders, Physicians should alert the patients about the possible ADRs associated with the usage of corticosteroids.
- Health care professionals (HCP) must counsel the patients and advise them to report as soon as possible if they experience any unwanted side effects after the usage of corticosteroids and other medications especially when prescribed with high-risk medications.
- If treatment is not initiated at an appropriate time, adverse events may lead to life-threatening conditions.

Conflict of interest:

None

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