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Review Article

REVIEW ARTICLE ON EFFECT OF STEROID MEDICATION AND RELATED ADVERSE DRUG REACTION IN ELDERLY PEOPLE

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ABSTRACT

Drug-related problems are a very common issue in the elderly patient and include drug ineffectiveness, adverse drug effects, overdosage, under dosage and drug interactions. Adverse drug effects are effects that are unwanted, uncomfortable or dangerous. Common examples are oversedation, confusion, hallucinations, falls and bleeding. Among ambulatory people ≥ 65, adverse drug effects occur at a rate of about 50 events per 1000 person-years. Hospitalization rates due to adverse drug effects are 4 times higher in the aged patients (about 17%) than in younger patients (4%). Glucocorticoids (GCs) often referred to as corticosteroids are synthetic steroids but naturally and biologically, they are active derivatives, secreted from cortisol by the adrenal cortex. Corticosteroids are used as powerful medications but they can have very wide range of side effects. So we can use them only if the potential benefits are outweighing this risk. The risk of experiencing side effects largely depends on: a) the dose (higher dose shows a greater risk of developing of side effects). b) The type of steroid (steroid tablets are more likely to cause side effects than inhalers or injections). c) The length of treatment (if the patient takes steroid tablets for more than three weeks). d) Age, (young children and the elderly are more likely to experience side effects).

Keywords: corticosteroids, adverse drug reactions, ageing

Introduction

Oral corticosteroids have been widely used in medical practice for over 50 years and play a major role in the treatment of asthma, inflammatory joint disorders, and other diseases affecting the gastrointestinal tract and central nervous system. Although they are often effective in these conditions, osteoporosis is one of the most serious complications of oral corticosteroid treatment.[1]

The beneficial effects of GCs, as well as their potential for side effects, are proportional to the amount of dose administered. generally, steroids doses are classified as being low dose (7.5 mg/day or less), medium dose (between 7.5 and 30 mg/day), or high dose (greater than 30 mg/day).doses of steroids mostly are considered as equivalent dose, such as equivalent doses of prednisone, for example, 5 mg of prednisone is equivalent to 4 mg of methylprednisolone, and also as their duration of action, such as short, intermediate, or long acting.[1]

Short-term glucocorticoids treatment lasts less than one to three months. If Treatment extends more than three months it is considered as a long term and may result in the majority of severe side effects. When steroids are used for short durations for few days or weeks, they are relatively safe. It should be noticed that patients under steroids treatment, must be informed and educated about risks associated with steroid therapy to assess expected benefits vs. the associated risks.[1]

MECHANISM OF ACTION IN CORTICOSTEROIDS:

Glucocorticoids (GCs) are considered as the most important and frequently class of anti-inflammatory drugs. Studies on discovering the mechanism of action in GCs has been made in the last 10–15 years only. There is an assumption that the desired anti-inflammatory effects of GCs are mainly mediated by repression of gene transcription. In contrast, the underlying molecular mechanisms for GC-mediated side effects are complicated and just partly understood. Recent

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facts imply that certain side effects are mostly mediated by transactivation (e.g., diabetes, glaucoma), while others are mediated by transrepression (e.g., inhibition of the hypothalamic-pituitary-adrenal axis).also For a broad number of side effects, the accurate molecular mode can be done either as an unknown method or both (transactivation and transrepression,e.g., osteoporosis). [2]

STEROID-ASSOCIATED RISKS:

Adrenal suppression:

Adrenal suppression is considered as the inability of the body to provide sufficient cortisol following exposure to high-dose or long-term GC use. Longer-acting GC formulations can be associated with a higher risk of adrenal suppression. In Adrenal suppression, the body adrenal glands normally produce small amounts of cortisol which is a hormone and is similar to oral steroids and important for many body`s functions such as regulation of blood sugar and the immune system of the body. However, when the body takes a steroid, the brain can't distinguish between the natural products of steroid and the medication. When an oral steroid is used at moderate to high doses for a month or longer, the brain thinks that body doesn't need very much cortisol, so the adrenal glands will produce fewer amounts than before. Usually, the adrenal glands can be recovered and produce normal amounts if the dose of steroid medication slowly decreased. It should be taken into account that, If the patient suddenly stops taking the steroid medication, it can cause a life-threatening condition known as an acute adrenal insufficiency.[2] Signs of adrenal syndrome include weakness/fatigue, malaise, diarrhea, abdominal pain, nausea, vomiting, headache, fever, anorexia (fallowing by weight loss), myalgia, arthralgia, and psychiatric symptoms. Signs of adrenal crisis include hypotension, decreased consciousness, lethargy, unexplained hypoglycemia, hyponatremia, seizure, and coma.[3]

Weight gain and fat redistribution:

Almost all patients taking Glucocorticoids for a long time will experience weight gain that may be caused by fluid retention and the redistribution of fat from the arms and legs to the face (moon face), back of the neck (buffalo hump), and stomach (truncal obesity).[3]

Wound healing:

Long-term use of steroids may impair wound healing which has been reported in some individuals. Patients taking steroids who are at risk of impaired wound healing can use supplementation with vitamin A to improve wound healing and decrease some of the side effects of corticosteroids on skin integrity.[3]

Increased blood glucose and diabetes:

Diabetic patients who are receiving steroids may experience high blood glucose levels so they may need to diabetes medications dose adjustment. For example Prednisone which is a commonly prescribed corticosteroid, will Increase glucose level of blood and is a common incidence among people taking prednisone and other steroids.[3,4]

Cataracts and glaucoma:

The risk of both cataracts and glaucoma has been increased in patients taking GCs, this risk is dose dependent and routine eye examinations are recommended. [3,4-7]

Atherosclerosis and cardiovascular risk:

Patients using chronic steroids are considered with the high risk of mortality due to atherosclerosis because of increased cholesterol, very low and low-density lipoproteins, and the decrease of cardioprotective high-density lipoproteins. long-term steroid use will cause to fluid retention which is following by edema and weight gain. Elderly patients and other patients at risk of heart or kidney disease are susceptible to sodium and fluid retention, which may cause to hypertension and congestive heart failure. [8]

Gastrointestinal ulcers and bleeding:

Steroid use will also increase the risk of gastritis and peptic ulcers. H. pylori bacteria will attach to the lining of the stomach or small intestine, multiply, and cause to release toxins and that cause mucosal inflammation, peptic ulcer disease, gastritis, and other complications such as gastric cancer. Also, combination use of NSAIDs such as aspirin, ibuprofen, and naproxen along with long term use corticosteroids will increase the risk of peptic ulcer.[8]

Mental status changes:

Administration of corticosteroids may cause to delirium by increasing the CNS cortisol levels. Use of high-dose steroids more than 80 mg/day (for example prednisone) along with the long duration of use or the abrupt discontinuation can induce mental status changes such as delirium, chronic cognitive impairment as well as psychosis. Even brief exposure to high doses of steroids can reversibly affect neuronal activity in the hippocampus which is the area of the brain associated with memory; continually use may cause permanent injury.[9,10-26]

Decreased immune response:

Steroids work will be done by decreasing inflammation and reducing the activity of the immune system. Typically Inflammation is a process of protection of the body against infections. In some diseases, however, the immune system of the body doesn't work properly. This may cause inflammation to work against the body's tissues and cause damage. Signs of inflammation include reddishness, warmness, swelling, and pain. Steroids will decrease the production of chemicals that cause inflammation. Steroids also decrease the activity of the immune system by distressing the way that white blood cells work.[27]

Osteoporosis, fractures, and osteonecrosis:

All people (men and women) have some risk of developing 'thinning' of the bones (osteoporosis) by aging, particularly over the age of 60. Women are more at risk than men because they lose bone material more rapidly, especially after the menopause as their estrogen levels fall down. (Estrogen is a female hormone and helps to protect against bone loss.) One of the side-effects of long-term use steroids is an increase of risk of 'thinning' of the bones (osteoporosis). The steroid lowers the bone density and increases the risk of developing a fragility fracture.[27,28]

Recommended monitoring:

Monitoring recommendations for steroids therapy and it depends on the duration of treatment and dose intensity. Monitoring of the baseline consist of serum glucose, lipid profile, and bone mineral density is recommended. When treatment begins, blood pressure should be measured closely also, weight gain monitoring, visual changes, breath problems (shortness of breath), edema, and polydipsia (excessive thirst) also should be checked and monitored during each physician visit. Furthermore, if chronic long-term treatment with steroids is used, bone mineral density should be monitored at least yearly.[29,30]

CONCLUSION:

The effects of aging on adrenal function should be considered when steroids are prescribing for the elderly. Monitoring of steroids treatment is varied and depends upon the duration of treatment and dose intensity. The baseline monitoring such as serum glucose, lipid profile, and bone mineral density are recommended. After treatment begins all the suspicious condition like high blood pressure, weight gain, visual changes, shortness of breath, edema, and polydipsia should be checked continuously and without interruption by the physician. Also, in the case of chronic long-term treatment with steroids, bone mineral density should be monitored every year. In addition, the risk/benefit factors in steroid use should be under strict consideration. The physician may consider lowering the steroid dose in elderly patients of aesthetic build due to the decrease in muscle mass and plasma volume that happens by aging. Totally it should be considered that despite the physiologic changes that accompany aging, the steroid used carefully and appropriately can be both safe and effective in the elderly.

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