Topical corticosteroid-induced adrenal insufficiency
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Background

- Topical corticosteroids are often used for the treatment of dermatological diseases
- Systemic adrenal insufficiency may result from their overuse
- Young children and patients with damaged skin barriers are especially at risk for development of adrenal insufficiency

Case presentation

Case History

- 11 year-old boy, referred because of suspicion of Cushing syndrome
  - He was addressed by a dermatologist who treated his dishyrdotic eczema of the hands with 0.05% betametason cream during three years
  - He used the cream only during exacerbations (twice a day on the hands during one week)
  - He has no medical history or allergy

Physical Examination

- Obesity, a weight of 79 kg, height of 157 cm, (body mass index [BMI] 32.3 kg/m²)
- His sitting blood pressure was 121/60 mm Hg

Initial investigations, Diagnosis and Treatment

- Fasting blood glucose 98 mg/dL
- Plasma sodium 140 mEq/L, plasma potassium 4.3 mEq/L, hemoglobin 14.4 g/dL
- Free T4 1.11 ng/dL [0.8–1.7], TSH 1.2 mU/L [0.7–4.65]
- Basal serum cortisol levels (at 8:00 AM) were <1 µg/dL [3.7–19.4] and basal ACTH was 1.3 ng/L [7.2–63.3]
- Twenty four hours urinary cortisol was <16 µg in 24 hours [16–176]
- Secondary adrenal insufficiency was diagnosed and topical corticosteroid was stopped
- Hydrocortisone at physiological doses (10 mg/m²/day) was started as well as recommendations in case of fever or disease

Further investigations and Follow-up

- Four months later, a 250 µg cosyntropin stimulation test (Synacthen®) was performed
- Cortisol levels were 241 ng/mL [35-430], 17 OH-progesterone 4.5 nmol/L [35–430], DHEAS 139 µg/dL [35-430], Plasma sodium 140 mEq/L, plasma potassium 4.3 mEq/L, hemoglobin 14.4 g/dL
- Four months later, a 250 µg cosyntropin stimulation test (Synacthen®) was performed
- Hydrocortisone was stopped
- Plasma sodium 140 mEq/L, plasma potassium 4.3 mEq/L, hemoglobin 14.4 g/dL
- Fasting blood glucose 98 mg/dL
- Twenty four hours urinary cortisol was <16 µg in 24 hours [16–176]
- Physical examination showed a weight of 86 kg, a height of 160 cm, (body mass index [BMI] 33.7 kg/m²). His sitting blood pressure was 119/63 mm Hg
- The obesity was probably not due to a topical corticosteroid

Discussion

- Percutaneous absorption of topical steroids depends on various factors: age of the patient, body site and area treated, amount of topical steroid used, structure and potency of the drug, vehicle of the drug (solvent used), frequency of application, duration of the therapy, use of occlusion, nature of the skin, coexistent hepatic or renal disease, hydration of stratum corneum, local hyperemia, vigorous rubbing into the skin, use of keratolytic agents or dimethyl sulfoxide,...
- The stratum corneum acts as a barrier for percutaneous absorption of drug into systemic circulation
- Damaged skin has impaired barrier function ➔ enhanced percutaneous absorption
- The horny layer also acts as a reservoir ➔ drug penetration into the body continues even after a single application
- Therefore, even small doses of topical steroids can produce systemic side effects like suppression of HPA axis, iatrogenic Cushing’s syndrome and growth retardation in children

Conclusions

- Among the adverse effects associated with topical corticosteroid use, the most dangerous is HPA axis suppression, which in some cases, can be life threatening
- Therefore, it should be used with an increased awareness of the potential risk of adrenal axis suppressive effects

References


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