

Topical corticosteroid use in children: Adverse effects and how to minimize them

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Topical corticosteroids (TC) are some of the most commonly used drugs by dermatologists. Their effects in suppressing many inflammatory dermatoses make them invaluable in our therapeutic armamentarium. However, they are also the proverbial 'double-edged-sword' drugs, i.e., are indispensable but need careful handling by provider and recipient for safe and effective use.

In children, the rapid symptomatic relief provided by TC is especially valuable since the effect of a pediatric dermatosis is felt by the whole family.^[1] Inappropriate use of corticosteroid preparations in terms of any one of the following variables can cause both local and systemic adverse effects: quantity per application, frequency of application, duration of treatment, potency, vehicle used and site of application. Children are especially more prone to the systemic adverse effects of these drugs because their skin has poorly developed barrier function and a large surface area: weight ratio compared to adults.^[2] Thus, there is higher potential for clinically significant absorption of the drug into the systemic circulation, which defeats the very purpose of topical therapy.

ADVERSE EFFECTS OF TOPICAL CORTICOSTEROIDS IN CHILDREN

Table 1 summarizes the adverse effects of TC use with special reference to children and the possible mechanisms involved. Both local and distant adverse effects can be produced by these agents upon seemingly localized topical use in children. Iatrogenic Cushing's

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Table 1: Adverse effects of topical corticosteroids and their broad mechanisms

| Mechanism | | Adverse effects |
|------------------------------------|--------------------------|--|
| Systemic absorption | Local | Glaucoma due to periocular application |
| | Distant | Cushing's syndrome Symptomatic adrenal suppression Slowing of linear growth *Diabetes mellitus *Hypertension |
| Local effects | Dermis | Atrophy, striae, telangiectasia |
| | Epidermis | Atrophy, hypopigmentation |
| | Adnexa | Hypertrichosis |
| | | Acne Rosacea Perioral /periocular dermatitis |
| Prolonged use on sensitive sites | | Corticosteroid dependence |
| | Contact hypersensitivity | Corticosteroid contact dermatitis |
| Aggravation/ masking of infections | Fungal | Tinea incognito, Majocchi's granuloma, infantile gluteal granuloma, pityrosporal folliculitis |
| | Viral | Eczema herpeticum, molluscum contagiosum, plane warts, disseminated cytomegalovirus infection ³ |
| | Bacterial | Exacerbation of impetigo, folliculitis |
| | Others | Demodicidosis |

*Not reported in children so far

syndrome^[3] and slowing of linear growth^[4] due to systemic absorption has been reported in infants and children with TC use, mainly on the diaper region. However, non-reversible adrenal insufficiency has not been reported. Older children and teenagers using TC on the face are more prone to develop steroid acne, rosacea or perioral dermatitis.

Dependence can be produced when TC are used continuously for longer than recommended periods over sites like face or flexures. This manifests as itching, burning, redness and other unpleasant sensations on attempting to stop their use and often leads to higher

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and higher potencies being used to control these symptoms. Allergic contact dermatitis to TC is an adverse effect frequently undiagnosed in children and requires a high index of suspicion from the treating physician. It usually manifests as a lack of expected response to TC and sometimes as aggravation of an inflammatory dermatosis after treatment with TC. It is usually seen in children with chronic relapsing dermatoses e.g., atopic dermatitis and chronic hand eczema.^[5] Since atopic dermatitis is a very common indication of TC use in children, it is very important to be aware of this possibility. Also, some of the less potent and 'safe' corticosteroids used commonly in children like hydrocortisone base, desonide and hydrocortisone butyrate have high allergenic potential due to their structural instability. Some commonly used potent corticosteroids are rare allergens, e.g., fluorinated corticosteroids, clobetasol propionate, betamethasone dipropionate, mometasone, etc. TC allergy has been reviewed recently.^[6]

Aggravation of infectious dermatoses occurs when TC are used inappropriately for symptomatic relief of undiagnosed or misdiagnosed 'rashes.' Some dermatoses like tinea may get suppressed and lose their clinical characteristics, making diagnosis difficult.

FACTORS AFFECTING THE ADVERSE EFFECTS OF TOPICAL CORTICOSTEROIDS

Three broad categories of factors impinge upon the adverse effect potential of any topical corticosteroid:

(i) **Drug-related factors:** These include the chemical structure of the corticosteroid and the vehicle of the formulation. For instance, halogenation and side chain substitutions can increase the potency of the product as can formulation in occlusive ointment bases, increasing the potential to cause adverse effects. If a corticosteroid has active metabolites *in vivo*, the duration of action as well as the possibility of unintended effects increases. For example, mometasone has pharmacologically active breakdown products, whereas fluticasone does not, which makes the former theoretically less safe on prolonged use.^[7]

The vehicle in which the TC is formulated is a major determinant of its potency, and therefore, of its adverse effect potential. Occlusive ointments and formulations with keratolytics or penetration enhancers can dramatically increase drug penetration and skin

maceration. The latter produces ideal conditions for microbial overgrowth. Formulations like creams and lotions that have a high water content need more biocides and preservatives to maintain the shelf life, increasing the chances of a hypersensitivity reaction.^[8]

(ii) **Site-related factors:** Local factors that increase the chances of adverse effects of TC are thin stratum corneum, high pilosebaceous follicle density, high ambient humidity and friction. All these factors enhance the penetration of topical applications, leading to both local and systemic adverse effects. Sites that require caution are: head and neck, major flexures and scrotum in all ages and the entire diaper region in infants. The face is especially prone to develop certain side effects like hypertrichosis, acne, rosacea and demodicidosis upon inappropriate use of TC.

(iii) **Human factors:** How a topical agent is used by the patient is a very important factor in its safety. For example, the quantity, frequency and duration of application of the same agent can vary widely between patients and so can their safety. Steroid phobic patients may apply very small amounts only once a day, whereas patients distressed by an itchy rash may apply large amounts repeatedly, altering the adverse effect profile of the same product. Wet wraps or cellophane occlusion is therapeutically useful in children with severe dermatoses but needs to be done very carefully for limited periods since it dramatically increases the absorption of the product being used and can also cause folliculitis.^[9]

Inappropriate use of TC is a big problem in our country. Easy availability of very potent products without a prescription makes misuse very common. Some examples of misuse of TC are: prescription sharing with family and friends, use of TC as a skin lightening agent, use as a general moisturizing or anti-acne cream, etc.

Certain cultural factors such as increasing childhood obesity and the use of occlusive diapers have important ramifications on safety of TC use in children. Both of the above increase skin maceration increasing the possibility of significant systemic absorption of locally applied corticosteroids, as well as promoting microbial overgrowth.

STRATEGIES FOR ENSURING SAFE USE OF TOPICAL CORTICOSTEROIDS

In order to minimize adverse effects, every attempt

should be made to avoid the use of topical corticosteroids wherever possible. Some substitutes, depending on the condition being treated could be: topical calcineurin inhibitors, topical antipruritic agents (viz. phenol or menthol containing lotions), emollients or topical antimicrobials with anti-inflammatory activity (viz. metronidazole,azole antifungals).

An undiagnosed rash should not be treated with topical corticosteroids, because it makes the possibility of a diagnosis even bleaker. Alternatives (vide supra) should be used while diagnostic tests are done. Otherwise, another visit should be scheduled after a few days while the patient is given bland applications or the alternative agents discussed above to buy time so that the dermatosis reveals itself clearly. It is axiomatic that the lowest potency TC that is effective in controlling the signs and symptoms of any disease should be used, especially in children. However, physicians should also be wary of letting a steroid phobic parent affect the choice of corticosteroid being prescribed.^[10] For example, concern about side effects should not result in a low potency TC being prescribed for discoid lupus erythematosus.^[11]

Antifungal or antibacterial combinations with corticosteroids should be used with caution in the treatment of primary infectious dermatoses. Often, these combinations lead to very rapid subsidence of all signs and symptoms and patients stop the application prematurely, leading to recurrences.

All patients and caregivers should be taught about the correct amount of TC to be applied in a particular case. In this regard, the use of fingertip units (FTU) should be taught to the patients and the expected number of FTUs required to adequately treat the target area should be conveyed to them.^[12] For smaller areas, common objects like a pea, or a grain of dal should be used to explain the amount to be used. Most of the modern TC like mometasone, fluticasone and methylprednisolone are recommended for once a day application. It has recently been recommended that even older established TC should be used once a day in atopic dermatitis.^[13] The physician should explain that more frequent application will not lead to additional or faster response, but increase the chances of adverse effects. The duration of application should also be clearly mentioned in the prescription and conveyed orally to patients or caregivers.

A TC should never be the sole active agent in a prescription. All modifiable factors that improve the

dermatosis should be addressed by either medication or preventive advice. Xerosis in atopic dermatitis, weight/sweating/friction in intertriginous dermatoses, scratching/picking in psoriasis, hygiene in recurrent infectious eczematoid dermatosis (IED), mosquito protection measures in papular urticaria are some examples of modifiable factors.

Strategies for withdrawal of topical corticosteroids should be in place for all children who require prolonged treatment. These can be: gradual substitution by emollients; weekends-only use or sequential therapy with nonsteroidal agents. There are several studies in both psoriasis and atopic dermatitis of regimens that minimize TC use by applying them intermittently or alternating them with non-steroidal therapies like calcipotriol or tacrolimus.^[14-16]

Prescription sharing and using old prescriptions to treat new problems are two major causes of topical corticosteroid related side effects. The physician should explain that these topical agents are as powerful and dangerous as pills and capsules and should be treated as such. A certain amount of information and control should be given to the patients/caregivers by explaining which products they can use safely in the long term without consulting a doctor, e.g., emollients. They should also be told what initial treatment (e.g., emollient/calamine lotion/over the counter antihistamine syrup) they can take safely in case of a relapse, on the failure of which they need to re-visit. These tips are highly appreciated by patients and lessen the chances of misuse of topical corticosteroids.

Being on the lookout for early signs of TC side effects can prevent the appearance of irreversible adverse effects. Skin surface microscopy should be utilized to look for horizontally oriented dilated subpapillary capillary plexus vessels, which is an early sign of dermal atrophy.^[17]

The art of medicine lies in realizing that each patient is unique and treatment needs to be tailored to suit his or her peculiar circumstances. Topical corticosteroid use in children is similar, in that general guidelines of use as outlined above should be adhered to, while finding creative solutions to patients' problems so that they can safely use these formulations.

REFERENCES

1. Beattie PE, Lewis-Jones MS. An audit of the impact of a consultation with a paediatric dermatology team on quality of

- life in infants with atopic eczema and their families: Further validation of the Infants' Dermatitis Quality of Life Index and Dermatitis Family Impact score. *Br J Dermatol* 2006;155:1249-55.
2. West DP, Worobec S, Solomon LM. Pharmacology and toxicology of infant skin. *J Invest Dermatol* 1981;76:147-50.
 3. Semiz S, Balci YI, Ergin S, Candemir M, Polat A. Two cases of Cushing's syndrome due to overuse of topical steroid in the diaper area. *Pediatr Dermatol* 2008;25:544-7.
 4. Wolthers OD, Heuck C, Ternowitz T, Heickendorff L, Nielsen HK, Frystyk J. Insulin-like growth factor axis, bone and collagen turnover in children with atopic dermatitis treated with topical glucocorticosteroids. *Dermatology* 1996;192:337-42.
 5. de Waard-van der Spek FB, Oranje AP. Patch tests in children with suspected allergic contact dermatitis: A prospective study and review of the literature. *Dermatology* 2009;218:119-25.
 6. Baeck M, Chemelle JA, Terreux R, Drieghe J, Goossens A. Delayed hypersensitivity to corticosteroids in a series of 315 patients: Clinical data and patch test results. *Contact Dermatitis* 2009;61:163-75.
 7. Seyfarth F, Elsner P, Tittelbach J, Schliemann S. Contact allergy to mometasone furoate with cross-reactivity to group B corticosteroids. *Contact Dermatitis* 2008;58:180-1.
 8. Coloe J, Zirwas MJ. Allergens in corticosteroid vehicles. *Dermatitis* 2008;19:38-42.
 9. Hon KL, Wong KY, Cheung LK, Ha G, Lam MC, Leung TF, *et al.* Efficacy and problems associated with using a wet-wrap garment for children with severe atopic dermatitis. *J Dermatolog Treat* 2007;18:301-5.
 10. Charman C, Williams H. The use of corticosteroids and corticosteroid phobia in atopic dermatitis. *Clin Dermatol* 2003;21:193-200.
 11. Bewley A; Dermatology Working Group. Expert consensus: Time for a change in the way we advise our patients to use topical corticosteroids. *Br J Dermatol* 2008;158:917-20.
 12. Long CC, Mills CM, Finlay AY. A practical guide to topical therapy in children. *Br J Dermatol* 1998;138:293-6.
 13. Green C, Colquitt JL, Kirby J, Davidson P. Topical corticosteroids for atopic eczema: Clinical and cost effectiveness of once-daily vs. more frequent use. *Br J Dermatol* 2005;152:130-41.
 14. Kubota Y, Yoneda K, Nakai K, Katsuura J, Moriue T, Matsuoka Y, *et al.* Effect of sequential applications of topical tacrolimus and topical corticosteroids in the treatment of pediatric atopic dermatitis: An open-label pilot study. *J Am Acad Dermatol* 2009;60:212-7.
 15. Hanifin J, Gupta AK, Rajagopalan R. Intermittent dosing of fluticasone propionate cream for reducing the risk of relapse in atopic dermatitis patients. *Br J Dermatol* 2002;147:528-37.
 16. Koo JY. New developments in topical sequential therapy for psoriasis. *Skin Therapy Lett* 2005;10:1-4.
 17. Katz HI, Prawer SE, Mooney JJ, Samson CR. Preatrophy: Covert sign of thinned skin. *J Am Acad Dermatol* 1989;20:731-5.