Topical Corticosteroid Therapy: What You Need to Know

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In pediatric dermatology, topical corticosteroids are routinely prescribed as first-line treatment for many of the common conditions encountered in clinical practice. Steroids, as pharmacological intervention, are often misunderstood. However, the appropriate topical corticosteroid in the correct dose provides an extremely safe treatment that boasts impressive results.

Mechanism of Action

The effects of topical corticosteroids are related to four main mechanisms of action: anti-inflammatory, immunosuppressive, antiproliferative, and vasoconstrictive effects. Together, the effects of these medications make them instrumental in treating a wide variety of disorders.1

The anti-inflammatory effect of topical corticosteroids is mediated by the inhibition of phospholipase A2 release, an enzyme necessary for the production of prostaglandins, leukotrienes, and other arachidonic acid derivatives. These drugs also work by inhibiting transcription factors involved in activating proinflammatory genes. It has also been proposed that corticosteroids inhibit phagocytosis and stabilize the lysosomal membrane of phagocytizing cells, which further contributes to their anti-inflammatory effects.1

The immunosuppressive effect of topical corticosteroids is mediated by their ability to significantly suppress the production and action of humoral factors involved in the inflammatory response, to inhibit the migration of leukocytes to the site of inflammation, and to interfere with the function of granulocytes, endothelial cells, mast cells, and fibroblasts.1

The antiproliferative effect of topical corticosteroids is mediated by their ability to interfere with DNA synthesis and mitosis. In addition, they also inhibit fibroblast activity and collagen formation.1

The vasoconstrictive effect of topical corticosteroids is not yet completely understood. It is believed that the effect on superficial dermal vessels may be mediated via inhibition of natural vasodilators, including antihistamine, bradykinins, and proaglandins.1

Choosing a Corticosteroid

When choosing a topical corticosteroid, it is crucial to consider the area of the body to which the therapy will be applied and to be vigilant to the qualities of the underlying skin. Penetration varies greatly between sites as a result of the thickness of the stratum corneum, as well as vascular supply to the area. Logically, side effects also vary according to the area treated.2

Corticosteroids are classified based on potency. The gold standard for measuring potency is the vasoconstrictor assay, which is used to group corticosteroids into seven groups. Group I is very high potency, Groups II and III are high potency, Groups IV and V are mid potency, and Groups VI and VII are low potency. Vehicle also influences
potency through alterations in the steroid release rate and bioavailability.\textsuperscript{3}

In terms of the vehicle, ointments are most effective overall. They are particularly useful for areas of low penetration, as well as problematic lesions. They enhance penetration and drug delivery by hydrating the stratum corneum and providing an occlusive barrier to prevent evaporation.\textsuperscript{4} Creams, lotions, and gels are useful for weeping/blistering lesions and hair covered surfaces, and they are often preferred by parents, because they are easier to apply and clean and are more cosmetically acceptable.\textsuperscript{4}

Hydration and occlusion both play central roles in corticosteroid absorption. Application to hydrated skin immediately following bathing can increase absorption by four to five times. Occlusion has been reported to increase absorption by up to 10 times and can be extremely useful in treating severe lesions.\textsuperscript{5}

Low potency steroids are preferred for areas with high penetration, including the axillae, groin, genitals, and face. They are preferred for infants, children, and the elderly due to the increased susceptibility of these populations to side effects. In patients who require long-term therapy and/or application to a large area, low potency steroids are also recommended.\textsuperscript{5}

High potency and very high potency topical corticosteroids should be reserved for areas with low penetration, including palms, soles, elbows, knees, as well as areas of lichenification.\textsuperscript{3,5} Additionally, when using these agents, it is recommended that, once control is obtained, the patient be stepped down to a lower potency agent for maintenance. High and very high potency therapies should only be used for short periods of time or intermittently to avoid adverse effects.\textsuperscript{3}

### Application: Amount and Frequency

Generally, topical corticosteroid application can be quantified using the fingertip unit (FTU) scale, which describes the amount of ointment expelled from a 5 mm diameter nozzle from the distal skin crease to the tip of the index finger as 1 FTU. In children, FTUs for a particular area vary based on age (see Table 1).\textsuperscript{6}

Overall, the assessment report completed by the National Institute of Health’s Appraisal Committee did not identify a clinically significant difference between once daily application or more frequent application of topical corticosteroids (in any of the potency groups) in terms of effectiveness, patient satisfaction, adverse events, concordance with therapy, or the number of follow-up visits required.\textsuperscript{7,8} As a result, it is recommended that current clinical practice should adhere to the

<table>
<thead>
<tr>
<th>Anatomic Area</th>
<th>FTU(s) Required to Adequately Cover Anatomic Area</th>
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<tbody>
<tr>
<td></td>
<td>3–6 Months</td>
</tr>
<tr>
<td>Face and Neck</td>
<td>1</td>
</tr>
<tr>
<td>Arm and Hand</td>
<td>1</td>
</tr>
<tr>
<td>Leg and Foot</td>
<td>1.5</td>
</tr>
<tr>
<td>Anterior Trunk</td>
<td>1</td>
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<tr>
<td>Posterior Trunk and Buttocks</td>
<td>1.5</td>
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</tbody>
</table>

Table 1: Estimation of FTUs of Topical Corticosteroid Required (Based on Age)
recommendation that topical corticosteroids be applied no more than twice a day.\(^8\)

Once daily application of topical corticosteroids is preferable, as it may decrease the risk of side effects and tachyphylaxis, decrease the cost of therapy, and increase the patient’s compliance.\(^1\)

**Uses of Topical Corticosteroids**

Topical corticosteroids are widely used for a variety of dermatological conditions. These can be divided into one of three groups, highly responsive, moderately responsive, and least responsive.\(^1\) Intertriginous psoriasis, pediatric atopic dermatitis, intertrigo, and seborrheic dermatitis are all highly responsive to topical corticosteroids. Psoriasis, adult atopic dermatitis, nummular eczema, papular urticaria, lichen simplex chronicus, primary irritant dermatitis, and parapsoriasis are moderately responsive to topical corticosteroid therapy. Finally, with some diseases, more potent topical steroids are required to achieve an adequate clinical response (e.g., lichen planus, cutaneous lupus erythematosus); whereas, others (e.g., sarcoidosis and granuloma annulare) are much less likely to respond to topical steroids, irrespective of potency.\(^1\)

References