Management of Pediatric Psoriasis

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Psoriasis is a chronic inflammatory disease of the skin, nails, and joints. Overall prevalence in the US is 2.5%. Among children aged 0 to 18 years, prevalence is 1% and incidence is 40.8 per 100,000. More than one-third of patients present before age 20.

The pattern of psoriasis presentation in children can vary from what is classically observed in adults. Children have increased involvement of the face and anogenital regions, and pruritus is common. Plaque-type psoriasis is most common (73.7%) and presents as erythematous plaques with silvery-white scales typically involving the scalp, postauricular region (Figure 1a, see page e2), elbows, knees, umbilicus, and buttocks (Figure 1b, see page e2).

Guttate psoriasis is the next most common type (13.7%); it is composed of few to numerous small (<1 cm), drop-like erythematous scaly papules (Figure 1c, see page e2). Guttate psoriasis has a documented association with pharyngeal — and less commonly — perianal, streptococcal infection.

Other common types are inverse psoriasis, involving the skin folds and flexures (neck, axillae, groin), and psoriasis in the anogenital area (diaper or “napkin” psoriasis). Diaper psoriasis is especially common in children younger than 2 years of age and presents as bright- to dull-red smooth or slightly scaly erythema in the diaper area, which may be accompanied by more typical psoriasis in other locations (Figure 1d, see page e2).

Pustular and erythrodermic psoriasis are uncommon subtypes in young children but, when present, are typically accompanied by systemic signs, including fever, chills, malaise, and subsequent dehydration and toxicity. Nail involvement such as pitting, onycholysis, and subungual debris can occur with all types of psoriasis and can serve as a diagnostic clue (Figure 1e, see page e2).

The differential diagnosis for psoriasis in children depends on the site of involvement. Scalp psoriasis presents with discrete or confluent red patches with silvery scale. The scale may become very thick and mat the hair down in clusters. This is referred to as pityriasis amiantacea (Figure 1a, see page e2). The differential for scalp psoriasis includes: seborrheic dermatitis in infants and adolescents; atopic dermatitis (usually accompanied by other signs, symptoms, or a family history of atopy); and tinea capitis, which should be ruled out with a fungal culture.

Plaque and guttate psoriasis may be confused with nummular atopic dermatitis, a form of atopic dermatitis presenting with coin-shaped lesions. This also is typically accompanied by a personal or family history of atopy, and pityriasis rosea, a viral exanthem that follows Langer’s lines on the skin and thus is distributed in the classic “Christmas tree” pattern on the trunk and proximal extremities. Diaper pso-
Psoriasis must be differentiated from irritant diaper dermatitis (which spares the folds) or candidal diaper dermatitis (“beefy” red plaques with characteristic satellite papules and pustules).12

ENVIRONMENTAL TRIGGERS
A thorough history and physical should be performed to identify potential disease triggers. These include trauma (Koebner phenomenon), infections (especially pharyngeal and perianal group A beta-hemolytic streptococci and viruses including HIV), drugs (particularly recent oral steroid withdrawal), and physical or psychological stress.10

COMORBIDITIES
Psoriasis is a chronic inflammatory disease that may not be limited to the skin. Studies in adults have demonstrated an association between psoriasis and metabolic syndrome (hypertension, obesity, dyslipidemia, and hyperglycemia)12 and increased cardiovascular risk. Psoriasis is also associated with increased rates of depression and decreased quality of life.13 Comorbidities in the pediatric population are less well defined, but data are emerging linking psoriasis to obesity and depression in children.14 Psoriatic arthritis in children is well documented, with a prevalence ranging from 5% to 40%.10,15 Onset age of psoriatic arthritis in children is usually between 9 and 12 years. Severe nail and digital disease is a clinical predictor of joint disease.16 However, correlation between the severity of skin disease and arthritis is usually poor.15

Since the true risk in this population is insufficiently investigated, whether pediatricians and dermatologists should screen youths with psoriasis for the presence of comorbid conditions remains to be established. A reasonable approach is a detailed history and physical examination, with directed investigations performed on an individual basis. Counseling for patients with severe psoriasis is appropriate, since adult and preliminary pediatric data show that the risk for comorbidities, especially obesity, hypertriglyceridemia, and hyperglycemia, increases with disease severity.17

TREATMENT
Topical Therapy
Available topical treatment vehicles include creams, ointments, foams, gels, lotions, liquid solutions, sprays, oils, and drug-impregnated tapes. Thicker vehicles such as ointments (usually petrolatum) are more occlusive and therefore often more effective than creams and lotions. Choice of vehicle is based on the location of the psoriasis and patient preference. Plaques on the extremities call for ointments or creams, whereas hair-bearing sites (scalp) require thinner preparations such as liquids, gels, lotions, sprays, oils, or foams.18

Figure 1. (a) scalp psoriasis; (b) typical plaque psoriasis; (c) guttate psoriasis; (d) diaper psoriasis; (e) nail psoriasis (pits); (f) adolescent with atrophy and striae after using a highly potent topical steroid (clobetasol) twice daily for 6 months. Source: a-e, Cordoro KM; f, Sugarman J. Reprinted with permission.
Twice-daily application is required for maximum effect of most topical medications. The traditional dogma that ointments are more effective must be reconciled with patient preference to select vehicles that the patient will actually apply. Adolescents often object to greasy ointments on the body and prefer creams, lotions, or foams. An effective compromise is to prescribe cosmetically acceptable vehicles for daytime use and reserve oils and ointments for nighttime use.

**Corticosteroids**

Topical corticosteroids (TCS) are the first-line agents for treatment of psoriasis in all age groups and all body sites. They are anti-inflammatory, anti-proliferative, and reduce erythema, scaling, and pruritus. TCS range in potency from the very weak Class VII to high-potency Class I agents. In general, psoriasis on sensitive or occluded sites (face, neck, genitalia/diaper area, folds, flexures including axillae and proximal thighs) call for lower potencies, whereas thicker psoriasis on the trunk, extremities, palms, soles, and scalp require higher potencies. The thin skin of the hands and inguinal folds is also more at risk for irritation from tazarotene and calcipotriene. Figure 2 provides a quick reference for the potency of TCS that may be used for various body sites.

If higher potency agents are required for thicker plaques in high-risk sites such as the diaper area, their use should be limited to short bursts of daily application only until the plaques thin down, followed by reduction of potency, frequency, or both. An often under-appreciated area of concern for the risk of atrophy and striae from long-term use of high-potency topical steroids is the proximal medial aspect of the upper and lower extremities, especially in rapidly growing, pubertal patients (Figure 1f, see page e2). Extremely potent agents should be avoided or used sparingly in infants.

To decrease the risk of potential adverse effects, such as cutaneous atrophy, combine or rotate topical steroids with steroid-sparing alternatives, such as vitamin D analogues, coal tar/liquor carbonis detergens (LCD), anthralin, and topical calcineurin inhibitors.

Infants have a high ratio of body surface area to mass, thus widespread application of TCS may result in systemic absorption. Close supervision and use of combination and rotational therapies will enhance efficacy and minimize the risk of side effects of TCS, such as skin atrophy, striae, telangiectasia, and adrenal suppression. A recent study examined the atrophogenic potential of TCS used for inflammatory skin diseases in children. The researchers concluded that, when used appropriately, TCS do not cause skin atrophy. Their data provide evidence that the true risk of “thinning the skin” from the routine use of topical steroids in children is far less than previously thought; however, caution is still advised and patients using topical corticosteroids should be monitored routinely for beneficial as well as adverse effects.

There are a multitude of TCS formulations and potencies (see Table, page e4). For practical purposes, start with a short list of at least one generic medication from each of the potency classes and their available formulations. For example: low potency desonide is available in an ointment, cream, lotion, gel, and foam; mid-potency triamcinolone acetonide is available as an ointment, spray; and high-potency clobetasol propionate is available as an ointment, cream, lotion, solution, spray, and shampoo. This clinically useful toolbox of topical corticosteroids will aid in developing a site- and severity-based treatment plan. The patient/family can participate in the care plan by selecting treatment vehicle.

**Vitamin D Analogues**

Calcipotriene (calcipotriol in Europe and Canada) and calcitriol are vitamin D3 analogues that play a primary role in the treatment of childhood and adult psoriasis. In the US, calcipotriene is available in an ointment, cream, and solution; calcitriol is available in an ointment. They are efficient non-steroidal alternatives for monotherapy or...
Regimens combining vitamin D analogues and topical steroids are well tolerated, steroid-sparing, and synergistic in action.\textsuperscript{24} Calcipotriene ointment has documented efficacy, tolerability, and safety in children with psoriasis. It can be used as monotherapy in very mild cases with thin patches and plaques or in combination with other topical agents for thicker or more severe disease. Local irritation is the most common side effect.\textsuperscript{25}

Adverse effects on systemic calcium homeostasis in adult psoriasis patients have been evaluated and are related to dose per unit of body weight. Though no formal guidelines exist for children, use of up to 45 g/m\textsuperscript{2}/week of calcipotriene in children does not seem to influence serum ionized calcium levels. Calcitriol ointment has also been shown to be effective and safe in children, with complete clearing of treated plaques after 4 weeks of treatment.\textsuperscript{26} Calcitriol ointment is reportedly less irritating than calcipotriene ointment when used in sensitive areas such as flexures.\textsuperscript{27}

### Coal Tar and LCD

Tar is a safe, effective, steroid-sparing treatment for childhood psoriasis. Crude coal tar has antipsoriatic, anti-seborrheic, antipruritic, and keratolytic effects.\textsuperscript{28} The mechanism of action is largely unknown, but enzyme inhibition, antimitotic actions, and suppression of DNA synthesis have been iden-

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**TABLE.**

**Commonly Used Topical Agents for Pediatric Psoriasis**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Available Concentrations</th>
<th>Available Vehicles</th>
</tr>
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<tbody>
<tr>
<td><strong>Low-potency topical corticosteroids</strong></td>
<td>Desonide&lt;br&gt;Used for: sensitive areas (face, axillae, groin)</td>
<td>• 0.05%</td>
</tr>
<tr>
<td><strong>Mid-potency topical corticosteroids</strong></td>
<td>Triamcinolone acetonide</td>
<td>• 0.025%&lt;br&gt;• 0.1%&lt;br&gt;• 0.5%</td>
</tr>
<tr>
<td><strong>High-potency topical corticosteroids</strong></td>
<td>Clobetasol propionate&lt;br&gt;Limit to short bursts if used in high-risk areas (axillae, groin); then decrease potency</td>
<td>• 0.05%</td>
</tr>
<tr>
<td><strong>Vitamin D analogue</strong></td>
<td>Calcipotriene&lt;br&gt;Used in combination with topical corticosteroids for steroid-sparing effect</td>
<td>• 0.005%</td>
</tr>
<tr>
<td><strong>Topical retinoid</strong></td>
<td>Tazarotene</td>
<td>• 0.05%&lt;br&gt;• 0.1%</td>
</tr>
<tr>
<td><strong>Coal tar/liquor carbons detergens (LCD)</strong></td>
<td>Anti-inflammatory and keratolytic; can be compounded with corticosteroids, emollients, lactic and salicylic acids (eg, 5% LCD in 0.1% triamcinolone ointment)</td>
<td>• 20% LCD&lt;br&gt;• 2% crude coal tar (CCT)&lt;br&gt;• 5% CCT&lt;br&gt;• 10% CCT</td>
</tr>
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</table>
Tazarotene is a third-generation topical retinoid used to treat plaque psoriasis and moderate to severe acne vulgaris. Similar to other retinoids, tazarotene restores normal epidermal differentiation and proliferation and reduces inflammation. Tazarotene is neither sensitizing nor phototoxic but dose-related skin irritation often necessitates the use of topical steroids applied at the same or different time of day. Supplied as a cream or gel in 0.05% and 0.1% concentrations, tazarotene should be limited to thicker plaques on nonintertriginous sites. Irritation can be minimized by starting with 0.05% cream applied for 10 to 60 minutes per day, then washed off (short contact therapy), or applying on alternate days or once weekly. Tazarotene is also effective for nail psoriasis. Tazarotene is a pregnancy category X agent in the US.

Topical Calcineurin Inhibitors

Tacrolimus and pimecrolimus are non-steroidal immunomodulating macrolactams that inhibit IL-2 production and T-cell activation and proliferation. Both topical calcineurin inhibitors (TCI) are FDA-approved for second-line intermittent treatment of atopic dermatitis in patients aged 2 years and older (pimecrolimus and tacrolimus 0.03%) and 15 years and older (tacrolimus 0.1%). TCIs are used as steroid-sparing options in combination or rotation with other topicals for adverse effects of long-term topical steroid use (face, eyelids, flexures, fingertips/nails, anogenital region). Stinging or burning may occur when TCIs are applied to fissured plaques or thin skin such as the eyelids. TCIs have not been proven unequivocally effective for thick plaque psoriasis on the elbows, knees, or trunk.

Anthralin

Anthralin (dithranol) is a potent anti-inflammatory and antiproliferative agent. It is a synthetic version of chrysarobin, a natural substance derived from the araroba tree of South America, which has been used to treat psoriasis for nearly 100 years. Negligible systemic absorption is responsible for anthralin’s excellent safety profile. Its use is limited because of the potential for staining and irritation with prolonged skin contact times. However, short contact and “minutes” therapy are popular alternatives (increasing concentrations — 0.1% to 3% — dithranol applied to the skin and left in place for 10 to 30 minutes daily until slight irritation develops, then maintain the same dose/time until clear). Lower concentrations or shorter contact time should be used on more sensitive sites such as anogenital skin.

Salicylic Acid, Lactic Acid, Urea

Keratolytics are peeling agents used to debulk thick plaques of psoriasis and are used in combination regimens with anti-inflammatory topicals such as TCS and vitamin D analogues. Salicylic acid, available over-the-counter (OTC) as a shampoo and by prescription as a 6% gel, is a useful adjunctive keratolytic for thick, localized plaques on the scalp, palms, and soles. It should be avoided in infants because of the risk for percutaneous salicylism. Lactic acid and urea are also effective keratolytics available OTC and by prescription as creams, lotions, and ointments.

Phototherapy and Systemic Therapy

Although most cases of psoriasis can be managed adequately with topical therapies, a subset of children present with severe or rapidly evolving disease that may warrant the use of systemic or phototherapy. Phototherapy is an effective treatment for carefully selected patients with diffuse guttate or plaque psoriasis or focal debilitating palmoplantar psoriasis.

Three main types of therapeutic light options exist: broadband UVB; narrowband UVB; and UVA. Narrowband UVB is often selected for treating children because of its ease of use and safety.

Phototherapy is administered in a physician’s office or phototherapy center and rarely via home phototherapy units. Short-term adverse reactions include burn and itch, while potential long-term risks include photodamage and cutaneous carcinogenesis.

Severe or refractory plaque, pustular, or erythrodermic psoriasis and psoriatic arthropathy require systemic therapy.
therapy. The three most commonly used systemic treatments for psoriasis in children are: acitretin, a non-immunosuppressing systemic retinoid; and the immunosuppressants methotrexate and cyclosporine. Because they have not undergone the scrutiny of randomized controlled trials in this population, none are FDA-labeled for psoriasis in children. Accumulated data regarding the utility, benefits, and risks of these agents for treatment of psoriasis derives largely from long-term use in children with other disorders such as ichthyoses (acitretin), juvenile rheumatoid arthritis (methotrexate), and organ transplantation (cyclosporine). There are vast amounts of anecdotal data regarding the use of these medications in pediatric psoriasis; however, formalized treatment and monitoring guidelines do not yet exist. Patient selection is critical and requires expert dermatologic consultation.

Targeted therapy, rather than generalized immunosuppression, represents the newest direction in treatment and is accomplished by use of biologic molecules. Tumor necrosis factor alpha-inhibitors (etanercept, adalimumab, and infliximab) are the most commonly used. Of all the currently available biologics, etanercept has the most significant published literature to substantiate recommendations for its use in the pediatric psoriasis population. Although biologics appear to be generally safe and effective, long-term data for psoriasis are lacking; serious adverse events, including opportunistic infections, have been reported. Careful consideration of the risk-benefit ratio for individual patients is required when deciding whether to use this class of medications, which is very expensive.

CONCLUSION

Managing children with psoriasis can be challenging due to the lack of approved therapies and compliance issues. In contrast to adults with psoriasis, little is known about the potential comorbidities of pediatric psoriasis. Given the potential effect of this disease on overall physical and emotional well-being, these patients require vigilant monitoring. Although a subset of children present with severe, rapidly evolving disease that requires systemic or phototherapy, most cases are mild, adequately managed with topical preparations. In patients with severe or refractory disease, or for psoriasis accompanied by comorbidities such as obesity or arthritis, timely referral for dermatologic consultation may lessen the potential effect of psoriasis on patients and families.

REFERENCES


