PEDIATRIC ATOPIC DERMATITIS: UTILIZING OMT AS AN ADJUNCT TREATMENT

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Abstract
Atopic dermatitis is a common, chronic, inflammatory skin condition that can affect people of any age. The etiology of atopic dermatitis is multi-factorial, with genetics, environment, and impaired immune response as predominant factors. Because atopic dermatitis is an inflammatory process that results in somatic dysfunction, the dermatologist can use osteopathic manipulative techniques as adjunct tools in pediatric atopic dermatitis management. Here we describe osteopathic manipulative treatments that may aid in the management of pediatric atopic dermatitis.

Introduction
Atopic dermatitis (AD) is a chronic and relapsing, pruritic, inflammatory disease occurring most frequently in children, though it also affects adults.1 Atopic dermatitis is often associated with a personal or family history of allergies, rhinitis, and asthma. In the past 30 years, the prevalence of AD has almost tripled in developed countries. In the United States, the highest prevalence occurs on the east coast and in Utah, Idaho, and Nevada. African American race and an education level beyond high school are significantly associated with a higher prevalence of eczema.1,2 Approximately 15 percent to 30 percent of children and 2 percent to 10 percent of adults are affected.1,3 Early onset is common, with up to 60 percent of patients affected during the first year of life, and 90 percent affected by age 5.3 Less than 10 percent of AD patients first develop symptoms as an adult.1,3 Seventy percent to 90 percent of children have resolution of the disease by adulthood.

It is important to recognize that AD may have a significant impact on the morbidity and quality of life in the pediatric population. Continual scratching at night can lead to an average of 1.9 hours of lost sleep per night for the patient, and 2.1 hours of lost sleep per night for the family.4 Patients with a visible skin disorder may suffer socially, and the need for frequent doctor visits and applications of topical medications may interfere with daily life. Central obesity and ADHD have been loosely associated with atopic dermatitis, as have daytime tiredness, dependence, irritability, and fearfulness.3,4 The severity of atopic dermatitis has been correlated with depression, stress, and anxiety, which may have a negative effect on the immune system due to increases in cortisol levels.5 Like any chronic disease, the financial burdens of management are immense. One study concluded that the personal financial cost of managing atopic dermatitis was greater than that of managing asthma.1 Other causes of an eczematous pattern of reaction include irritant contact dermatitis, allergic contact dermatitis, dyshidrotic eczema, asthmatoid eczema, and lichen simplex chronicus.1,2

The diagnosis of AD is made clinically and is based on the distribution of lesions, morphology, histologic findings, and associated clinical signs.1,3 A complete history and physical is needed to aid in diagnosis and treatment. The most widely used and accepted diagnostic criteria, created in 1980 by Hanifin and Rajika, were revised in 2003 by the American Academy of Dermatology to include an approach to diagnosis and treatment. The most widely used and accepted diagnostic criteria, created in 1980 by Hanifin and Rajika, were revised in 2003 by the American Academy of Dermatology to include an approach to AD that is suitable for diagnosis in infants, children, and adults (Table 1).1,3 Depending on the patient age and presentation, it may be necessary to conduct further testing, such as serum immunoglobulin E, patch testing, fungal testing, and genetic testing, to rule out other common conditions.

Background and Presentation
The term “atopic dermatitis” and “eczema” are often used interchangeably and can be thought of as the same diagnosis. However, eczema is more strictly defined as a reaction pattern of the skin, which in children is most commonly caused by atopic dermatitis.1 Other causes of an eczematous pattern of reaction include irritant contact dermatitis, allergic contact dermatitis, dyshidrotic eczema, asthmatoid eczema, and lichen simplex chronicus.1,2

Table 1. Diagnostic criteria for atopic dermatitis*

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<tr>
<th>Essential Features (must be present)</th>
<th>1. Pruritus</th>
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<td>2. Eczema (acute, subacute, or chronic)</td>
<td>a. Chronic or relapsing history</td>
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<td></td>
<td>b. Typical morphology and age-specific patterns</td>
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<td></td>
<td>- Facial, neck, and extensor involvement in infants and children</td>
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<td>- Current or previous flexor lesions</td>
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<td>- Sparing of the groin and axillary regions</td>
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<th>Important Features (usually present)</th>
<th>1. Early age of onset</th>
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<td>2. Atopy</td>
<td>a. Personal and/or family history</td>
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<td></td>
<td>b. Raised IgE levels</td>
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<td>3. Xerosis</td>
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| Associated Features (nonspecific; suggests diagnosis) | 1. Atypical vascular responses: |
|-------------------------------------------------------| a. Facial pallor |
|                                                       | b. White dermographism |
|                                                       | 2. Keratosis pilaris, pityriasis alba, hyperlinear palms, ichthyosis |
|                                                       | 3. Ocular/periorbital changes |
|                                                       | 4. Perioral/periauricular lesions |
|                                                       | 5. Perifollicular accentuation, lichenification, prurigo lesions |

| Exclusionary Conditions | A diagnosis of AD depends on exclusion of: scabies, seborrheic dermatitis, contact dermatitis (irritant or allergic), ichthyosis, cutaneous T-cell lymphoma, psoriasis, photosensitivity dermatoses, immune-deficiency diseases, and erythroderma of other causes. |

In some pediatric patients, emollients may be adequate to deal with existing lesions, and anti-inflammatory therapies can be saved for new lesions. In others, both new and previously involved lesions may benefit from application of topical corticosteroids (TCSs) or topical calcineurin inhibitors (TCIs) on a scheduled and intermittent basis. TCSs (1x - 2x per week) and TCIs (2x - 3x per week) can be used in conjunction with moisturizers, though TCIs should only be used in children over 2 years of age. Only low-potency (class 6 or 7) steroids should be used on the face, axillae and groin in order to minimize side effects such as acne, striae, telangiectasia, and atrophy. Ointments, which are more potent than creams, should be avoided on open or oozing lesions and intertriginous folds. Proactive use of TCSs and TCIs is an effective strategy for AD flares, but there are no studies that compare the two classes of topical therapy. The optimal interval of scheduled intermittent use is not clear due to variations between studies. Current treatment guidelines do not recommend more than twice-daily application of topical corticosteroids. TCIs should not be used on open lesions, as they cause skin burning and irritation. Patients should also be counseled on proper sun protection. The U.S. Food and Drug Administration (FDA) recommends avoiding long-term use of TCIs in all patients. The use of sedating antihistamines in children has been shown beneficial in treating pruritus and sleep disturbance associated with AD. Antibiotics should be reserved for the treatment of acutely infected lesions associated with atopic dermatitis. Environmental modifications are recommended and well studied. Patients with atopic dermatitis should avoid known irritants, such as wool, acids, bleaches, and solvents. Any chemical or environmental triggers that are known and specific to the individual should be avoided. Smooth clothing and avoidance of irritating, manufactured fabrics may help minimize eczema flares. There are no studies to date showing that specialized clothing (such as silver-impregnated garments) is warranted.

Two new and emergent treatments for atopic dermatitis include crisaborole, a topical boron-based phosphodiesterase-4 inhibitor (PDE-4), and dupilumab, an antibody that inhibits interleukin-4/IL-13 receptor α chain. The FDA approved dupilumab to treat adults with moderate to severe atopic dermatitis. In three placebo-controlled clinical trials with a total of 2,119 adult participants, all with moderate to severe atopic dermatitis inadequately controlled on topical medication(s), dupilumab was established as safe and efficacious. In all trials, dupilumab significantly improved measures of skin-clearing intensity and severity of disease at 16 weeks compared to placebo. Dupilumab is administered via subcutaneous injection every other week after an initial loading dose. In contrast to dupilumab, which can only be used in adults, the FDA approved crisaborole ointment 2% for the treatment of mild to moderate atopic dermatitis in patients 2 years of age and older. The safety and efficacy of crisaborole topical were established in two placebo-controlled trials with 1,522 participants, ranging from 2 to 79 years of age, with mild to moderate atopic dermatitis. Participants applied crisaborole ointment twice a day for 28 days. Crisaborole-treated patients achieved higher Investigator’s Global Assessment (IGA) scores than vehicle-treated patients.

### Discussion

In addition to standard therapies, osteopathic manipulative treatment (OMT) may aid in the treatment of AD. The four guiding principles of OMT are:

1. The body is a unit; the person is a unit of mind, body and spirit.
2. The body is capable of self-regulation, self-healing, and health maintenance.
3. Structure and function are reciprocally interrelated.
4. Rational treatment is based on an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function.

Osteopathic physicians can use either direct or indirect techniques to restore the body’s physiological function and treat somatic dysfunction. Somatic dysfunction is defined as the impaired or altered function of related components of the somatic system: skeletal, arthrodial, and myofascial structures and their related vascular, neural, and lymphatic elements. Three OMT modalities useful in the treatment of atopic dermatitis – myofascial release, lymphatic pump technique and soft tissue technique – will be discussed as possible adjunct treatments and are described in Table 2.

Myofascial release (MFR) works to disengage the restrictive barrier, placing all areas of fascial tension in a state of ease. This, in turn, decongests the lymphatic area. It can be performed anywhere from head to toe, since fascia surrounds and compartmentalizes all structures. Myofascial release can be performed as a direct technique, by taking the fascia into a restrictive barrier, or it can be performed as an indirect technique, by taking the fascia into ease. To perform MFR, the physician must first find an area of myofascial strain, and then apply compression or distraction forces to the somatic dysfunction until the fascia releases and the strain is resolved. As previously mentioned, there are many palpable restrictive areas and tissue-texture abnormalities in patients with atopic dermatitis, and resolution of the strain is based on the physician’s perceived response to palpation of the fascia.

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<th>Table 2. Osteopathic manipulative treatment techniques used in atopic dermatitis</th>
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<td><strong>OMT Technique</strong></td>
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<tr>
<td>Myofascial Release</td>
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<tr>
<td>Soft-tissue Technique</td>
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<td>Lymphatic Technique</td>
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Lymphatic techniques have been shown to enhance the lymphatic and immune systems through modulation of inflammatory mediators. Schander et al. found that lymphatic pump techniques significantly increase total leukocyte count, interleukin-8, and keratinocyte-derived chemoattractant following treatment. Lymphatic pumps have been shown to have a positive effect on the B-lymphocyte and T-lymphocyte pumps have been shown to have a positive effect on the B-lymphocyte and T-lymphocyte components of the immune system in peripheral blood. According to Chikly, Slezynski and Kelso conducted a one-year, randomized, researcher-blinded trial of the thoracic lymphatic pump in patients who had undergone low-risk cholecystectomy. Patients treated with the thoracic lymphatic pump had greater recovery and quicker return to preoperative values of forced vital capacity than those that did not receive treatment.

There are four physiologic diaphragms in the human body that play a role in lymphatic return, including the tentorium cerebelli, thoracic inlet, abdominal diaphragm, and pelvic diaphragm. The location of an AD flare determines which diaphragm to treat. Treatment of the thoracic inlet relaxes tissue restrictions and enhances lymphatic drainage from the head and neck. This is helpful in pediatric patients with atopic dermatitis on the face, commonly the malar checks. Releasing the tentorium cerebelli can treat lesions on the scalp, face, and neck, as well. Thoracoabdominal-diaphragm release increases lymphatic return from the rest of the body and may increase lymphatic flow to the chest and upper back. Treatment of the pelvic diaphragm increases lymphatic flow to the abdomen, buttocks, lower back, and pelvis. For lesions on the upper and lower extremities, release of the palmar fascia and plantar fascia, respectively, can be employed.

Performance of these techniques by an osteopathic physician may enhance lymphatic flow to the affected skin while simultaneously decreasing immune congestion. For visual instructions, see Figure 4.) Lymphatic techniques are relatively easy, non-invasive adjunct treatments that may improve outcomes in pediatric AD patients.

Pediatric patients and parents or guardians must take an active role in management of AD. Topical emollients should be applied daily to protect and restore the epidermal layer. OMT can be combined with the use of ointments or creams as an adjunct to treatment, either performed by the dermatologist, patient, or parent/guardian.

The soft tissue techniques of effleurage, petrissage, friction, and tapotement can increase relaxation of surrounding fascia and promote lymphatic flow toward the lymphatic ducts (Figure 5). Soft tissue techniques have been shown to increase tissue elasticity, enhance circulation to local fascial structures, improve local nutrition and oxygenation, and improve local immune response. These osteopathic soft tissue techniques can be administered by the parent(s) or performed by the children themselves if they are old enough to participate in their own care. This is both cost effective and beneficial to the parents, in that it allows them to feel they are actively participating in the treatment process. We suggest parents or patients perform these techniques while applying medications, emollients and creams, which facilitates the standard of care and ensures that an adequate amount of time is spent applying medications so they are fully absorbed into the skin. Of course, if the parent(s) or patient is applying a steroid, it is important to wash hands or other areas that the steroid may have touched on the parent(s) or patient. Soft tissue techniques that can be utilized in atopic dermatitis include effleurage, skin rolling, stretching and petrissage. Effleurage is a light stroking soft-tissue technique that can be used on superficial eczematous plaques or patches. Skin rolling involves lifting the skin away from the deeper fascial structures and rolling it along the plane of treatment. Petrissage is a deeper kneading and constant squeezing pressure. Although this treatment has been shown to improve pruritus, pain, and anxiety in patients with scan, it may be too invasive for pediatric AD patients and should be used at the physician’s discretion. Instructions on how to perform these soft tissue techniques are provided below.

A study comparing standard medical management alone to standard medical management with massage therapy found that patients receiving massage therapy had statistical improvement in redness, lichenification, scaling, excoriation and pruritus. Although massage therapy differs from osteopathic soft tissue techniques in some ways, it can be inferred that using effleurage, petrissage, friction, and tapotement will benefit the patient with AD.

Absolute contraindications to lymphatic technique include coagulopathy, chronic infections, and infections with risk of reactivation, such as tuberculosis. Relative contraindications to lymphatic technique include active cancer, as there is a question as to whether lymphatic OMT can mobilize malignant cells. Further studies are needed to determine the risk of initiating superinfections in eczematoid patients with open excoriations by performing OMT. Physicians should use best practices and wear gloves if they are touching any open, excoriated areas. There is clear evidence that patients with necrotizing fasciti, abscess in the area, or systemic infection with temperature greater than 102 Fahrenheit (38.9° Celsius) should not be treated with OMT.

Time management is a major consideration in most dermatology practices. In a survey-based study conducted in 2003, dermatologists cited time restriction as a major barrier to performing OMT. The techniques described here should not take more than five minutes to perform. A sample patient handout is included to help patients and/or parents perform osteopathic soft tissue techniques, with either emollient or medication, at home (Appendix I). This may help to facilitate patient education, empower patients and parents, and decrease time spent on OMT in the office. Education for caregivers and patients is an important form of intervention. Since the pathogenesis of AD is complex and often requires multiple therapies, it also requires teaching and support to maintain a positive treatment response.

Examples of Osteopathic Manipulative Treatment Techniques

Diaphragm Release
Choose the appropriate area to treat based on the location of visibly affected skin. Based on the respiratory-circulatory module, the thoracic inlet should be treated for lesions of the upper extremity, head, and neck. For lesions of the lower extremity, treatment should begin with release of the pelvic diaphragm.

While palpating the diaphragm, hold the tissue in the direction in which it moves most freely. Allow the fascia to unwind, at which point the tension should release, and rhythmic motion of the diaphragm should resume.

Re-check the diaphragm to appreciate the motion gained, and a new end point should manifest.

Lymphatic Technique
Choose the appropriate area to treat based on the location of visibly affected skin. For example, if eczema flare is present in the cubital fossa, start distally (toward the wrist) and go proximally (toward the heart).

Place the thumb on the extensor surface and the fingers on the flexor surface and apply pressure, moving the hand upward (Figure 2). Emollient can be applied at the distal site and massaged upward. Gloves should be worn. Steroid can be used on active flares. Take care not to put excessive pressure on active lesions, as this may irritate the skin.

Soft-tissue Techniques
Choose the appropriate area to treat based on the location of visibly affected skin. For example, if...
eczema flare is present in the cubital fossa, start distally (toward the wrist) and go proximally (toward the heart) (Figure 3). Move to a modified effleurage technique, using the palms to apply pressure directly up the arm, to the shoulder. If using an emollient, do not put excessive pressure directly on the lesion, as this may irritate the skin. Topical steroids or calcineurin inhibitors can be used on active flares.

Use effleurage techniques to massage emollient gently in the distal-to-proximal direction. There is no specific end point to treatment. Once the emollient or medication is adequately absorbed, treatment can cease.

Conclusion

Atopic dermatitis affects not only the skin but also the whole patient, with emotional and psychological impacts. It represents a somatic dysfunction of the skin that can impact the structure and function of the body, creating upset in the body’s homeostatic mechanisms. Because atopic dermatitis is an inflammatory process, osteopathic manipulative medicine can be used as an adjunctive therapy alongside traditional treatments recommended by the American Academy of Dermatology. Further studies are needed to address the effectiveness of OMT, the number of treatments needed to achieve maximum therapeutic benefit, and the response rates of pediatric patients.

References


Appendix 1. Performing Soft Tissue Techniques for Atopic Dermatitis at Home
For upper-extremity eczema flare (often located in the elbow crease)

For a parent, guardian, or other supervisor:

1. Wearing latex-free gloves, apply a quarter-sized drop of emollient on the patient’s extremity, at the location farthest from the heart. (For example, to treat an eczema flare on the inner elbow crease, the emollient is applied on the back of the wrist.)

2. Place your thumb on the forearm and your fingers on the back of the forearm (on the side closest to the eczema flare).

3. Using squeezing pressure, advance up the arm to the armpit, being careful to use minimal pressure over the active eczema flare in the elbow surface. This step can be repeated three to four times.

4. Place your fingers on the back of the wrist and your thumb on the forearm, and massage up to the armpit using a sustained, gentle pressure, again being careful not to put too much pressure on the active eczema flare.

5. Starting at the wrist, use your fingers to gently massage up to the armpit, keeping them in constant contact with the skin.