Residual Scarring From Hidradenitis Suppurativa: Fractionated CO₂ Laser as a Novel and Noninvasive Approach

abstract

Hidradenitis suppurativa (HS) is a chronic, relapsing, inflammatory skin condition that can have a significant psychosocial impact, both with the active disease and with residual scarring. Although a wide variety of treatment options exist for HS, to our knowledge there are no reported modalities aimed specifically at treating HS scarring. We describe the case of an adolescent female who received medical management of intramammary HS followed by successful treatment with fractionated 10,600-nm carbon dioxide laser for her residual cribriform scarring. We believe there is great potential for the use of fractionated carbon dioxide laser to improve short- and long-term psychosocial outcomes of HS, promote physical scar remodeling, and possibly alter the disease process itself. Pediatrics 2014;133:e248–e251

AUTHORS: Andrew C. Krakowski, MD,a,b Shehla Admani, MD,a,b Nathan S. Uebelhoer, DO,c Lawrence F. Eichenfield, MD,a,b and Peter R. Shumaker, MDc

aUniversity of California, San Diego, La Jolla, California; bRady Children’s Hospital, San Diego, California; and cNaval Medical Center, San Diego, California

KEY WORDS fractionated, carbon dioxide, photothermolysis, hidradenitis suppurativa, scarring

ABBREVIATIONS

AFR—ablative fractional resurfacing
CO₂—carbon dioxide
HS—hidradenitis suppurativa

Dr Krakowski performed the laser procedure, analyzed the photos, performed a literature search, and helped draft the original manuscript; Dr Admani analyzed the photos, performed a literature search, and helped draft the original manuscript; Drs Uebelhoer and Shumaker supervised the laser procedure and revised the manuscript; Dr Eichenfield revised the manuscript; and all authors approved the final manuscript as submitted.

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the US Government.

www.pediatrics.org/cgi/doi/10.1542/peds.2012-3356
doi:10.1542/peds.2012-3356

Accepted for publication Jul 10, 2013

Address correspondence to Andrew C. Krakowski, MD, Scar Treatment and Revision (S.T.A.R.) Program, Pediatric and Adolescent Dermatology, Rady Children’s Hospital, 8010 Frost St, Suite 602, San Diego, CA 92123. E-mail: akrakowski@rchsd.org

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2014 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.
Hidradenitis suppurativa (HS) is a chronic, relapsing, inflammatory skin condition commonly affecting the axillary, inguinal, perineal, and intramammary regions. HS typically presents along a clinical spectrum involving comedones and painful, inflamed lesions that may include deep-seated nodules, sinus tracts, and abscesses; however, secondary lesions such as pyogenic granulomas in sinus tract openings, plaquelike induration, and giant multiheaded comedones can also be found. These lesions may ultimately heal with resultant fibrosis and scarring of the skin. There is no single universally effective treatment of patients with HS; consequently, most physicians use a variety of different therapeutic modalities, including antibiotics, retinoids, hormonal therapy, and immunosuppressive and antiinflammatory agents. Radiotherapy, cryosurgery, laser treatment, and surgical excision of affected skin areas have also been used effectively.

HS can be debilitating, with significant compromise in terms of function and patient quality of life. Due to the recurrent inflammatory course of HS, physical scarring may persist even after the active disease has been clinically controlled. Scarring may result in significant physical morbidities, including formation of dermal contractures, restricted limb mobility, and lymphedema caused by lymphatic injury from inflammation, as well as scarring. HS may be associated with significant psychosocial impact that correlates with disease severity, duration, pain, continuous evolution, and number of involved sites. Patients may experience a quality of life worse than patients with alopecia or mild to moderate psoriasis, and a study in 268 patients with HS revealed that >40% had a concurrent diagnosis of depression. Psychosocial factors involved with HS scarring include embarrassment, avoiding intimate contact, and hiding under excessive clothing even while at locations such as the beach.

We describe the case of an adolescent female who received medical management of intramammary HS followed by successful treatment with fractionated 10 600-nm carbon dioxide (CO₂) laser for her residual cribiform scarring.

**PATIENT PRESENTATION**

A 12-year-old girl presented to pediatric dermatology for evaluation of a rash in the intramammary and axillary regions diagnosed as HS. The psychological impact of the patient’s condition was immediately apparent because she had an extremely flat affect, avoided eye contact with everyone except for her mother, and resisted any discussion about her skin condition (including with a female physician who performed an examination without males present).

Over the next year, the patient was treated with a combination of chlorhexidine wash, clindamycin solution, oral doxycycline, and tretinoin cream. This treatment regimen eventually led to excellent control of her inflammatory HS; however, mild comedone formation persisted. Although the patient was satisfied with the control of her inflammatory HS, she continued to have significant concerns regarding the cribiform scarring present in her intramammary area (Fig 1). Management options were discussed with the patient, including conservative “watchful waiting,” surgical excision, and laser treatment. After extensive discussion of risks and benefits (including dyspigmentation, worsening scar, infection, pain, bleeding, and no improvement), the patient elected to proceed with laser scar revision.

The patient received 2 treatments separated by ~2 months with microfractionated CO₂ laser (Lumenis UltraPulse, Deep Fx; Lumenis, Yokneam, Israel) to the involved intramammary area at the following settings: 15 mJ, 15% density (ie, “surface coverage”), with a single pulse and a single pass (Fig 2). In this platform, microcolumn width and pulse width are fixed at ~120 μm and ~75 microseconds, respectively. The procedure was performed in an outpatient facility using only ice as a topical anesthetic between laser pulses. The patient tolerated the procedure well without complications or significant postprocedure pain. After the procedure, a thin layer of petrolatum was applied to the treatment area and reapplied 2 to 3 times daily until healed, after ~2 days. At follow-up, ~6 months after her initial treatment, the treatment area showed reduced erythema and markedly improved texture, pliability, and overall appearance (Fig 3). She has noted some persistent comedone formation but no
return of inflammatory lesions in the treated intramammary area. Both the patient and her family were pleased with the cosmetic outcome, and the patient was noted to be much more interactive and had a significantly improved affect on follow-up examinations.

DISCUSSION

HS can be difficult to treat and often requires a variety of different therapeutic modalities. Lasers have been used effectively for treatment of the medical disease. A study in 19 patients with HS treated with long-pulsed 1064-nm Nd:YAG laser revealed a >30% improvement in HS lesions. CO₂ laser excision has also been effective in treatment of HS lesions with complete removal of the affected skin. Although there are no treatment modalities aimed specifically at residual HS scarring, a number of different laser types such as pulsed dye lasers, full-field ablative lasers, and ablative and nonablative fractional lasers have shown benefit in the treatment of other types of scarring such as from acne, surgery, and trauma.

Manstein et al first described the concept of fractional photothermolysis in 2004. This method involves the laser-mediated generation of relatively deep and narrow pixelated columns of thermal injury over a fraction of the treatment area. In this model, large areas of adjacent untreated skin serve as a potential reservoir of healthy tissue to help drive the subsequent diffuse wound-healing and remodeling response while maintaining an excellent safety profile. Although the exact histopathologic mechanisms are still being elucidated, it appears that the benefits of fractional photothermolysis are likely related to a relative normalization of dermal and epidermal architecture over time guided by a multitude of temporally related mediators such as heat shock proteins, growth factors, matrix metalloproteinases, and microRNAs.

Nonablative fractional resurfacing has been reported for treatment of certain types of scarring in children. However, the literature is sparse in the use of ablative fractional resurfacing (AFR) for the treatment of scarring in the pediatric population. Recently, AFR using fractionated CO₂ laser has been used in children to effectively treat lymphangioma circumscriptum and fibro-fatty residuum in patients with involuted hemangioma of infancy. The promising efficacy and safety profile of AFR offer significant potential for the treatment of a variety of conditions in the pediatric population, including those mentioned above, and traumatic and nontraumatic scarring.

HS can be a chronic and debilitating condition, and the negative impact of HS on quality of life may persist long after the active disease process has “burnt itself out.” Residual scarring may serve not only as a constant reminder of the once-active condition’s sequelae but may also represent its own distinct set of physical and psychosocial comorbidities. To our knowledge, this case report is the first report in the literature documenting the treatment of residual HS scars with AFR. Although it is possible that time alone may have accounted for some of the scar improvement, we believe there is great potential for using this safe and effective technology to improve short- and long-term psychosocial outcomes of HS, promote physical scar remodeling, and possibly alter the disease process itself. Additional controlled studies are necessary to evaluate the true safety and efficacy of this novel technology in a broader pediatric population.
REFERENCES


An error occurred in the article by Eric Biondi et al, titled “Epidemiology of Bacteremia in Febrile Infants in the United States” published in the December 2013 issue of *Pediatrics* (2013;132[6]:990–996; originally published online November 11, 2013; doi:10.1542/peds.2013-1758). On page 990, in Authors, this reads: “Vivan Lee; Children’s Hospital of Los Angeles.” This should have read: “Vivian Lee; Children’s Hospital Los Angeles.”

doi:10.1542/peds.2013-4017


An error occurred in this article by Pickering et al, titled “The Red Book Through the Ages” published in the November 2013 issue of *Pediatrics* (2013;132[5]:898–906; originally published online October 14, 2013; doi:10.1542/peds.2013-2538). On page 899, under Early History of the COID, the first line reads: “After the establishment of the AAP in 1930 in the library of Harber Hospital….” This should have read: “After the establishment of the AAP in 1930 in the library of Harper Hospital….”

doi:10.1542/peds.2013-4105


doi:10.1542/peds.2014-0173


Two errors occurred in the article by Simpson et al, titled “A New Leukocyte Hyperadhesion Syndrome of Delayed Cord Separation, Skin Infection, and Nephrosis” published in the January 2014 issue of *Pediatrics* (2014;133[1]:e257–e262; doi:10.1542/2013-0884). On page e261, under Treatment With Glucocorticoids on line 31, this reads: “Whereas the exact mechanism causing the hyperadhesiveness of the integrins is not known, the symptoms bear resemblance to mice expressing constitutively active LFA-1 in which excessive adhesion prevents leukocytes from entering injured tissues and, when tested in vitro, causes increased adhesion and stalled migration.15,16” This should have not been inserted. Additionally, on the same page (e261) in the next section, Leukocyte Hyperadhesiveness, on line 12, this reads: “Whereas the exact mechanism causing the hyperadhesiveness of the integrins is not known, the symptoms bear resemblance to mice expressing constitutively active LFA-1 in which excessive adhesion prevents leukocytes from entering injured tissues and, when tested in vitro, causes increased adhesion and….”
Residual Scarring From Hidradenitis Suppurativa: Fractionated CO₂ Laser as a Novel and Noninvasive Approach
Andrew C. Krakowski, Shehla Admani, Nathan S. Uebelhoer, Lawrence F. Eichenfield and Peter R. Shumaker
Pediatrics 2014;133;e248; originally published online December 9, 2013; DOI: 10.1542/peds.2012-3356

The online version of this article, along with updated information and services, is located on the World Wide Web at:
/content/133/1/e248.full.html
Residual Scarring From Hidradenitis Suppurativa: Fractionated CO\textsubscript{2} Laser as a Novel and Noninvasive Approach
Andrew C. Krakowski, Shehla Admani, Nathan S. Uebelhoer, Lawrence F. Eichenfield and Peter R. Shumaker

*Pediatrics* 2014;133;e248; originally published online December 9, 2013; DOI: 10.1542/peds.2012-3356

<table>
<thead>
<tr>
<th>Updated Information &amp; Services</th>
<th>including high resolution figures, can be found at: /content/133/1/e248.full.html</th>
</tr>
</thead>
<tbody>
<tr>
<td>References</td>
<td>This article cites 30 articles, 1 of which can be accessed free at: /content/133/1/e248.full.html#ref-list-1</td>
</tr>
<tr>
<td>Citations</td>
<td>This article has been cited by 2 HighWire-hosted articles: /content/133/1/e248.full.html#related-urls</td>
</tr>
<tr>
<td>Errata</td>
<td>An erratum has been published regarding this article. Please see: /content/133/4/754.3.full.html</td>
</tr>
<tr>
<td>Permissions &amp; Licensing</td>
<td>Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: /site/misc/Permissions.xhtml</td>
</tr>
<tr>
<td>Reprints</td>
<td>Information about ordering reprints can be found online: /site/misc/reprints.xhtml</td>
</tr>
</tbody>
</table>