

# Lasers & topical vitamin C: scars in ehlers-danlos

## Abstract

**Background:** Hypermobile Ehlers-Danlos Syndrome (hEDS) is a connective tissue disorder with cutaneous manifestations including poor wound healing and atrophic scar formation. There is evidence supporting the use of topical vitamin C and laser for scar revisions, but limited reports of using topical vitamin C in scar revisions in patients with hEDS.

**Objective:** To present a case where topical vitamin C applied post-laser treatment resulted in improved healing and aesthetic outcomes in a patient with a connective tissue disorder.

**Methods:** We present a case of treatment of atrophic and hypertrophic scars in a patient with hEDS with ablative fractional laser, pulsed dye laser, and post-procedural topical vitamin C. We discuss the patient's treatments, outcomes, and previous literature on the matter.

**Results:** This patient had markedly improved wound healing after topical application of vitamin C post-laser treatment with no complications. Additionally, the patient had improved aesthetic outcomes with topical vitamin C and laser treatment just after one session.

**Conclusion:** This case suggests that hEDS scars may be safely treated with lasers when combined with post-procedural topical vitamin C.

**Keywords:** ehlers-danlos, ablative laser, vitamin c, wound healing, scars

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Gabriella Alvarez,<sup>1</sup> Nathan Leisenring,<sup>2</sup> Martin Nunez,<sup>2</sup> Amanda Suggs<sup>2</sup>

<sup>1</sup>Duke University School of Medicine, Durham, NC, USA

<sup>2</sup>Department of Dermatology, Duke University, Durham, NC, USA

**Correspondence:** Amanda Suggs, MD, Duke University Department of Dermatology, 234 Crooked Creek Pkwy Suite 300, Durham, NC 27713, Tel 919-385-7546, Fax: 919-385-7566, Email [Amanda.suggs@duke.edu](mailto:Amanda.suggs@duke.edu)

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## Introduction

Hypermobile Ehlers-Danlos syndrome (hEDS, previously known as EDS type III) is a genetic connective tissue disorder typically presenting with joint hypermobility, musculoskeletal manifestations, and impaired wound healing leading to abnormal, typically atrophic, scars.<sup>1</sup> Given the poor wound healing in hEDS, any form of skin trauma, including use of ablative lasers, could, theoretically, be risky. Waibel et al.,<sup>2</sup> found using topical vitamin C, E, and ferulic acid postoperatively after ablative laser therapy to the face promoted improved wound healing. We used the topical CE Ferulic acid solution created by Skin Ceuticals. Originally created by Dr. Sheldon R. Pinnell at Duke University, Skin Ceutical's topical CE Ferulic acid was initially shown to improve ultraviolet photo protection and later found to reduce ultraviolet-induced photodamage.<sup>3</sup> Its use has gained popularity in post-laser treatment application to reduce patient downtime and promote improved aesthetic outcomes.<sup>4</sup> Dr. Pinnell previously studied vitamin C's interaction in collagen formation in patients with Type VI EDS.<sup>5</sup> The patient presented provides an example where topical vitamin C can improve wound healing in EDS.

## Case

The presenting case is a 25-year-old female with hEDS who underwent laser treatment with postoperative topical 15% vitamin C serum (CE Ferulic, Skin ceuticals) for traumatic and surgical scars on the trunk and extremities. This patient had hypertrophic and atrophic scars, some with surrounding erythema. The hypertrophic scars were treated with 1:9 intralesional Kenalog: 5 fluorouracil approximately 4 weeks prior to the initial laser session due to symptomatic pruritus. Subsequently, all scars were treated over two sessions spaced eight weeks apart using a 595nm pulsed dye laser, 10mm spot, fluence 5J/cm<sup>2</sup>, 1.5 ms pulse duration (Vbeam, Candela, Wayland, MA) and/or 2940 nm fractional ablative laser at 1-3 mm spot size, 100-140um depth, 5.5% density (Profractional, Sciton, Palo Alto, CA). The laser(s) chosen for each scar depended on individual scar characteristics (i.e., degree of erythema, hypertrophy, atrophy, etc) (See Table 1 for details). Following laser treatment, we advised our patient to apply topical vitamin C twice a day to the treated areas. Topical application was not used immediately post-laser. First application of topical was performed the same day several hours later at-home.

**Table 1** Treatments Administered

	Scar Description		Treatments			
	Location	Type of scar (Hypertrophic/Atrophic)	ILK/5-FU (4-weeks prior)	595nm Laser	2940nm Laser	Vitamin C
Session 1	Right Shoulder	H	X	X	X	X
	Right chest	H	X	X	X	X
	Right chest	A			X	X
	Right thigh	H		X	X	X
	Left thigh	H		X	X	X
Session 2	Right Shoulder	H		X	X	X
	Right chest	H		X	X	X
	Right chest	A			X	X
	Right thigh	H			X	X
	Left thigh	H		X	X	X

After two sessions, the treatment was tolerated well, without complications including no worsening of current scars or new scar formation. Figures 1 and 2 show the pre- and post-treatment photos after just one session eight weeks later.

**Figure 1** Scar sites pre-treatment (1a-e).



**Figure 1a**



**Figure 1b**



**Figure 1c**



**Figure 1d**



**Figure 1e**

**Figure 2** Scar sites 8 weeks post-treatment (2a-e).



**Figure 2a**



**Figure 2b**



**Figure 2c**



**Figure 2d**



**Figure 2e**

## Discussion

In hEDS, patients typically have hyper extensible skin with poor wound healing and extensive scar formation.<sup>6</sup> Our patient presented with classic atrophic as well as some hypertrophic scars from both surgical intervention and traumatic injury. Although it is well established that ablative fractional lasers are a useful treatment option for scar revisions,<sup>7</sup> little is known on the use of ablative lasers on patients with hEDS. In our case, the patient did see benefit from laser use as well as post-procedure at-home application of topical vitamin C. As mentioned previously, there is evidence supporting the use of vitamin C after laser to achieve better wound healing,<sup>2</sup> but limited data on the use of vitamin C specifically for wound healing in hEDS. Topical vitamin C in rare cases can cause granuloma formation with use during microneedle therapy.<sup>8</sup> Microneedles creates tiny holes in the skin's surface like ablative lasers. However, there is less evidence to show one-time use of topical vitamin C immediately after ablative laser leads to complications<sup>9</sup> but there is a theoretical risk. More studies are needed to determine if long-term use of vitamin C topical post-ablative lasers lead to complications.

In terms of vitamin C use in patients with hEDS, Prentice, Pearson, & Fogarty<sup>10</sup> presented a case of using IV high-dose vitamin C with IV allogeneic mesenchymal stromal cells to improve cutaneous wound healing in a patient with vascular EDS. This patient initially had total abdominal wound dehiscence and after therapy was found to have near complete wound healing. Although this example was in a patient with vascular EDS, both vascular and hEDS share similar skin characteristics. More evidence is needed to show topical vitamin C benefits in hEDS, but our case and the few available cases in the literature show positive outcomes. Given that this is a single case report, it is unclear whether there was a synergistic effect of laser plus vitamin C or, if the patient would have had the same benefit from laser or topical vitamin C alone. Similarly, there are very few published reports of the use of ablative laser treatments in patients with EDS. Mueller, Zimmermann, & Borelli<sup>11</sup> published a case of a woman with classical EDS who underwent strikingly successful treatment of facial rhytides with two full-face resurfacings 9 months apart, first with CO<sub>2</sub>, and then with CO<sub>2</sub>/erbium:YAG combination laser. Taken together, our results suggest a potentially promising role for laser treatment in EDS.

## Conclusion

Our patient's scars treated with ablative fractional laser in combination with topical vitamin C resulted in improved scar size, erythema, and appearance. This case suggests that hEDS scars may be safely treated with lasers when combined with post-procedural topical vitamin C. More studies are needed to further evaluate the safety and efficacy of laser treatment in hEDS.

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None.

## Conflicts of interest

Authors declare that there is no conflict of interest.

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