Cosmetic treatment in patients with autoimmune connective tissue diseases

Best practices for patients with lupus erythematosus

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Learning objectives
After completing this learning activity, participants will be able to review cutaneous manifestations of systemic sclerosis and morphea, including en coup de sabre and progressive hemifacial atrophy, and discuss the physiological and psychological burden of these diseases; discuss and compare different laser treatments, injectables, and surgical options for cutaneous deficits attributable to these diseases; and describe objective and subjective outcomes of these procedures including long-term follow up data and associated side effects among this unique population.

Disclosures

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The cutaneous manifestations of lupus, especially chronic cutaneous lupus erythematosus, are a source of significant morbidity and can negatively impact patient quality of life. While the active inflammatory component of the disease may be adequately treated, patients are frequently left with residual skin damage and disfiguring aesthetic deficits. Dermatologists lack guidelines regarding the use and safety of various reconstructive and cosmetic interventions in this patient population. Laser treatments are largely avoided in the lupus population because of the possible photodamaging effects of ultraviolet and visible light. Similarly, given the autoimmune nature of this disease, some physicians avoid injectable treatment and grafts because of the concern for disease reactivation via antigenic stimulation. In the second article in this continuing medical education series we compile available data on this topic with the goal of providing evidence-based guidance on the cosmetic treatment of patients with lupus erythematosus with a focus on chronic cutaneous lupus erythematosus. (J Am Acad Dermatol 2020;83:343-63.)

Key words: calcium hydroxylapatite; fat transfer; hyaluronic acid; injectables; intense pulsed light; laser treatment; lipoinjection; lupus; mental health; poly-L-lactic acid; polymethylmethacrylate; pulsed dye laser; quality of life.

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Abbreviations used:

ACLE:	acute cutaneous lupus erythematosus
CCLE:	chronic cutaneous lupus erythematosus
DLE:	discoid lupus erythematosus
HA:	hyaluronic acid
IPL:	intense pulsed light
Nd:YAG:	neodymium-doped yttrium aluminum garnet
QoL:	quality of life
PDL:	pulsed dye laser
SCLE:	subacute cutaneous lupus erythematosus
SLE:	systemic lupus erythematosus

CUTANEOUS MANIFESTATIONS OF CHRONIC CUTANEOUS LUPUS ERYTHEMATOSUS

Cutaneous manifestations of lupus, especially chronic cutaneous lupus erythematosus (CCLE), are a source of significant morbidity and can negatively impact patient quality of life (QoL).[1] While the active inflammatory component of the disease may be adequately treated, patients are frequently left with residual skin damage and disfiguring aesthetic deficits.[2] Cutaneous lupus erythematosus (CLE) is comprised of 3 major subcategories, each with unique clinical characteristics: acute CLE (ACLE), subacute CLE (SCLE), and CCLE. Patients with systemic lupus erythematosus (SLE) can present with any form of cutaneous lupus; however, the association with systemic disease in patients presenting with skin disease tends to be highest with ACLE and lowest with CCLE.[3-5]

[F1-4/C] Patients with ACLE and SCLE (Fig 1) typically have more transient skin disease and fewer post-inflammatory changes than patients with CCLE. Discoid lupus erythematosus (DLE), lupus profundus/panniculitis, and tumid lupus are a few of the more common variants of CCLE. While there are limited epidemiologic data available about CCLE, the annual incidence is estimated to be about 4 per 100,000 with a prevalence of 70 per 100,000.[6] African American females represent the largest demographic of CCLE patients,[7] which is particularly problematic given often more severe and bothersome scarring and pigmentary changes are seen in this subset with darker Fitzpatrick skin phototypes. Patients with CCLE subtypes seek cosmetic intervention more commonly than patients with ACLE and SCLE, and therefore will be primarily discussed in this article.

Discoid lupus erythematosus

Discoid lesions are characterized by erythematous, well-demarcated plaques with overlying adherent scale and follicular plugging (Fig 2). **[F2-4/C]** Plaques are often indurated and are commonly found on the scalp, face, and ears. Scarring is an important concern and is a common sequela in long-standing lesions. Atrophic, hypertrophic, cribriform, and acneiform scarring have all been described in patients with DLE.[2] In addition, dyspigmentation with central hypopigmentation and peripheral hyperpigmentation, alopecia, and telangiectasia are common sequelae of DLE.

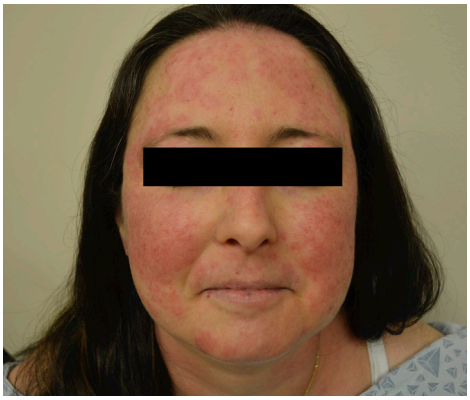

Fig 1. Photodistributed erythematous, scaly plaques of subacute cutaneous lupus erythematosus.

Lupus profundus/panniculitis

Lupus panniculitis occurs when there is inflammation of the subcutaneous fat, which leads to indurated, painful, inflammatory nodules (Fig 3). **[F3-4/C]** Some experts refer to this condition as lupus profundus when there are overlying discoid features in addition to panniculitis. Common locations for lupus panniculitis/profundus include the proximal extremities, chest, and face. Lipoatrophy with significant contour change is frequently seen in the post-inflammatory phase.[8-10]

Lupus erythematosus tumidus

Lupus erythematosus tumidus is characterized by photodistributed erythematous, edematous smooth plaques without epidermal involvement. Typically, these lesions resolve without sequela unlike the other subtypes of CCLE.[11-13]

IMPACT ON QUALITY OF LIFE AND PSYCHOLOGICAL WELL-BEING

Lupus is a cosmetically disfiguring condition, and its occurrence on easily visible skin, specifically the face and upper extremities, may have a profound impact on QoL[1] and psychological well-being leading to anxiety, depression, and low self-esteem.[14] Although there is limited literature measuring the

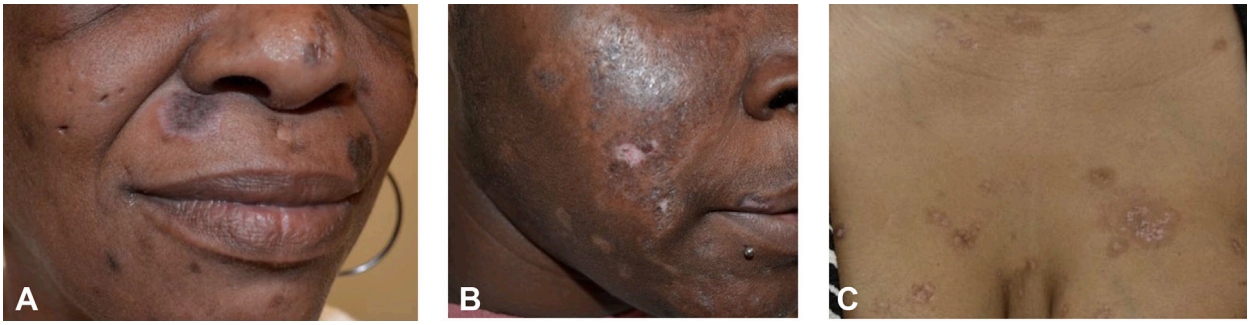

Fig 2. A, Plaques of discoid lupus erythematosus with hyperpigmented and telangiectatic components on the nose, upper vermillion border, and chin. **B**, Discoid lupus with resultant scarring and hypopigmentation. **C**, Discoid lupus lesions on the chest with peripheral hyperpigmentation, erythema, and central hypopigmentation.

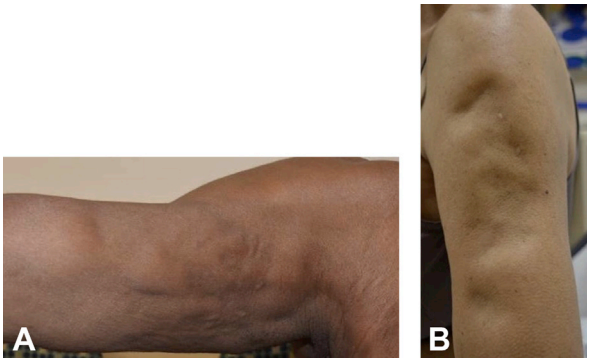

Fig 3. A and **B**, Lupus panniculitis in patients on systemic immunosuppression.

impact of cosmetic treatment in patients with lupus, studies using cosmetic camouflage reported improvement in health-related quality of life measures by the Dermatology Life Quality Index,[15] and cognitive behavior therapy and appearance enhancement counseling have been found to improve body image and QoL.[16] A prospective study analyzing disease activity and quality of life measured by Skindex-29 among patients with cutaneous lupus reported that disease improvement does not seem to directly correlate with an improvement in quality of life,[17] suggesting that disease damage and subsequent cosmetic sequelae also play a role. In addition, facial lesions, younger age, and female gender have been found to impair QoL.[18]

USE OF LASER AND LIGHT-BASED THERAPY

Key points

- The use of low fluences is hypothesized to reduce the risk of laser-induced disease exacerbation
- Early treatment with pulsed dye laser is hypothesized to prevent progression to scarring disease
- Many published reports document the positive response to laser and intense pulsed light treatment in patients with lupus erythematosus

In the past, the use of laser therapy in patients with lupus has been controversial given the photosensitive nature of this disease. In addition, the potential side effects from laser and intense pulsed light (IPL) treatments may be particularly concerning in patients with darker Fitzpatrick skin phototypes who comprise the majority of patients with DLE. A combination of photoprotection and medical management with topical immune-modulators and systemic antimalarial medications remains the first-line treatment for cutaneous lupus.[19] However, in recent years, multiple case reports, case series, and 1 double blind randomized controlled trial have described the distinct use of lasers to treat refractory lupus-associated erythema of active disease and hyperpigmentation and scarring of inactive disease. It must be noted that objective evaluation methods of treatment efficacy for cutaneous lupus are limited; in addition, the few established disease activity scoring systems, such as the Cutaneous Lupus Erythematosus Disease Area and Severity Index, are not validated for lupus panniculitis/profundus.[19-22]

Discoid lesions of lupus erythematosus are particularly challenging to treat because they are comprised of telangiectasia, dermal hyperpigmentation, and scarring. A combination of IPL and Q-switched neodymium-doped yttrium aluminum garnet (Nd:YAG) was reportedly well-tolerated in treating 1 patient with active DLE given that IPL can target the more superficial telangiectasia and Nd:YAG can target the dermal melanosomes.[23,24] Nd:YAG is a nonablative laser used for its horizontal scattering within the dermis that can induce dermal collagen formation while reducing the risk of epidermal wounds.[25] Erbium-doped yttrium aluminum garnet laser has also been reported for the treatment of discoid lupus scarring.[26,27] This ablative laser modality sacrifices efficacy in dermal collagen remodeling for decreased tissue damage and decreased healing times when compared with

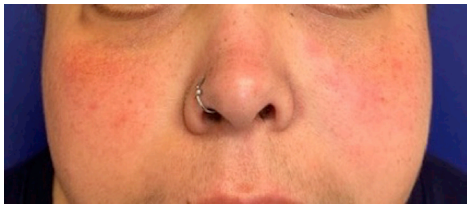

Fig 4. Patient with systemic lupus erythematosus with persistent malar erythema before treatment with a pulsed dye laser.

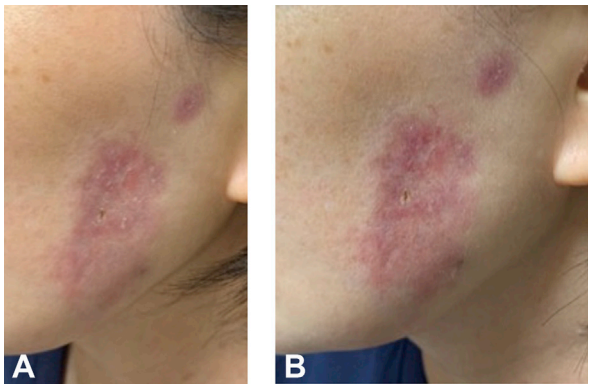

Fig 5. **A**, A patient with lupus tumidus before pulsed dye laser treatment. **B**, Immediately after pulsed dye laser treatment (wavelength 595 nm, spot size 5 mm, pulse 3 msec, fluence 7.5 J) showing expected response with minimal to no purpura with recommended treatment parameters of low fluence and short pulse duration.

CO_2 ablative lasers.[28,29] In addition, argon lasers (nonablative) have been used to treat erythematous, hyperkeratotic plaques, and telangiectasia of active DLE with subjective resolution of lesions and no scarring or pigmentary changes at 6 months of follow-up.[30] Argon lasers were once commonly used for vascular and pigmentary lesions, but the advantage of selective thermolysis and, thus, reduced scarring and pigmentary changes seen in newer pulsed dye lasers (PDLs) has led to decreased use.[31]

IPL has been used with positive response in treating the chronic facial erythema and burning [F4-4/C] associated with active SLE (Fig 4).[32] In addition to IPL, several studies have shown that PDL, when used at low fluences, is well tolerated when treating the vascular component of cutaneous lupus lesions and [F5-4/C] may even prevent disease progression (Fig 5).[26,33-35] Therefore, some authors advocate for the early use of PDL given that end stage lesions are more resistant to laser treatment.[26,33,34] It has been hypothesized that the selective destruction of dermal microvasculature by PDL inhibits the migration of inflammatory cells and thus prevents disease progression.[22] This theory is supported by the histopathologic results of biopsy

Table I. Argon laser therapy for lupus

Authors/study type	N	Disease	Age/skin type	Treatment/ location	Settings	Cooling/ postoperative	Sessions/ interval	Perioperative medication	Results	Follow-up	Side effects
Kuhn et al,[30] 2000 case report	1	DLE	59 with 15-year disease history, active disease	Argon laser to cheek	Wavelength: 514 nm; power/ fluence: 2W; pulse size: 100 ms; spot size: 1 mm; no overlapping	NR	5 sessions at 1-month intervals	NR	Subjective significant improvement after 2 sessions, complete resolution after 5	6 months	No pigment changes or scarring
Wolfe et al,[37] 1997 case report	1	Nasal bridge telangiectasia, laser-induced DLE	32 with Fitzpatrick skin type III with no history of lupus	Argon laser to nose	Wavelength: 514 nm; power/ fluence: 4.9 W, 22-30 J/cm^2; pulse size: 36-48 ms; spot size: 13 mm hexagon, 1 mm individual spot	Topical polymyxin B sulfate	1	NR	Sharply demarcated purple plaque, biopsy showed lymphocytic infiltrate with vacuolar alteration and keratinocyte necrosis	2 weeks	Laser-induced DLE

DLE, Discoid lupus erythematosus; *NR*, not reported.

Table II. Intense pulsed light therapy for lupus

Authors/ study type	N	Disease	Age	Treatment/ location	Settings	Cooling/ postoperative	Sessions/ interval	Perioperative medication	Results	Follow-up	Side effects
Byun et al,[23] 2017 case report	1	DLE	42 with 20-year disease history	IPL on cheek and later combination treatment with Q-switched Nd:YAG (see Table III)	Wavelength: 555-950 nm; power/fluence: 11-12 J/cm^2; pulse size: 8 mm	NR	3 sessions at 3- to 5-week intervals	NR	Subjective improvement in erythema but not hyperpigmentation	1 year	Mild erythema and oozing during treatment
Ekback and Troilius,[26] 2013 retrospective case series	4	DLE/ SCLE	28-69 (mean 54)	IPL on face, scalp, shoulder, lower leg, nail matrix, arms (1 patient also treated with PDL)	Wavelength: 530-750 nm; power/fluence: 8-13 J/cm^2; pulse: 8-13 ms	NR	3-5 sessions	1 patient treated with 5 mg prednisolone and clobetasol	Cleared (n = 2), improved (n = 1), cleared face/ improved arms (n = 1)	3-24 months	Blushing and swelling
Levy[32] 2000 case report	1	SLE	33 with 5-year disease history, patient reported disease currently active	IPL on face	Wavelength: 515-1200 nm; pulse/fluence: 22 J/cm^2	NR	2 sessions at 2-month interval	100 mg antimalarial daily	Subjective 75% improvement, flushing and burning relieved for 1 year	1 year, patient requested repeat yearly treatments	None

DLE, Discoid lupus erythematosus; *IPL*, intense pulsed light; *NR*, not reported; *PDL*, pulsed dye laser; *SCLE*, subacute cutaneous lupus erythematosus; *SLE*, systemic lupus erythematosus.

Table III. Erbium-doped yttrium aluminum garnet and neodymium-doped yttrium aluminum garnet laser therapy for lupus

Authors/ study type	N	Disease	Age	Treatment/ location	Settings	Cooling/ postoperative	Sessions/ interval	Perioperative medication	Results	Follow-up	Side effects
Byun et al,[23] 2017 case report	1	DLE	42 with 20-year disease history	Q-switched Nd:YAG (alone and combined with IPL) on cheek after previous IPL treatment failed to improve hyperpigmentation	Wavelength: 1064 nm; power/fluence: 6-6.5 J/cm^2; frequency: 10 Hz; spot size: 3 mm	NR	3 sessions at 3- to 5-week intervals	NR	Subjective improvement in hyperpigmentation (alone and combination) and erythema (combination only)	1 year	Mild erythema and oozing during treatment
Ekback and Troilius,[26] 2013 retrospective case series	1	DLE	39	Erbium YAG laser to face	NR	NR	1 session	None	Scarring persistent but improved	10 months	None
Tremblay and Carey,[27] 2001 case report	1	DLE	66 with 25-year disease history, currently inactive	Er:YAG laser to lips, nose, chin	Wavelength: 2940 nm; power/fluence: 10.2-28.3 J/cm^2; frequency: 5 pulses/second; spot size: 3-5 mm, 6-10 passes	5 days hydrogel sheet dressing changed daily	2 sessions at 3-week interval (different lesions treated at each session)	NR, although states that patient's disease had been controlled with potent topical steroids	Good subjective cosmetic result	2 years	Mild erythema at 3 weeks; no scarring; no reactivation in treated or other areas
Park et al,[66] 2011 case report	1	DLE	24 with 2-year disease history	Nd:YAG to cheek	Wavelength: 1064 nm; power/fluence: 45 J/cm^2; pulse: 20 ms; spot size: 5 mm	NR	3 sessions at 3-week intervals	NR	Subjective significant improvement with good cosmetic results	1 year	Slight erythema and swelling 1 day after treatment

DLE, Discoid lupus erythematosus; *Er:YAG*, erbium-doped yttrium aluminum garnet; *Nd:YAG*, neodymium-doped yttrium aluminum garnet; *NR*, not reported.

Table IV. CO_2 laser therapy for lupus

Authors/ study type	N	Disease	Age	Treatment/ location	Settings	Cooling/ postoperative	Sessions/ interval	Perioperative medication	Results	Follow-up	Side effects
Ekback and Troilius,[26] 2013 retrospective case series	1	DLE with severe scarring	50	CO_2 laser to face	NR	NR	1 session	Chloroquine	Improved	1 month	None
Henderson and Odom,[67] 1986 case report	1	DLE	36 with disease since 23	CO_2 laser to forehead, nose, lips, chin, cheeks	Wavelength: 10.6 μm; power/fluence: 20 W with 2-mm spot size and 200-mm focal length	NR	5 sessions at 5- to 12-month intervals	NR	Subjective dramatic improvement of skin texture, majority of areas of active disease were inactivated; small areas of recurrence surrounding lasered areas and in the more superficially lasered areas after the first session, but the deeply lasered areas have remained free of disease	Unclear	Hypopigmentation
Walker and Harland,[68] 2000 case report	1	DLE	45 with disease activity controlled by topical medication	CO_2 laser to face	Power/fluence: 16 W; multiple passes until yellowish hue of dermal collagen visible	Topical chloramphenicol	1 session	Mepacrine 125 mg daily, clobetasol propionate cream	Patient satisfied with the result	16 months	None

CO_2, Carbon dioxide; *DLE*, discoid lupus erythematosus; *NR*, not reported.

Table V. Pulsed dye laser treatment for lupus

Authors/ study type	N	Disease	Age/skin type	Treatment/ location	Settings	Cooling/ postoperative	Sessions/ interval	Perioperative medication	Results	Follow-up	Side effects
Raulin et al,[33] 1999 case series	12	DLE, SLE, SCLE, and CLE	26-62 (mean 44.1)	Flashlamp PDL on face, back, scalp, shoulder	Wavelength: 585 nm; power/ fluence for each pulse diameter: 3.4-3.5 J/cm^2 for 10 mm; 3-7 J/cm^2 for 7 mm; 6-7 J/cm^2 for 5 mm; pulse size: 0.3-0.45 ms	NR	Mean: 5.1 sessions (1-10)	Chloroquine (n = 5), oral steroids (n = 2), topical steroids (n = 1); no medications (n = 5)	70% clearance (n = 9), no clearance (n = 1), no clearance but reduction in pain/itch (n = 2)	Median: 7 months (range 3-32), relapse in only 1 case after 6 months	Purple erythematous maculae, edema, and occasional crusts developed in the treated areas, healed after 6-14 days; 2 patients had transient hyperpigmentation that resolved after 4-5 months
Baniandres et al,[42] 2003 retrospective case series	14	DLE and SLE	22-49, Fitzpatrick skin type II (n = 7), III (n = 5), IV (n = 2)	Flashlamp PDL (n = 3), long PDL (n = 11) on face, cheeks, trunk, arms, hands, scalp	FPDL: wavelength: 585 nm; power/ fluence: 5.7.75 J/cm^2; pulse: 0.45 ms; spot size: 5 mm; LPDL: wavelength: 595 nm; power/fluence: 6-13 J/cm^2; pulse: 1.5-10 ms; spot size: 7 mm	Dynamic cooling device of 20-20 to 60-20 ms	Repeated as long as improvement observed with 2-to 3-month intervals	Unable to determine if medications were concurrent with therapy	Average clearance rate of 60%	Median: 10 months; partial relapse in 3 patients after 1 year	Hyperpigmentation (n = 4) that resolved in 4-6 months, all in patients with Fitzpatrick type III/IV skin; mild atrophic scarring (n = 1) likely because of pulse stacking
Erceg et al,[22] 2009 prospective case series	12	DLE, all had ≥1 active CDLE lesion	37-69 (mean 52.8)	PDL to nose, scalp, forehead, lip, back, cheek, arm	Wavelength: 585 nm; power/fluence: 5.5 J/cm^2; pulse: 0.45 ms; spot size: 7 mm with 1 pass and 10-20% overlap	Cooling device during and after	3 sessions at 6-week intervals	Oral medications continued if stable treatment schedule for previous 6 months, otherwise no oral medications	3.1-point decrease in active CLASI (erythema, scaling, hypertrophy), no effect on damage CLASI (scarring, atrophy, panniculitis)	6 weeks	Mild hyperpigmentation (n = 1)
Nunez et al,[69] 1996 case series	4	SLE	42-46; age at treatment not provided for 2 patients	Flashlamp PDL to face, cheeks, hands, trunk	Wavelength: 585 nm; power/fluence: 6.75-7.75 J/cm^2; pulse: 0.45 ms; spot size: 5 mm	NR	3-6 sessions, interval NR	NR	>75% of lesions cleared	16 weeks	Mild transient hyperpigmentation (n = 1)
Ekback and Troilius,[26] 2013 retrospective case series	12	DLE, SCLE	28-69 (mean 54)	PDL to face, scalp, shoulder, arms, breast, leg	Setting 1: 585 nm, 5 mm spot, 0.45 ms, 5.75-6.75 J/cm^2, endpoint was slight erythema; setting 2: 595 nm, 7 mm spot size, 0.45-1.5 ms pulse, 7.5-9 J/cm^2, endpoint was slight erythema	30/20 dynamic cooling device	Mean of 5 sessions (range 1-11)	6 patients on oral meds: chloroquine (n = 6), prednisolone 5 mg (n = 1), beta-methasone (n = 1)	All patients' lesions were either cleared or improved; 2 patients had recurrence of lesions, and 2 patients had appearance of new lesions	3-130 months (mean 44 months)	None
Gupta et al,[70] 1999 case report	1	SCLE	39 with 14-year disease history	PDL to face	Wavelength: 585 nm; power/fluence: 5.3 J/cm^2; pulse: 0.45 ms; sot size: 5 mm	NR	4 sessions at 1-month intervals	NR	Subjective marked improvement of erythema	NR	NR

Diez et al,[43] 2011 prospective open label	9	DLE, SLE, LE tumidus, all patients had ≥1 active CLE lesion	31-69 (mean 45.3)	PDL to face, hands, back, arm	Wavelength: 595 nm; power/fluence: 11 J/cm^2; pulse: 2 ms; spot size: 7 mm	Air cooling system	NR	Systemic medication continued if no changes in past 6 months, 4-week washout for topical medication	4 had "total improvement" of erythema and scaling, 4 had "improvement," no changes in 1; no changes in pigmentation, scarring, or atrophy; all patients satisfied, regardless of objective results	NR	None
Nunez et al,[71] 1995 case report	1	LE telangiectoides	42	Flashlamp PDL to cheek	Wavelength: 585 nm; power/fluence: 7.25-8.75 J/cm^2; pulse: 0.45 ms; spot size: 5 mm; superimposed double pulse to areas of thicker telangiectasia	NR	5 sessions, interval NR	None	Excellent subjective response	16 weeks	None
Truchuelo et al,[36] 2012 prospective study	10	Lupus tumidus (none met criteria for SLE)	36-62 (mean 46)	PDL to back, thorax, face, arms, buttocks, legs	Wavelength: 595 nm; power/fluence: 8 J/cm^2; pulse: 0.5 ms; spot size: 10 mm	Air cooling system	1 session	8-week washout for topical and systemic medication	Mean patient satisfaction 8.5/10, all showed clinical improvement, 9/10 had reduced dermal lymphocytic infiltrate on biopsy	At 6 months, 5/10 patients had new lesions nearby or distant to treated areas	Purpura (necessary to achieve results): n = 10, immediate postoperative pain (n = 6), transient hypopigmentation (n = 1), transient hyperpigmentation (n = 2)
Izikson et al,[72] 2008 case report	2	SLE port wine stain	Patient 1: 49, skin type II; patient 2: 27, skin type II-III	Patient 1: PDL and later alexandrite laser to forehead; patient 2: PDL arm, hand, shoulder	Patient 1 PDL: wavelength: 595 nm; power/fluence: 8-12.5 J/cm^2; pulse: 0.45-1.5 ms; spot size: 7 mm 20-57 pulses; patient 1 Alexandrite: wavelength: 755 nm; power/fluence: 40-55 J/cm^2; pulse: 1.5 ms; spot size: 8 mm 8-9 pulses; patient 2 PDL: wavelength: 595 nm; power/fluence: 7-8 J/cm^2; pulse: 0.45 ms; spot size: 7 mm 325-700 pulses	Patient 1 PDL: dynamic cooling device 20/20-40/20; patient 1 alexandrite: dynamic cooling device 40/40; patient 2 PDL: dynamic cooling device 30/20	Patient 1: 19 PDL sessions at 1-month interval, 2 alexandrite sessions at 1-month interval; patient 2: 3 sessions at 4- to 5-week intervals	Patient 1: hydroxychloroquine, methotrexate, synthroid folic acid; patient 2: hydroxychloroquine	Patient 1: initially responded well but later became treatment resistant and switched to alexandrite laser with mild improvement after each session; patient 2: treated areas 70-80% lighter at 1 month	NR	Prolonged pain/swelling of arm, blisters on forearm and fingers that resolved over 5 weeks with mild desquamation and no residual scarring after treatment with 1% cortisone cream and Tylenol for pain; hypopigmented areas on shoulder; purpura and erythema, but no lupus flare or other pigmentary alteration

Continued

Table V. Cont'd

Authors/ study type	N	Disease	Age/skin type	Treatment/ location	Settings	Cooling/ postoperative	Sessions/ interval	Perioperative medication	Results	Follow-up	Side effects
Rerknimitr et al,[35] 2018 DBRCT	9	DLE	Mean 38.5 with 6.23-year disease duration; Fitzpatrick skin type III (n = 2), IV (n = 7)	PDL to half of face, upper extremity, or trunk; lesions on opposite side served as control	Wavelength: 595 nm; power/fluence: 8 J/cm^2; pulse: 6 ms; spot size: 7 mm; single pass, 10% overlap	Dynamic cooling device 30/20	4 sessions at 4-week intervals	Hydroxychloroquine (n = 8), prednisolone (n = 8), azathioprine (n = 3), cyclosporine (n = 1); no previous laser treatment and/ or topical therapy for DLE 4 weeks before the study	Lesions treated with the PDL demonstrated significantly more decreases in erythema index, texture index and improvement in Physician Global Assessment scores compared with the control; no significant difference in mCLASI	24 weeks from first session, 3 months after last session	Tolerable pain, minimal hyperpigmentation in 10.41% of treated lesions
Yelamos et al,[73] 2013 case report	1	DLE	9 with 1-year disease history	PDL to cheek, hands	Wavelength: 585 nm; power/fluence: 5.5 J/cm^2 on cheeks; 7 J/cm^2 on hands; pulse: 0.5 ms; spot size: 10 mm	NR	1 session	Topical steroids, topical tacrolimus, unclear if continued during procedure; hydroxychloroquine 200 mg/day	Hand lesions resolved completely after 1 month	"Almost 2 years"	Hyperpigmentation of cheeks that resolved after 6 months
Bras et al,[34] 2016 case series	3	DLE	27-61, lesion duration 2-15 months, Fitzpatrick skin type III (n = 3)	PDL to eyelids	Wavelength: 595 nm; power/fluence: 8 J/cm^2; pulse: 0.5 ms; spot size: 10 mm; treated until purpuric, some double passing but no pulse stacking	Air cooling at level 4, lesions covered in ultrasound gel	1-2 sessions at 4-week interval	Hydroxychloroquine (n = 1)	Significant improvement of erythema, scaling, edema, and telangiectasia; no improvement of madarosis	6-10 months	None

CDLE, Chronic discoid lupus erythematosus; *CLE*, cutaneous lupus erythematosus; *DLE*, discoid lupus erythematosus; *IPL*, intense pulsed light; *(m)CLASI*, (modified) Cutaneous Lupus Erythematosus Disease Area and Severity Index; *NR*, not reported; *PDL*, pulsed dye laser; *SCLE*, subacute cutaneous lupus erythematosus; *SLE*, systemic lupus erythematosus.

Table VI. Strength of recommendations for laser treatment for lupus

Recommendation	Recommendation no.	Level of evidence	Studies
Options for laser treatment in patients with lupus			
PDL	1.1	1B-III	Ekback and Troilius,[26] Raulin et al,[33] Bras et al,[34] Rerknimitr et al,[35] Truchuelo et al,[36] Baniandres et al,[42] Diez et al,[43] Nunez et al,[69] Gupta and Roberts,[70] Nunez et al,[71] Izikson et al,[72] and Yelamos et al[73]
IPL	1.2	III	Byun et al,[23] Ekback and Troilius,[26] and Levy[32]
Nd:YAG	1.3	III	Byun et al[23] and Park et al[66]
Er:YAG	1.4	III	Ekback and Troilius[26] and Tremblay and Carey[27]
CO_2	1.5	III	Ekback and Troilius,[26] Henderson and Odom,[67] and Walker and Harland[68]
1450-nm diode	1.6	III	Jih et al[90]
PDL, when used at low fluences, appears to be well tolerated when treating the vascular component of cutaneous lupus lesions and may even prevent disease progression	1.7	1B-III	Ekback and Troilius,[26] Raulin et al,[33] Bras et al,[34] and Rerknimitr et al[35]

Level IA evidence includes evidence from metaanalysis of randomized controlled trials; level IB evidence includes evidence from ≥1 randomized controlled trial; level IIA evidence includes evidence from ≥1 controlled study without randomization; level IIB evidence includes evidence from ≥1 other type of experimental study; level III evidence includes evidence from nonexperimental descriptive studies, such as comparative studies, correlation studies, and case-control studies; and level IV evidence includes evidence from expert committee reports or opinions or clinical experience of respected authorities, or both.
Er:YAG, Erbium-doped yttrium aluminum garnet; *IPL*, intense pulsed light; *Nd:YAG*, neodymium-doped yttrium aluminum garnet; *PDL*, pulsed dye laser.

specimens from 10 patients with lupus tumidus treated with PDL, of which 9 of 10 showed reduced dermal lymphocytic infiltrate at 4 weeks postoperatively compared with the preoperative histopathologic results.[36] In addition, a randomized split-body trial evaluating PDL as an adjuvant treatment compared with no treatment for discoid lesions found improvement in the erythema index, texture index, and physician global assessment score in the treatment group.[35]

Although most experts recommend only treating inactive disease until more safety data are available, active lesions of chronic DLE have been treated in 12 patients with PDL therapy.[22] Overall, there was a significant 3.1-point decrease in the active Cutaneous Lupus Erythematosus Disease Area and Severity Index (erythema, scaling, and hypertrophy), a validated outcome measure for cutaneous lupus, and only 1 patient experienced slight hyperpigmentation. Nine of the 12 patients were continued on their disease-modifying medications during treatment, all of which were started >6 months before treatment with no dosage changes within that timeframe. Although limited by sample size and the lack of a control group, PDL may be considered for patients with discoid lesions that remain active despite optimal medical management (level of evidence III).

To our knowledge, there is only a single case of potential laser-induced DLE in a previously unaffected patient after argon laser treatment for nasal telangiectasia.[37] It remains unclear whether this represented laser-induced disease or if conversely the facial telangiectasia for which the patient sought laser treatment represented the initial stages of lupus activity that was subsequently exacerbated by the argon laser. IPL, in contrast with lasers, emits visible light and therefore has the potential to aggravate cutaneous and systemic disease.[23] While the ability of visible light to induce pigmentary changes has been studied, it may also have the potential to exacerbate lupus.[38,39] For these reasons, patients with lupus should be advised to use physical

Table VII. Fat transfer for lupus

Author/ study type	N	Age/disease duration	Disease	Treatment	Location/amount	Sessions/ interval	Perioperative medication	Result	Side effects	Follow-up
Cortese et al,[74] 2000 case series	1	NR	SLE	Autologous fat transfer	NR	1 session	NR	Poor, 90% resorption attributed to poor vascularization at recipient site	NR	NR
Yoon et al,[75] 2012 case report	1	25 with 7-year disease history	Lupus profundus	Autologous fat transfer	Temporal area, amount NR	5 sessions at 1.5- to 2-month intervals	NR	Subjective impressive cosmetic benefit	None	6 months
Gleeson et al,[45] 2010 case report	1	37 with 20-year disease history	Lupus profundus	Repeat autologous fat transfer (previously treated with fat transfer 10 years prior)	35 mL each cheek	1	Thalidomide 25 mg daily and prednisolone 7.5 mg daily	NR	Fat embolism and cardiac arrest leading to death	N/A
Lei et al,[76] 2016 case series	18	28-50 (mean 37.3), all with stable disease	Lupus panniculitis	Autologous fat graft	3-9 mL to cheek, 5-10 mL to temple, 4-9 mL to zygoma, goal was 10-20% overcorrection	1-3 sessions at 3- to 6-month intervals	All lupus medication stopped ≥6 months prior	33.3% of patients, 27.8% of laypersons, and 38.9% of doctors were satisfied with the results. 44.4% of patients, 55.6% of laypersons, and 50.0% of doctors were mostly satisfied; no more resorption after 90 days	None	Mean 1.5 years
Valdatta et al,[77] 2012 case report	1	55	Lupus profundus/ panniculitis	Coleman technique Lipofilling	Submalar, parotideal, perioral, mandibular; session 1: 12 mL; session 2: 15 mL; session 3: 18 mL	3 sessions at 6-month intervals	NR	Stable at 12 months, and submalar and parotideal atrophy was completely filled, natural appearing, and symmetric; cutaneous lesions of lupus syndrome were improved; first graft had unacceptable result, hypothesized to be related to patient's cigarette smoking in the immediate postoperative period	None other than antibiotic intolerance	12 months
Hammer-Hansen et al,[78] 2015 case report	1	62	SLE	Autologous fat transfer	8.2 mL to malar area	1 session	NR	Additional treatment sessions planned at time of publication	None	4 months
Polivka et al,[79] 2016 case report	2	13-year-old with 18-month history, and 32-year-old with 6-year history of SLE with development of lupus panniculitis lesions	Lupus panniculitis	Lipofilling	Submental and malar	NR	NR	Positive aesthetic outcome was maintained 3 years after the procedure with no signs of the recurrence of panniculitis; Dermatology Quality of Life Index decreased from 16 to 0 6 months postoperatively in 13-year-old patient	None	3 years

Yesilada et al,[80] 2012 case report	1	26 with 2-year disease history	DLE	Autologous fat transfer	Session 1: 71.7 mL to frontal bar area, bilateral temples, bilateral malar prominences, bilateral upper eyelids and eyebrows, bilateral medial canthus, bilateral tear trough, and the lower eyelid subcutaneously and subdermally; session 2: 10 mL to frontal bar region and 20 mL to bitemporal regions	2 sessions at 6-month interval	Coenzyme Q10 30 mg TID for 3 months	At 3 months follow-up, down-slanted look on the lateral canthi remained; sunken orbit appearance and especially severe bitemporal hollowing seemed to diminish significantly; estimated 85% graft survival at 3 months	NR	3 months
Yoshimura et al,[46] 2008 prospective cohort study with control group	5	25-48	Lupus profundus	Cell assisted lipotransfer (CAL) and non-CAL	Face, non-CAL group: 50-250 mL. CAL group: 90-100 mL; goal was 20% overcorrection	1 session	2 (n = 1 CAL and n = 1 non-CAL) taking oral prednisolone	Non-CAL group: good (n = 1), fair (n = 2). CAL group: good (n = 2); excellent (>80% improvement), good (60%-80% improvement), fair (40%-60% improvement); all patients obtained improvement in facial contour, but the CAL group had a better clinical improvement score than did the non-CAL patients, although the difference did not reach statistical significance	Adipose necrosis in 1 non-CAL case who took perioperative prednisolone; subcutaneous bleeding that resolved in 1-2 weeks; swelling that resolved in 4 weeks	9-10 months

CAL, Cell-assisted lipotransfer; *DLE*, discoid lupus erythematosus; *NR*, not reported; *SLE*, systemic lupus erythematosus; *TID*, ter en die.

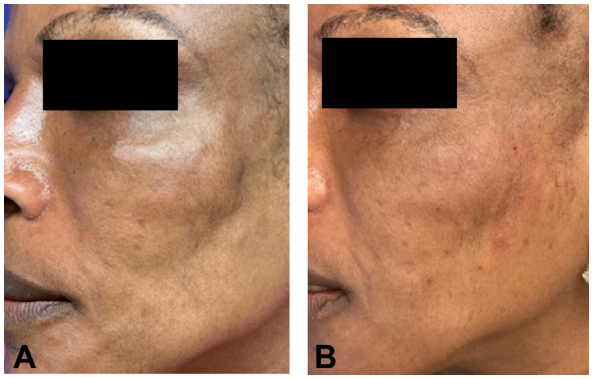

Fig 6. **A**, A patient with overlap connective tissue disease before injection with hyaluronic acid for disease-related atrophy. **B**, A patient with overlap connective tissue disease immediately after 4 cc of hyaluronic filler injection to the cheek and midface. The side effect of nodularity improves with time and can potentially be improved with subcision and expansion before injection.

sunscreen, particularly sunscreens containing iron oxide,[40] to protect from wavelengths within the visible spectrum.

Because data on safe laser parameters for patients with lupus are limited, many experts have recommended using the lowest fluence possible to achieve efficacious results.[23,26,35,41-43] Although subjective and device specific, low fluence setting has been proposed as 5.75 to 9 J/cm^2 for PDL,[26,44] 11 to 12 J/cm^2 for IPL,[23] and 6.5 J/cm^2 for Q-switched Nd:YAG (level of evidence: IV).[23]

Further information from studies on the use of laser treatments in patients with lupus is presented in Tables I to V, and treatment recommendations with the associated levels of evidence are summarized in Table VI.

INJECTABLES

Key points

- Despite theoretical risk of disease reactivation after tissue stimulation, there are no reports in the literature of lupus reactivation after reconstructive injectable treatment
- Performing fat transfer during active disease or while on corticosteroid treatment is hypothesized to result in impaired outcomes

Injectable treatment in patients with lupus, similar to other autoimmune or connective tissue disorders, has long been avoided because of the theoretical risk of disease exacerbation or reactivation caused by tissue stimulation.[19] While more controlled studies are needed to understand the pathogenesis of lupus and the tissue effects of injectable material in this patient population, a few studies have demonstrated success with injectable correction of atrophic cutaneous lupus lesions.

The majority of published cases describing injectable treatment for correction of aesthetic deficits in patients with lupus discuss fat transfer (Table VII).[45,46] The largest controlled trial for lipotransfer (autologous fat transfer using cannula-assisted liposuction for donor site extraction), involving 5 patients with lupus profundus, compared results of lipotransfer with and without (control group) addition of cultured adipose-derived stem cells. They observed no adverse effects in the patients with lupus other than adipose necrosis of the grafted tissue requiring drainage in 1 patient who was taking oral corticosteroids preoperatively (unspecified duration before treatment).[46] The authors concluded that steroids taken perioperatively or, possibly, the severity of lupus requiring oral steroids usage, negatively impacts angiogenesis and fat transfer viability. We agree with the authors' conclusion that fat transfer should be performed at a period of quiescent disease (level of evidence IIA).

While there are no studies reporting that patients with underlying inflammatory diseases are more prone to postoperative fat transfer complications, 1 publication reports a case of patient mortality after low-volume fat transfer that led to fat embolism and subsequent cardiac arrest.[45] The authors of this study hypothesize that the patient's underlying inflammatory disease could have contributed to an endothelial reaction that resulted in thrombus formation and heart failure. This case is further complicated by the intake of daily thalidomide, which has been associated with the risk of thromboembolism.[47] Events like these are not unique to the lupus patient population and, as with any cosmetic intervention, adequate patient counseling and thorough discussion of procedural risks (and possible increased risk in the lupus population) is imperative before any invasive procedure.[48]

Case reports discussing the use of hyaluronic acid (HA), poly-L lactic acid, polyacrylamide hydrogel filler, and polymethyl-methacrylate in the lupus population showed subjective satisfactory results with no adverse reactions or disease aggravation (Fig 6). The first article in this continuing medical education series provides further description of these fillers. Not previously described is polyacrylamide, a permanent, biocompatible, nonabsorbable and nonbiodegradable filler composed of 2.5% crosslinked polyacrylamide hydrogel suspended in sterile water that is approved for use outside of the United States. Documented adverse effects have included edema, transient erythema, ecchymosis, hematoma, tenderness, inflammatory/foreign

[F6-4/C]

Table VIII. Injectable treatments in patients with lupus

Authors/ study type	N	Age	Disease	Treatment	Location/amount	Perioperative medication	Sessions/interval	Results	Side effects	Follow-up
Fogo,[81] 2011 case report	1	30 with 6-year disease history	Lupus profundus	Large particle HA filler (1000 gel particles/mL)	3 mL to right cheek, 1 mL to left temple	NR	1 session	Dermatology Life Quality Index score decreased from 10 to 4; 9% increase in soft tissue thickness on MRI	None	1 month
Eastham et al,[82] 2013 case report	1	30 with 9-year history, inactive for many years	Lupus erythematosus panniculitis	PLLA (1:8 dilution) followed by HA filler	Session 1 and 2: 1 vial of PLLA to malar eminence; session 2: 2 mL HA filler to malar eminence and nasolabial fold	Chloroquine and dapsone but unclear if continued during treatment	3 sessions, 4-week interval between PLLA sessions, followed by HA 5 months later	Patient reported high satisfaction with only minimal discomfort	None	11 months
Costa et al,[83] 2009 retrospective case series	3	NR	Lupus profundus	PMMA filler	Face	NR	NR	Subjective good results	None	NR
Gupta et al,[84] 2016 case report	1	Age at treatment unclear, with 10-year disease history, currently inactive	Lupus panniculitis	2.5% polyacrylamide hydrogel dermal filler, injected subdermally with 18-G needle using fanning technique	10 mL to face over 1.5 years	None, but before treatment underwent 2 years of hydroxy-chloroquine 200 mg BID and then 3-year observation for disease activity	5 sessions with 3- to 4-month intervals	After 9 years, results are satisfactory and maintained	None	9 years

BID, Bis in die; *HA*, hyaluronic acid; *MRI*, magnetic resonance imaging; *NR*, not reported; *PLLA*, poly-L-lactic acid; *PMMA*, polymethyl-methacrylate.

Table IX. Strength of recommendations for injectable treatment for lupus

Recommendation	Recommendation no.	Level of evidence	Studies
Fat transfer should be performed at a period of inactive disease and when the patient is off immunosuppressant medications	2.1	IIA	Yoshimura et al[46]
Injectable filler options for patients with lupus are:			
Fat transfer	2.2	IIA-III	Gleeson et al,[45] Yoshimura et al,[46] Cortese et al,[74] Yoon et al,[75] Lei et al,[76] Valdatta et al,[77] Hammer-Hansen et al,[78] and Yesilada et al[80]
Hyaluronic acid (excluding Vycross type)	2.3	III	Fogo[81] and Eastham et al[82]
PLLA	2.4	III	Eastham et al[82]
PMM	2.5	III	Carvalho Costa et al[83]
Polyacrylamide	2.6	III	Gupta et al[84]

Level IA evidence includes evidence from metaanalysis of randomized controlled trials; level IB evidence includes evidence from ≥1 randomized controlled trial; level IIA evidence includes evidence from ≥1 controlled study without randomization; level IIB evidence includes evidence from ≥1 other type of experimental study; level III evidence includes evidence from nonexperimental descriptive studies, such as comparative studies, correlation studies, and case-control studies; and level IV evidence includes evidence from expert committee reports or opinions or clinical experience of respected authorities, or both.
PLLA, Poly-L-lactic acid; *PMMA*, polymethyl-methacrylate.

body reaction with granuloma formation, and infection.[49-51] All reported cases of injectable filler were for patients with facial atrophy caused by lupus profundus/panniculitis. None of the patients were taking immunosuppressive medications, but most studies described purposeful timing of the procedure during periods of disease inactivity and stability (Table VIII). As in other immune conditions, given the sometimes profound volume changes, nodularity immediately postinjection is a typical complaint. This improves with time and can be ameliorated with subcision and expansion of underlying tissue with normal saline.

With HA fillers, there has been an increasing number of patients experiencing delayed onset (≤1 year) immune-mediated nodules, particularly with fillers of the Vycross family, hypothesized to be related to their inclusion of low molecular weight HA molecules.[52-54] These nodules have been described as treatment resistant, requiring multiple sessions of hyaluronidase and triamcinolone injections to reduce nodule size.[53] The use of laser or heat therapy has also been reported to treat delayed-onset noninfectious inflammatory nodules.[55,56] Until more information is gathered regarding the pathogenesis of these postfiller nodules, we recommend avoiding the use of Vycross technology HA fillers in patients with a history of autoimmune inflammatory disease (level of evidence IV). Treatment recommendations related to injectables and their associated level of evidence are summarized in Table IX.

SURGICAL AND OTHER INTERVENTIONS

Key point

- Invasive surgical procedures in patients with lupus are hypothesized to have an increased risk of complications, including disease reactivation, hypercoagulability, and impaired wound healing related to immunosuppressing medication

The potential risk of disease reactivation from invasive procedures has limited the use of surgical interventions in patients with lupus and other collagen vascular disorders.[57] Prevention of such disease exacerbation with immunosuppressing medications could potentially impair wound healing and thus negatively impact cosmetic outcomes. Furthermore, a combination of vascular inflammation and production of autoantibodies known to be prothrombotic make hypercoagulability a well-known risk in the operative and postoperative periods for patients with lupus.[58]

In the preoperative period, patients with SLE were more likely than healthy control subjects to be anemic, lymphopenic, hypoalbunemic, or taking daily aspirin, all of which were independently associated with postoperative complications.[59] In addition, patients with lupus had an increased risk of major complications (cardiovascular events,[60] acute renal insufficiency, or deep vein thrombosis), minor complications (surgical site infection),[61] all-cause complications, and mortality in the postoperative period compared with healthy control subjects.[59] Even when compared with patients with

Table X. Surgical or other interventions in patients with lupus

Authors/ study type	N	Age	Disease	Defect/location	Treatment	Perioperative mediation	Results	Side effects	Follow-up
Ratner and Skouge,[85] 1990 case report	1	42 with 6-year disease history	DLE	Cribriform scarring to nose and upper lip	2 sessions or dermabrasion, hand engine, diamond fraises, and light freezing with 75% dichloro-tetrafluoroethane plus 25% ethyl chloride	None	Cutaneous disease not exacerbated and did not progress to systemic disease	3 weeks postoperatively, two 5-mm erythematous papules on upper lip that responded to 0.01% fluocinolone acetonide cream BID	2 years
Lewandowicz et al,[86] 2014 case report	2	Patient 1: 48 with 30-year disease history; patient 2: 59 with 20-year disease history currently in remission	Patient 1: lupus panniculitis ; patient 2: SLE	Patient 1: lipoatrophy and scarring lesions on face and arms; patient 2: extensive scarring lesion of scalp	Patient 1: lipodermal graft from gluteal fold to both zygomatic areas, nasolabial folds, and skin flaps to arms; patient 2: tissue expander, scar excision and scalp flap	NR	Patient 1: some parietal graft resorption following first procedure but still good subjective outcome; patient 2: good subjective results	None	Patient 1: 2 years; patient 2: 1 year
Wang et al,[58] 2012 case series	4	40-48	SLE	Breasts	Muscle-sparing transverse rectus abdominis musculocutaneous flap	Adalimumab (n = 1)	NR	Delayed healing of breast and abdomen (n = 1), no vascular complications	NR
Longaker et al,[87] 1996 case series	1	28	SLE	Facial atrophy	Superficial inferior epigastric flap and face lift, left side first, right side 2 months later	NR	Dramatic subjective improvement	Postoperative hematoma requiring operative exploration and evacuation	20 months
Kesiktas et al,[88] 2008 case report	1	50 with 30-year disease history	DLE	Squamous cell carcinoma on a DLE lesion on preauricular area	Free radial forearm fasciocutaneous flap	NR	No exacerbation of DLE and no tumor recurrence	1 cm distal flap area necrosed and spontaneously reepithelialized	2 years
Kadam et al,[89] 2013 case report	1	36 at procedure, disease started at 22, had been inactive for 1 year	DLE		Radial artery forearm flap and superficial temporal artery flap	NR	No vascular complications and stable results at follow-up	None	6 months

BID, Bis en die; *DLE*, discoid lupus erythematosus; *NR*, not reported; *SLE*, systemic lupus erythematosus.

Table XI. Strength of recommendations for perioperative management of patients with systemic lupus erythematosus undergoing elective total hip or total knee arthroplasty

Recommendation	Recommendation no.	Level of evidence	Studies
Biologic therapies should be withheld for surgery and before surgery for 1 dosing cycle or surgery should be planned for the end of the dosing cycle of that medication	3.1	IV	Goodman et al[65]
Patients with severe SLE should continue mycophenolate mofetil, azathioprine, cyclosporine, or tacrolimus through the surgical period	3.2	IV	Goodman et al,[65] Palmisano et al,[91] and Klement et al[92]
Patients with nonsevere SLE should hold mycophenolate mofetil, azathioprine, cyclosporine, or tacrolimus 1 week before surgery	3.3	IV	Goodman et al[65]
Restart biologic therapy when withheld before surgery with evidence of wound healing and no signs of infection or drainage (~14 days)	3.4	IV	Goodman et al[65]
There is no need/utility to "stress dose steroids" for those taking chronic steroids; the panel recommended the continued use of daily dose glucocorticoids for patients throughout surgery	3.5	IV	Goodman et al[65]

SLE, Systemic lupus erythematosus.

Table XII. Organizations focused on lupus-related research and patient support

The Us in Lupus	https://www.usinlupus.com
Lupus Canada	https://www.lupuscanada.org/mylupusguide/
The Lupus Initiative	https://thelupusinitiative.org
Lupus Foundation of America	https://www.lupus.org/resources
HealthWell Foundation	https://www.healthwellfoundation.org/fund/systemic-lupus-erythematosus/
American College of Rheumatology (ACR)	https://befiercetakecontrol.org
Lupus Research Alliance	https://www.lupusresearch.org
Lupus and Allied Diseases	https://www.ladainc.org
Looms for Lupus	http://www.thelupusproject.com/exhibitors/looms-for-lupus/
Lupus LA	http://www.thelupusproject.com/exhibitors/lupus-la/
The Howse Foundation	http://www.thelupusproject.com/exhibitors/thehowsefoundation/

rheumatoid arthritis, patients with SLE were more likely to have complications of any cause after orthopedic surgery.[62] The risk of adverse surgical outcomes was particularly high among patients with a severe lupus flare within the preceding 6 months.[63]

The American College of Rheumatology developed consensus guidelines for the perioperative management of patients with rheumatic diseases, including patients with SLE.[64,65] While these guidelines were developed for patients undergoing total joint replacement, we typically follow the same general principles for any invasive procedure in SLE patients (level of recommendation IV): 1) for patients with severe SLE, continue methotrexate, mycophenolate mofetil, azathioprine, cyclosporine, or tacrolimus through the surgical period, and 2) for patients with nonsevere SLE, mycophenolate mofetil, azathioprine, cyclosporine, and tacrolimus should be withheld 1 week before patients undergo surgery.

For elective cosmetic procedures, however, disease should be well controlled and ideally inactive before any surgical intervention. The use of a test area to assess for complications such as ulceration or koebnerization has been proposed.[19,21] A collection of studies documenting various surgical and nonsurgical interventions in patients with lupus is detailed in Table X, and a summary of American College of Rheumatology guidelines with associated level of evidence is summarized in Table XI.

SUMMARY AND PATIENT RESOURCES

In the second article in this continuing medical education series, we summarized the available evidence for performing cosmetic treatments in patients with lupus. Although high-quality data are still lacking, we hope that the compiled information will help guide future studies, particularly randomized controlled trials that will allow for more evidence-based treatment recommendations. There is a need for reconstructive treatments within this population given the associated potentially disfiguring cosmetic sequelae, and we hope that this article will help providers determine how to approach cosmetic treatments in patients with lupus patients. To keep patients and clinicians up to date with the latest in lupus information and advocacy, a list of organizations focused on lupus-related research as well as patient support can be found in Table XII.

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Answers to CME examination

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