IN-DEPTH REVIEWS

A Review of Treatments for Dissecting Cellulitis of the Scalp

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ABSTRACT

Dissecting cellulitis of the scalp (DCS) is a rare and chronic skin disorder that presents with suppurative nodules on the scalp with associated scarring alopecia. The pathogenesis of the disease involves inflammation and destruction of the hair follicle. This makes it clinically and pathologically similar to acne conglobata and hidradenitis suppurativa, which can also occur concomitantly. Many therapies exist to treat DCS, but its refractory nature makes treatment difficult and combination therapies are often needed. The aim of this review is to evaluate the evidence-based medical and surgical treatments for this disease so that clinicians can choose the best treatments according to the disease stage and severity. Knowledge of the clinical endpoints of each treatment modality is important for managing patient expectations and setting treatment goals. There is no standardized method for measurement of clinical improvement in DCS, and each individual treatment can improve one or more aspect of disease activity (such as inflammation or scarring). Topical and oral medications will be reviewed in addition to surgical and laser treatments.

INTRODUCTION

The main features of dissecting cellulitis of the scalp (DCS) are pustules, suppurative nodules, draining sinuses, and scars. It can be associated with acne conglobata, hidradenitis suppurativa, and pilonidal cysts which are collectively referred to as the follicular occlusion tetrad[12]. Although these diseases are specific to different body sites, they are characterized by follicular-based inflammation that leads to tissue scarring. The pathogenesis of DCS is unknown, although it is speculated to be related to follicular occlusion that is secondary to an infection[3]. However, a specific pathogenic bacterium has yet to be determined[4]. DCS is also classified as a primary cicatricial alopecia, where the hair follicles are irreparably destroyed and replaced by fibrous tissue[5]. Patients with dissecting cellulitis may experience psychological distress as a result of the alopecia and scarring.

DCS has a higher prevalence in African American males between the ages of 20-40[6], although there have been reports of this condition occurring in women[7] and men of other ethnic origins[8, 9]. Histologically, there are abscesses, inflammatory infiltrates of neutrophils, dermal fibrosis, and decreased

density of hair follicles[10]. Culture of the exudate may reveal the presence of bacteria that is secondary to the follicular occlusion, most commonly *Staphylococcal* species[10]. DCS is characterized by the absence of fungi, as tinea capitis can be a mimicker[11].

Treatment of DCS varies greatly based on the severity of disease. A patient with early stage disease will likely benefit from treatments that are directed against bacterial colonization and inflammation such as oral and topical antibiotics, retinoids, and biologics. Later stage disease requires treatments that address the end-stage scarring and alopecia associated with the disease. These treatments can include intralesional steroids to decrease scar, excision or marsupialization of the diseased skin, or laser treatments to target the hair. Early and late inflammatory stages of DCS are illustrated in Figure 1 and Figure 2.

TREATMENTS

Antibiotics

Oral antibiotics have demonstrated success in dissecting cellulitis and are appropriate agents for patients with early limited disease. Oral antibiotics are used for their quick action and anti-inflammatory effect, however relapses can occur when stopped. A retrospective review of 40 patients with DCS showed clinical improvement while on oral antibiotics such as doxycycline, pristinamycin, rifampicin, or a combination of several antibiotics, however all patients relapsed when discontinuing the medication[12]. A retrospective review of 21 patients with biopsy-proven DCS reported positive outcomes with doxycycline, azithromycin, or a combination rifampicin and clindamycin[13]. Two case studies demonstrated complete resolution with

Figure 1. Early inflammatory stage dissecting cellulitis with sinus tracts and alopecia. Oral antibiotics in combination with adalimumab and intralesional steroids were used in this patient.

Figure 2. Late stage dissecting cellulitis with significant scarring alopecia. Oral antibiotics and intralesional steroids were used to treat this patient.

ciprofloxacin for 1 month with treatment-refractory DCS[14, 15]. Oral clindamycin in combination with topical clobetasol was also successful at improving disease burden in a series of three patients[17]. These findings are summarized in Table 1.

Table 1. Treatment of DCS with antibiotics.

Author Reference	Study Design	Method	Number of Patients	Treatment Duration	Disease Symptom Improvements (Yes/No)	Hair Regrowth? (Yes/No)
Segurado-Miravalles et al. 2017	Retrospective review	Doxycycline 100 mg q.d.	5	N/A	Yes, 4 of 5 patients	N/A
		Azithromycin 500 mg q.d. three times a week	3	N/A	Yes	N/A
		Rifampicin 300 mg b.i.d. and Clindamycin 300 mg b.i.d.	1	10 weeks	Yes	N/A
Garelli et al. 2017	Case series	Clindamycin 300 mg b.i.d.	4	1 month	Yes	N/A
Badaoui et al. 2016	Retrospective review	Doxycycline, pristinamycin, rifampicin, or combination of antibiotics	40	11 months	Yes, but relapse reported after treatment discontinuation	N/A
Onderdijk and Boer 2010	Case report	Ciprofloxacin 500 mg b.i.d. for 1 month then 250 mg b.i.d. for 3 weeks	1	5 months	Yes	N/A
Greenblatt et al. 2008	Case report	Ciprofloxacin 250 mg b.i.d. for 1 month then 250 q.d. for 4 months	1	5 months	Yes	Yes
Salim et al. 2003	Case report	Trimethoprim 100 mg b.i.d. and clindamycin aqueous solution	1	18 months	Yes	N/A

Table 2. Treatment of DCS with retinoids.

Author Reference	Study Design	Method	Number of Patients	Treatment Duration	Disease Symptom Improvements (Yes/No)	Hair Regrowth? (Yes/No)
Segurado-Miravalles et al. 2017	Retrospective study	Isotretinoin 30 mg q.d.	8	N/A	Yes, 7 of 8 patients	N/A
Marquis et al. 2017	Case report	Isotretinoin 20 mg q.d.	1	4 months	Yes	Yes
Badaoui et al. 2016	Retrospective review	Isotretinoin 0.5-0.8 mg/kg q.d.	35	6 months	Yes, 33 of 35 patients but relapse reported after treatment discontinuation	N/A
		Acitretin 30 mg q.d.	1	11 months	N/A	N/A
Jacobs et al. 2011	Case report	Acitretin 10 mg q.d.	1	6 months	Yes	N/A

Georgala et al. 2008	Case series	Isotretinoin 0.5 mg/kg q.d. for 3-4 months	4	7 – 8 months	Yes	N/A
Bolz et al. 2008	Case report	Isotretinoin 80 mg q.d for 4 weeks then with dapsone 50 mg b.i.d. for 10 months	1	12 months	Yes	Yes
Khaled et al. 2007	Case report	Isotretinoin 0.8 mg/kg q.d.	1	12 months	Yes	Yes
Shaffer et al. 1992	Case report	Triamcinolone acetonide (40 mg/mL) intralesional injections and isotretinoin 0.85 - 1.48 mg/kg over x 5 months	1	5 months	Yes	Yes

Table 3. Treatment of DCS with biologic agents.

Author Reference	Study Design	Method	Number of Patients	Treatment Duration	Disease Symptom Improvements (Yes/No)	Hair Regrowth? (Yes/No)
Badaoui et al. 2016	Retrospective review	Infliximab	1	11 months	No	N/A
Mansouri et al. 2016	Case report	Adalimumab 80 mg on day 0, 40 mg on day 7, and 40 mg every other week thereafter	1	5 months	Yes	N/A
		Infliximab 5 mg/kg at week 0, 2 and 6, followed by 8 week intervals	1	20 months	Yes	N/A
Wollina et al. 2012	Case report	Infliximab 5 mg/kg body weight at weeks 0, 2, and 6	1	6 weeks	Yes	N/A
Navarini and Trüeb 2010	Case series	Adalimumab 80 mg followed by 40 mg 1 week after and an additional 40 mg every 2 weeks	3	1 – 7 years	Yes, but relapse reported within 4 weeks after treatment discontinuation	N/A

Table 4. Procedural therapies.

Procedure	Authors	Study Design	Method	Time of follow-up	DCS recurrence? (Yes/No)	Hair Regrowth? (Yes/No)
Surgical excision	Housewright et al. 2011	Case report	Scalpectomy with split thickness skin graft	10 months	No	No
	Bellew et al. 2003	Case report		2 months	No	No
	Williams et al. 1986	Case report		1 – 4 years	No	No
	Badaoui et al. 2016	Retrospective study	Surgical treatment (excision or abscess drainage)	N/A	N/A	N/A
	Meunier et al. 2014	Case report	Marsupialization	7 months	No	No
Laser-assisted epilation	Krasner et al. 2006	Observational	Nd:Yag laser	1 year	No	Yes, 3 of 4 patients
	Boyd and Binhlam 2002	Case report	800-nm long-pulsed diode laser	6 months	No	No
Photodynamic therapy (PDT)	Liu et al. 2013	Case report	ALA PDT	5 months	No	No
X-Ray epilation	McMullan and Zeligman 1956	Case series	X-Ray	6 months – 1 year	No	Yes

Combination therapy with corticosteroids

Oral, intralesional or topical corticosteroids can be used in DCS to reduce inflammation and swelling of the scalp, and to minimize scarring. Monotherapy with oral corticosteroids is not recommended due to the risk of relapse and long-term side effects. Salim et al. reported a case of a man with DCS and spondylarthropathy who noted improvement with prednisolone 30mg daily but relapsed when the prednisolone was tapered[19] Intralesional triamcinolone and topical steroids can be used alone in patients with limited disease or in combination with systemic treatments. These combination treatments are included in Table 2. Topical corticosteroids have not been studied as monotherapy in DCS.

Retinoids

Isotretinoin and acitretin are used for the treatment of DCS because they reduce follicular occlusion and decrease sebaceous activity. Isotretinoin can offer good results, particularly when used early in the disease course, because of the possibility of remission within one year of therapy[21-24]. Patients in a case report and comprehensive review were able to achieve remission on monotherapy with isotretinoin doses from 0.5-1 mg/kg over 4-12 months[21, 23], although one case report added dapsone for sustained improvement[22]. One case report of a 25-year-old man was administered 0.8 mg/kg isotretinoin and achieved significant clinical improvement within 4 months of treatment, with evidence of hair regrowth at 6 months. He was also able to discontinue isotretinoin after 12 months with sustained remission 6 months later[21]. Shaffer et al. reported successful resolution of DCS in a patient treated with a combination of 5 months of isotretinoin and bimonthly intralesional triamcinolone injections[18]. A retrospective study conducted at two Dermatology departments in France between 1996-2013 found similar efficacy, with 92% of patients treated with isotretinoin 0.5-0.8 mg/kg achieving remission within 3 months of therapy. However, their data found frequent relapse upon discontinuation, suggesting that longer courses may be required for sustained remission[12]. Acitretin can be used for patients requiring long-term systemic therapy as well. Jacobs et al., reported a patient treated with prednisolone, topical corticosteroids, topical tacrolimus, and acitretin. The systemic and topical steroids were tapered, and the patient remained stable on acitretin six months later[20].

Retinoids can be considered as monotherapy in early disease or in combination with other systemic and topical agents in later stage disease. It is important to consider the use of isotretinoin early in the disease course in order to attempt to stop further structural damage to the hair follicle. These findings are summarized in Table 2.

Biologics

Tumor necrosis factor (TNF) inhibitors have been used in DCS due to its similar pathogenesis to hidradenitis suppurativa. TNF inhibition is effective for suppression of the inflammation of DCS, but studies show that it does not reverse fibrosis. A case series by Navarini and Trueb demonstrated significant symptomatic improvement on adalimumab in three patients with severe clinical disease who had failed isotretinoin therapy[25]. These patients were subcutaneously administered 80mg at week 0, 40mg at week 1, and 40mg every 2 weeks thereafter. Subjective burden of disease was significantly reduced in all three patients at 8 weeks of treatment, however, relapse

occurred within 4 weeks of discontinuing therapy[25]. Other case reports using adalimumab have found similar clinical improvement and reduction in Dermatology Life Quality Index (DLQI) with this dosing regimen[26, 27]. Higher doses may provide additional efficacy, but no studies have been reported using a weekly dosing regimen.

Infliximab may also provide similar improvement to adalimumab. In a recent case report, a patient with a severe suppurative DCS had reduced symptoms and inflammation on infliximab (5 mg/kg at weeks 0, 2, and 6, with 8-week intervals thereafter), but did not have reversal of the fibrosis associated with DCS[26].

TNF inhibitors like adalimumab and infliximab are useful treatment options for patients with moderate to severe disease with prominent nodules, abscesses and sinus tracts [25]. Patients with prominent scarring will likely require combination with other treatments such as intralesional corticosteroids or procedural therapies. These findings are summarized in Table 3.

Procedural Therapies

For intractable cases of DCS, procedural therapies including X-ray epilation, surgical excision, laser treatment and photodynamic therapy have been reported. X-ray therapy is no longer a primary treatment option due to increased risk of skin cancer[28]. Surgical procedures that have shown benefit in the treatment of DCS include scalpectomy (excision of the diseased scalp skin) and marsupialization. Treatment with scalpectomy was first reported in 1986 with subsequent publication of successful cases[6, 29, 30]. More recently, marsupialization was shown to be of benefit in DCS as it is significantly less invasive and can heal remarkably well by secondary intention without the requirement for split-thickness grafting[31]. However, new lesions can occur in untreated areas and in all reported surgical modalities, hair regrowth was never observed[29-31]. In patients with longstanding disease and significant scarring, surgical options can be discussed early to provide a targeted reduction in disease burden.

Recently, hair follicle ablation with laser treatment has been successfully reported in regard to achieving long-term remission of DCS and can also stimulate hair regrowth. In one case series, four patients were treated with three to seven monthly treatments over one year with the 1,064-nm Nd:YAG laser. Three patients had at least partial hair regrowth at treatment sites[32]. The use of 5-aminolevulinic acid photodynamic therapy (ALA-PDT) has been reported to be successful in one case with no recurrent disease at 5 months follow up. Laser and light therapies may be preferential to surgery for patients who have failed multiple conventional therapies and seek to retain hair and may be combined with systemic and topical treatments. These findings are summarized in Table 4.

DISCUSSION

The multitude of treatment options for DCS reflects the refractory nature of this chronic skin condition. This makes DCS challenging to treat and places a substantial burden on the quality of life of those afflicted. Due to the progressive nature of the disease, establishing the diagnosis early and providing directed treatments will lead to the best patient outcomes. Treatment selection should account for disease severity and the amount of abscesses, sinus tracts and scar. Combination treatments with both medical and surgical modalities may offer patients

with DCS the best results to address both the inflammatory and fibrotic processes of this disease.

Conflict of Interest Disclosures: Dr. Murina is a Speaker for Abbvie, Celgene, Janssen and Novartis

Funding: None.

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