Review Article

Hidradenitis Suppurativa: A Systematic Review and Meta-analysis of Therapeutic Interventions

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Abstract

Hidradenitis suppurativa is a chronic inflammatory condition that affects skin regions bearing apocrine glands. Although hidradenitis suppurativa is difficult to treat and cure, the currently available treatments are directed toward managing the lesions and associated symptoms. This review presents an evidence-based outline of the available treatment options. We searched four electronic databases and extracted data from retrieved studies for qualitative or quantitative analysis. Meta-analysis was conducted using the comprehensive meta-analysis software to generate pooled standardized mean differences or risk ratios. Numerous medical treatments are available for hidradenitis suppurativa such as antibiotics, retinoids, antiandrogens, immunosuppressive and anti-inflammatory agents and radiotherapy for early lesions. Adalimumab, an anti-tumor necrosis factor antibody, was superior to placebo in reducing Sartorius score (standardized mean difference = −0.32, confidence interval [−0.46, −0.18], $P < 0.0001$) and pain (risk ratio = 1.42, confidence interval [1.07, 1.9], $P = 0.02$), when given weekly (not every other week). Combination therapies (such as antibiotics and hyperbaric oxygen therapy) have been tested, which have shown promising results that are yet to be confirmed. Based on the quality of evidence, the most recommended treatments for hidradenitis suppurativa include adalimumab and laser therapy. Surgery (either by simple excision or complete local excision followed by skin graft) is the first choice for intractable disease presenting in the late stages. However, the evidence on most of these treatments is deficient and further randomized trials are needed to establish the most efficient therapies for hidradenitis suppurativa management.

Key words: Acne inversa, adalimumab, antibiotics, hidradenitis suppurativa, immunosuppressive therapy, laser, surgery

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Introduction

Hidradenitis suppurativa, also known as acne inversa or Verneuil's disease, is a chronic inflammatory condition affecting skin regions bearing apocrine glands.[1] The deep-seated, inflamed and painful lesions develop as sinus tracts, nodules or abscesses, most commonly after puberty. The flares that may subside untreated within two weeks occur at varying intervals with painful and suppurative manifestations.[2]

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Though it was believed to be a rare disease, the findings of several studies contradicted this view. A survey showed a point prevalence of 1% of the French population.[3] In another study, the prevalence was found to be 4% in young adults undergoing screening for sexually transmitted diseases.[4] This condition shows a significant gender bias with three times more occurrence in women. Although the condition is recorded routinely in postmenopausal women and children, the early 20s is the most common age of affection.[5]

Genetic and hereditary factors play a role in increasing the risk of hidradenitis suppurativa as one-third of the patients report family history.[6] Further, the affected families have been demonstrated to exhibit an autosomal dominant inheritance of the condition. Mutations in γ-secretase complex genes have been linked with a subset of hidradenitis suppurativa, accompanied with a severe form of acne.[7] Obesity is a major risk factor for hidradenitis suppurativa as majority of the patients are overweight.[8] Smoking is also another major risk factor.[9]

Some of the symptoms such as stinging, burning, pain, pruritis, hyperhidrosis and heat are experienced from about 2 days before the appearance of nodules in about half of the patients. A nodule lasts for 1–2 weeks and may remain blind (not burst and subside without intervention or remain silent). But most of the nodules turn into abscesses and drain out. Compared with other chronic dermatological conditions such as psoriasis, the lifestyle of hidradenitis suppurativa patients is heavily affected because of the substantial negative effects of the condition.[10,11] These patients usually use more sick leaves and score low on the self-reported level of health status scales.[10,12]

Several other dermatological and nondermatological conditions such as inflammatory bowel disease, sinusitis, acne, palmoplantar pustulosis, hyperosteosis, osteitis—also known as SAPHO syndrome—pyoderma gangrenosum, Adamantiades-Behçet disease, spondyloarthropathy, keratitis-ichthyosis-deafness syndrome, Down's syndrome, squamous cell carcinoma, adenocarcinoma, acne conglobata, severe acne and pilonidal cysts are associated with hidradenitis suppurativa. It is also common that these conditions are misdiagnosed in hidradenitis suppurativa patients.[1]

Clinical evaluation is the most reliable method for diagnosis of hidradenitis suppurativa. Physical examination reveals the typical signs of noninflamed or inflamed nodules; sinuses that may be draining or non-draining; and abscesses in anogenital, inguinal and/or axillary regions.[13] In refractory or atypical cases, bacteriological cultures and biopsies are ordered to guide therapy. Bacteriological examinations show no underlying organisms in almost all cases. However, the presence of a superinfection or various bacteria including *Staphylococcus aureus* is associated with severity of symptoms.[14,15] In case of preparing for surgical interventions, ultrasonography is used to delineate the extent of spread of lesions under the skin.[16].

Owing to considerable similarities with other common dermatological conditions such as furunculosis, bacterial folliculitis and inflamed epidermoid cyst, the disease is ?? diagnosed and treated for a longer period of time. Some studies have reported this period to be even up to 12 years.[17] Further, clinicians also tend to treat the condition as common boils with antibiotics or lancing. Antibiotics tend to relieve the inflammation in most cases as the flares are mostly caused by bacterial infection. However, the disease keeps progressing. Although hidradenitis suppurativa is difficult to treat., the tavailable options are directed toward management of the condition and regression of precipitating factors.

The choice of treatment depends on the stage of the condition. As a rule, topical therapy is preferred for stage 1 with necessary systemic treatments prescribed based on the extent of the lesions. The available medical treatments, as assessed in this study, include antibiotics, antiinflammatory, immunosuppressive agents, botulinum toxin, isotretinoin and antiandrogens. Extensive clinical evidence, particularly using randomized controlled design, is scarce on the medical management of hidradenitis suppurativa. Therefore, choices are mostly guided by the clinicians understanding and experience, as well as published case reports and case series.

We performed this systematic review and meta-analysis to investigate the safety and efficacy of available treatment options (medical, radiation and surgical) for hidradenitis suppurativa with published data in the literature.

Methods

Literature search

A systematic literature search according to the PRISMA guidelines was conducted to identify studies on the treatment of patients with hidradenitis suppurativa. A combination of the following terms was used to search PubMed, Scopus, ISI Web of Science and Cochrane CENTRAL: ("acne inversa" OR "hidradenitis suppurativa") AND ("drug therapy" OR (rifampicin OR moxifloxacin OR metronidazole OR clindamycin OR isotretinoin OR adalimumab OR etanercept OR infliximab OR anakinra) OR (surgery OR laser OR photodynamic therapy). The search results were screened and categorized according to the type of study design such that results from case reports, case series and single-arm retrospective clinical studies were narratively summarized, while data from randomized clinical trials were pooled in a meta-analysis model. The final database search was conducted on January 26, 2018 to include all the suitable studies published in English from inception to search date.

Eligibility criteria

For a study to be meta-analyzed, certain eligibility criteria were applied. The study must be a randomized clinical trial

or a comparative clinical trial that compared hidradenitis suppurativa treatments including antibiotics, tumor necrosis factor-α with placebo or another active agent. Two reviewers screened all the retrieved results and in case of discrepancy, the disagreement was solved by discussion with a third reviewer.

Quality assessment

The quality of the included studies was assessed using a 5-point JADAD scale for scoring clinical trials. A positive response for the question was scored 1, whereas a negative response was scored 0. The study was labeled as "low quality" if the total score was ≤2, and as "high quality" if the total score was ≥3.[18]

Data extraction and synthesis

Data were extracted from the studies which met the eligibility criteria and analyzed using comprehensive meta-analysis (version 3). Continuous data were pooled as standardized mean difference and 95% confidence interval, and dichotomous data were pooled as risk ratio and 95% confidence interval. The data extraction was conducted independently by two authors, followed by resolution of discrepancies with mutual discussion. Data that were not suitable for quantitative analysis were analyzed in a qualitative approach.

Results

Literature search results and quality assessment results

Database searching resulted in 544 unique records. After screening these records, 13 randomized trials were found eligible for meta-analysis [Figure 1].[19-31] Regarding quality assessment, except for four studies, all the trials were of high quality [Table 1].

Outcomes of assessed interventions

Antibiotics

In a small randomized controlled trial, using topical clindamycin was found to diminish the nodules, pustules and abscesses.[21] However, this 3-month study had not assessed the stage of disease and used a 10 mg per milliliter preparation of clindamycin. Oral antibiotics are prescribed as a second-line therapy when desired results are not obtained by topical therapies. Agents with immunomodulatory and antiinflammatory properties are preferred if available.[32] However, a 3-month randomized controlled trial showed no superiority for oral tetracycline compared with topical clindamycin.[24] In a double-blind randomized placebo-controlled trial of patients with stage I or mild stage II hidradenitis suppurativa, a 0.1% clindamycin topical preparation showed favorable effects in terms of patients' assessments, number of abscesses, inflammatory nodules and pustules at each monthly evaluation ($P < 0.01$).[21]

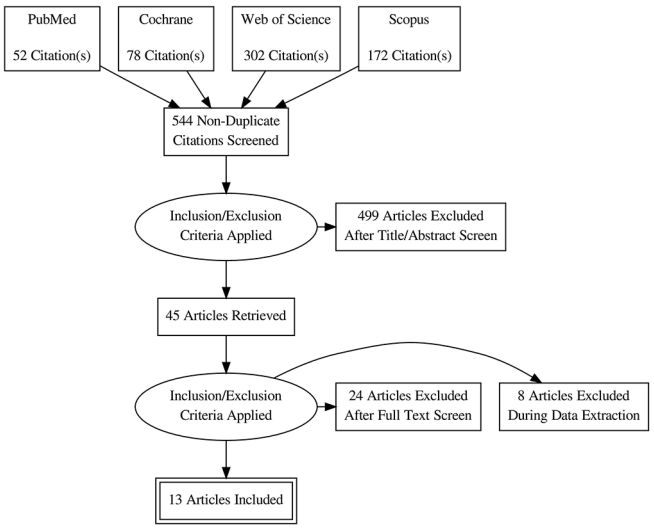

Figure 1: PRISMA flow diagram of search results and screening

There is emerging evidence that combination therapies may also be effective. A randomized controlled trial using hyperbaric oxygen therapy as an adjunct to systemic antibiotic therapy (rifampicin and clindamycin) found the combination to be significantly superior to antibiotics alone in improving hidradenitis suppurativa symptoms.[30] The treatment group was administered a hyperbaric oxygen therapy session of 120 min, compression for 20 min, followed by treatment at 2.4 atmospheres absolute for three times (with 5-min air break), each lasting 25 min, followed by 15 min of decompression. A total of 20 sessions were conducted with five sessions every week. The comparison group was given a combination of clindamycin (300 mg orally, BID) and rifampicin (300 mg orally, BID) for 10 weeks. After follow-up for 10 weeks, both Sartorius score and Dermatology Life Quality Index improved in the combination group as compared with antibiotic monotherapy. Nevertheless, further evidence is needed to establish the benefits of adjunct therapies before introducing them in clinical practice.

Antiinflammatory agents

Intralesional injections of glucocorticoids have also shown promising results. Triamcinolone has been found effective at 2–5 mg/ml when used for individual lesions.[1] Recently, a double-blind, randomized trial on the efficacy of anakinra (which inhibits binding of inflammatory pathway mediator interleukin-1 to its receptor) showed that anakinra was effective in reducing the severity of hidradenitis suppurativa.[29] Anakinra was administered subcutaneously every day for 12 weeks at a dose of 100 mg, followed by a 12-week follow-up. Clinical response was achieved in 78% of the subjects (compared with 30% in the placebo group). Further, the disease activity score was significantly lowered by 67% in the anakinra group (compared with 20% in the placebo group).

Antiandrogens

On the basis of anecdotal evidence, clinicians have been using antiandrogens in women with hidradenitis suppurativa.[33] A cross-over double-blind trial in 25 women showed that ethinyl estradiol alone or in combination with cyproterone showed

Table 1: Quality of the trials included for meta-analysis graded by JADAD score

Criteria	Adams 2010	Angel 1987	Clemmensen 1983	Fadel 2015	Gottliep 2010	Highton 2011	Jemec 1998	Kimball 2012	Kimball 2016	Miller 2011	Mortimer 1986	Tzanetakou 2016	Yildiz 2016
1. Was the study described as random?	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
2. Was the randomization scheme described and appropriate?	N	N	N	N	Y	N	N	Y	Y	N	N	Y	N
3. Was the study described as double-blind?	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	N
4. Was the method of double blinding appropriate?	N	N	N	N	Y	N	Y	Y	Y	N	Y	Y	N
5. Was there a description of dropouts and withdrawals?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Total score	3	3	2	2	5	2	4	5	5	3	3	5	2

Y: Yes, N: No

similar benefits in terms of reduction in discharge, lumps, nodules, pain and discomfort. The patients received the drugs as per the reversed sequential regimen of Hammerstein and Cupceancu, wherein a 100 mg of cyproterone acetate per day for 10 days and 50 μg per day of ethinyl estradiol per day for 21 days was administered. After 3–7 months, the ethinyl estradiol dose was reduced to 30 μg per day and the cyproterone dose was reduced to 50 mg per day.

Further, the disease either significantly improved or completely cleared in half of the patients and the number of serious adverse events was significantly lower in the combination group. [28] Antiandrogens such as finasteride have been tested in some small studies. Farrell *et al*. (two subjects), Joseph *et al*. (seven subjects) and Domenech *et al*. (one subject) showed that finasteride was able to achieve a favorable effect, ranging from partial to complete resolution.[34-36] The dose of finasteride in these studies was 5 mg/day. In the study by Joseph *et al*., the follow-up periods ranged between 8 and 24 months and patients experienced remissions lasting 8–18 months. The patient in the case report by Domenech *et al*. experienced complete remission after 1 year of treatment by finasteride. The exact mechanism of action of antiandrogens in achieving resolution of hidradenitis suppurativa is still not clearly understood.

Isotretinoin

Isotretinoin has been found to be less effective. Studies have used a dose of 0.5–1.2 mg/kg daily, administered over 4–12 months. A 4-month intervention with isotretinoin improved lesions in just one-fourth of participants, most of whom were having mild condition. Therefore, isotretinoin is not favored for the treatment of hidradenitis suppurativa.[37]

Immunosuppressive therapy

Rapid benefits have been reported with the systemic immunosuppressive agent cyclosporine.[38,39] A case of hidradenitis suppurativa, not responding to long-term antibiotics and ultraviolet B therapy responded to 4.5 mg/kg/day dose of cyclosporine. Favorable results appeared at 4 months wherein the hidradenitis suppurativa lesions healed, and discharging sinuses and pain were diminished. The benefits were maintained for 15 months during which cyclosporine was administered along with broad-spectrum antibiotics.[38] However, these are isolated case reports.

The much-preferred agents for autoimmune diseases, the tumor necrosis factor inhibitors, have also given inconsistent results. In a first of its kind, a double-blind trial with 8 weeks of infliximab or placebo with cross-over switching option for placebo group patients to infliximab reported at least 50% improvement in hidradenitis suppurativa severity index score. A total of 33 patients with moderate-to-severe hidradenitis suppurativa were given infliximab at 5 mg/kg intravenously at weeks 0, 2 and 6. The treatment was well-tolerated and provided additional benefits of pain alleviation and reduction in severity. In contrast, another trial showed that etanercept had no benefits compared with placebo as physician and patient global assessment scores were similar between the groups.[19] Using a randomized, double-blind, placebo-controlled trial design, 20 moderate-to-severe hidradenitis suppurativa patients were administered a twice weekly dose of etanercept at 50 mg for 12 weeks, followed by open-label switching to the same dose for 12 more weeks.

The selective phosphodiesterase-4 inhibitor (Apremilast, 30 mg, twice a day) has been found mildly effective in a series of nine hidradenitis suppurativa patients.[40] The duration of treatment with Apremilast ranged from 2 days to 9 months. During treatment, most patients experienced significant reductions in the visual analog scale for pain and Dermatology Life Quality Index. Apremilast, primarily developed for psoriasis, reduces tumor necrosis factor-α production by directly impacting the cyclic AMP

formation. It also reduces interleukin-17 and interleukin-23, and increases interleukin-10 that modulates inflammation. Two case reports showed that reducing interleukin-17 levels with the interleukin-17A antibody (Secukinumab) could be effective in severe hidradenitis suppurativa.[41,42] Other interleukin-17A antibodies such as brodalumab, which showed robust efficacy in interleukin-17-mediated lesions as psoriasis may show significant benefits in hidradenitis suppurativa and should be investigated.[43]

There is accumulating evidence on the safety and efficacy of adalimumab in hidradenitis suppurativa management. More recently, in a phase 2 randomized double-blind trial, adalimumab weekly dosing was found to have significant efficacy in symptomatic management of 154 hidradenitis suppurativa patients, compared with the placebo group.[25] Moreover, in a subpopulation of the same clinical trial, the majority of women with moderate-to-severe hidradenitis suppurativa showed symptomatic reduction of the disease with a 40 mg adalimumab weekly dose when compared with placebo or fortnightly dosing regimen.[31] In recent phase 3 clinical trials, the safety and efficacy of adalimumab was further demonstrated when administered on a weekly basis with dose reduction for 12 weeks.[26] In a *post-hoc* analysis, adalimumab was found to reduce pain and depressive symptoms associated with hidradenitis suppurativa over a period of 16 weeks.[44]

A pooled meta-analysis of four randomized controlled trials[25-27] was conducted to obtain more precise effect estimates regarding the safety and efficacy of adalimumab. Weekly administration of adalimumab was superior to placebo in terms of decreasing sartorius score (standardized mean difference = −0.32, confidence interval [−0.46, −0.18], $P < 0.0001$). However, adalimumab administered every other week was not significantly different from placebo (standardized mean difference = −0.25, confidence interval [−0.61, −0.12], $P = 0.18$) [Figure 2a]. The Dermatology Life Quality Index analysis showed that adalimumab was superior to placebo when administered weekly (standardized mean difference = −0.63, confidence interval [−1.03, −0.23], $P = 0.002$), but not when given every other week (standardized mean difference = −0.19, confidence interval [−0.55, 0.17], $P = 0.29$) [Figure 2b]. The number of patients with ≥30% reduction in pain score was increased in the adalimumab weekly regimen (risk ratio = 1.42, confidence interval [1.07, 1.9], $P = 0.02$), but not significantly different with adalimumab given every other week (risk ratio = 1.34, confidence interval [0.73, 2.43], $P = 0.34$) [Figure 3a]. Borderline improvement in Physician Global Assessment

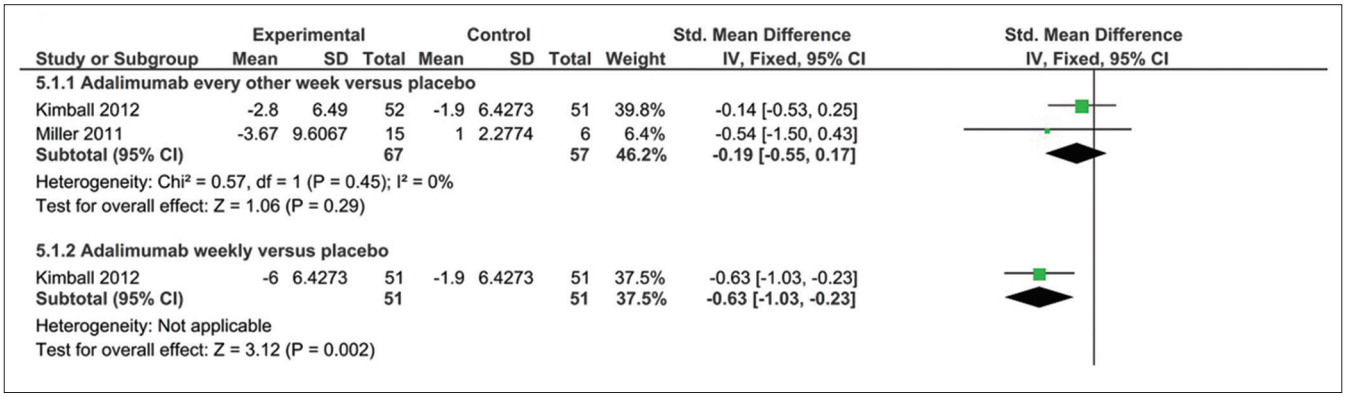

Figure 2a: Forest plot of Sartorius score in adalimumab weekly versus placebo and adalimumab every other week versus placebo

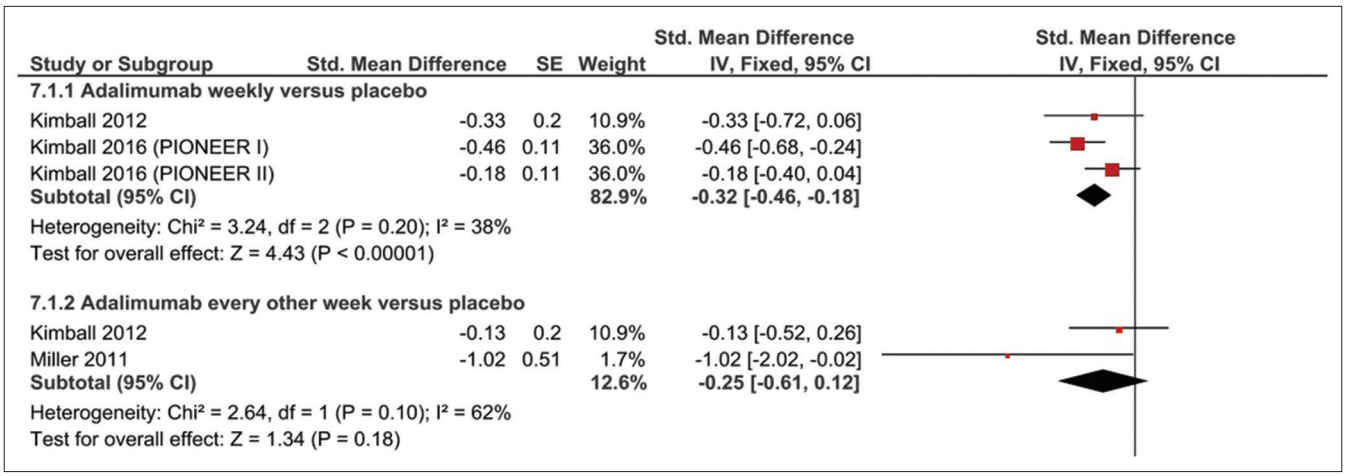

Figure 2b: Forest plot of Dermatology Life Quality Index in adalimumab weekly versus placebo and adalimumab every other week versus placebo

was observed with the weekly regimen (risk ratio = 4.5, confidence interval [1.02, 19.81], P = 0.05), but not when the drugs was given every other week (risk ratio = 2.45, confidence interval [0.5, 12.07], P = 0.27) [Figure 3b].

The pooled analysis also showed that adalimumab was highly tolerable. There was no significant difference in the incidence of serious adverse events between adalimumab weekly (risk ratio = 0.9, confidence interval [0.37, 2.18], P = 0.81) and every other week (risk ratio = 2.29, confidence interval [0.61, 8.69], P = 0.22) and placebo [Figure 4a]. The incidence of infection was similar in both regimens as compared with placebo; weekly (risk ratio = 0.84, confidence interval [0.67, 1.06], P = 0.14) and every other week (risk ratio = 1.17, confidence interval [0.80, 1.71], P = 0.41) [Figure 4b]. Treatment discontinuation?? was not significantly different between both adalimumab weekly and placebo (risk ratio = 0.78, confidence interval [0.29, 2.06], P = 0.61) nor adalimumab every other week and placebo (risk ratio = 1.78, confidence interval [0.38, 8.33], P = 0.46) [Figure 5]. Although preliminary, these findings for clinical treatment of hidradenitis suppurativa with adalimumab are promising.

Four cases of hidradenitis suppurativa have been treated with botulinum toxin based on the rationale that botulinum toxin reduces sympathetic activation of apocrine glands by lowering the acetylcholine release. Lowered apocrine activity limits inflammation and follicular rupture.[45-47] These reports used inconsistent regimens (ranging from botulinum toxin administration once to four sessions over 3 years of treatment) with doses ranging between 40 and 50 IU and reported complete remissions after 1–4 doses.

Surgical intervention

Patients with stage 1 and 2 hidradenitis suppurativa do not need surgical interventions. Surgical intervention is preferred as a last option for unresponsive lesions. Extensive scarring invariably needs surgery because it does not respond to medications. Recurrence is very common if the lesions are just drained.[48] And drainage does not work for inflamed and non-fluctuating nodules. In minor surgeries, the roof of the sinus tract is excised, leaving the floor intact to ensure rapid healing.[49] Interestingly, excision of all hair-bearing in the affected region provides much higher benefits compared to excision of just the inflamed lesions.[50] This could be due to the presence of diffuse invisible lesions around the focal lesions.

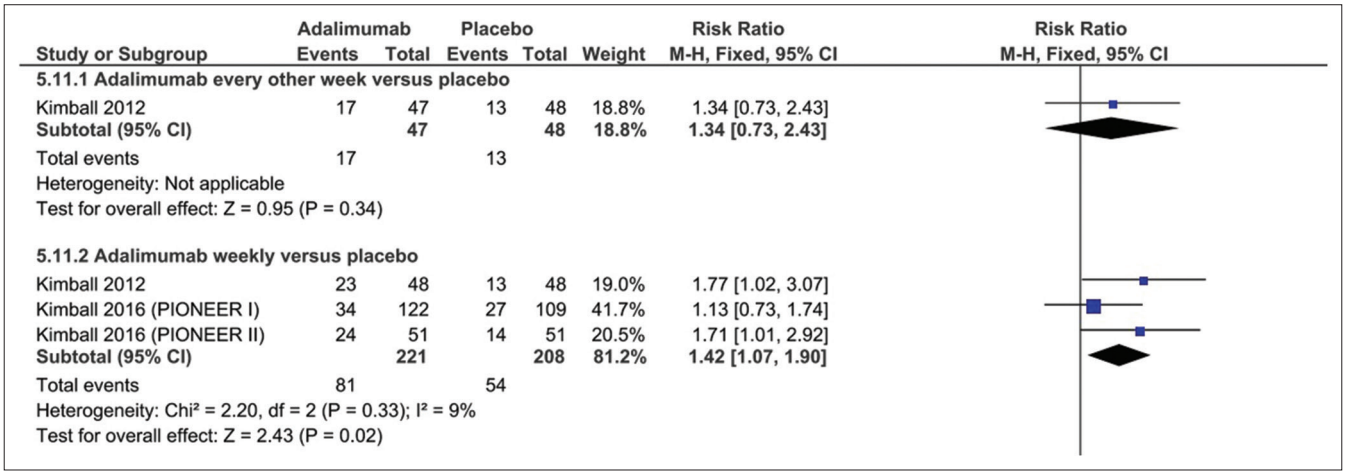

Figure 3a: Forest plot of ≥ 30% reduction in pain score in adalimumab weekly versus placebo and adalimumab every other week versus placebo

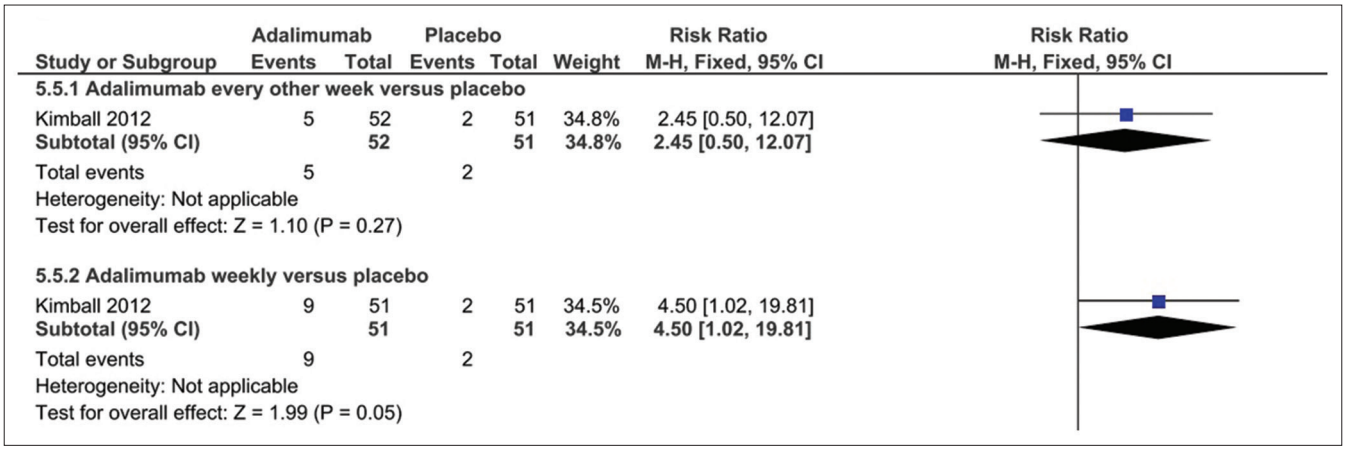

Figure 3b: Forest plot of improvement in physician global assessment in adalimumab weekly versus placebo and adalimumab every other week versus placebo

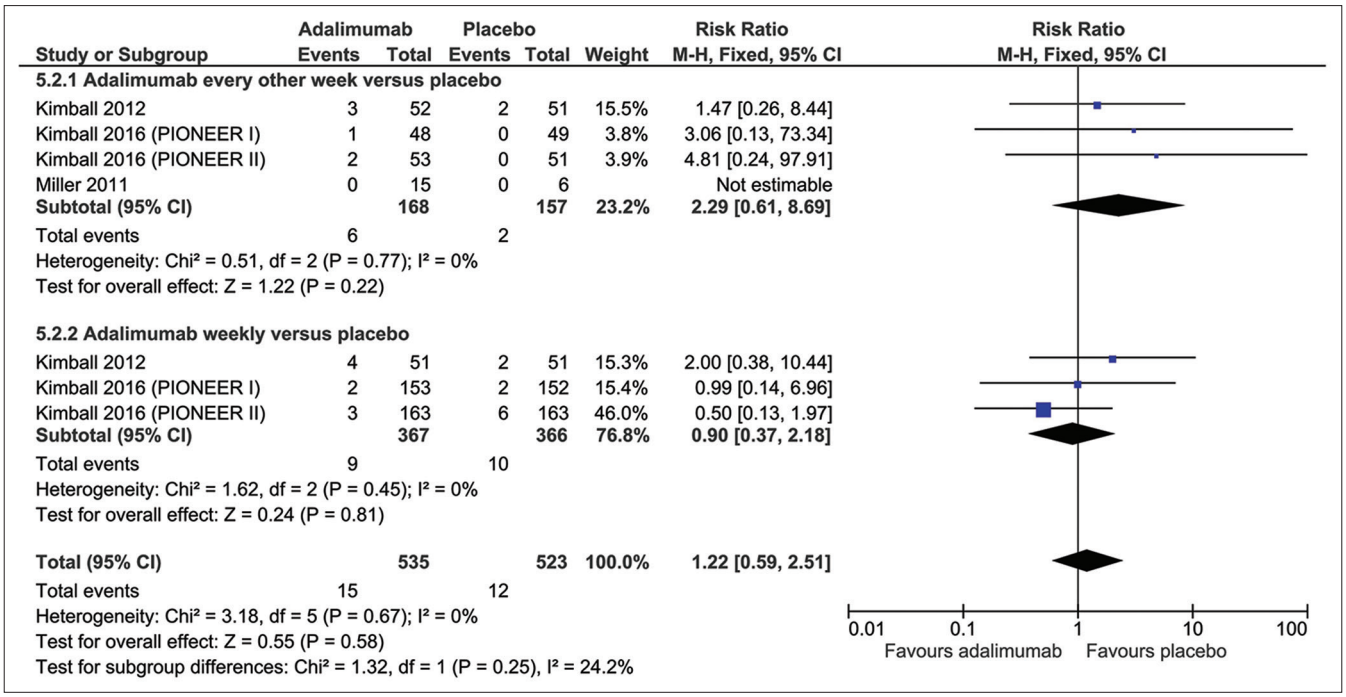

Figure 4a: Forest plot of serious adverse events in adalimumab weekly vs. placebo and adalimumab every other week vs. placebo

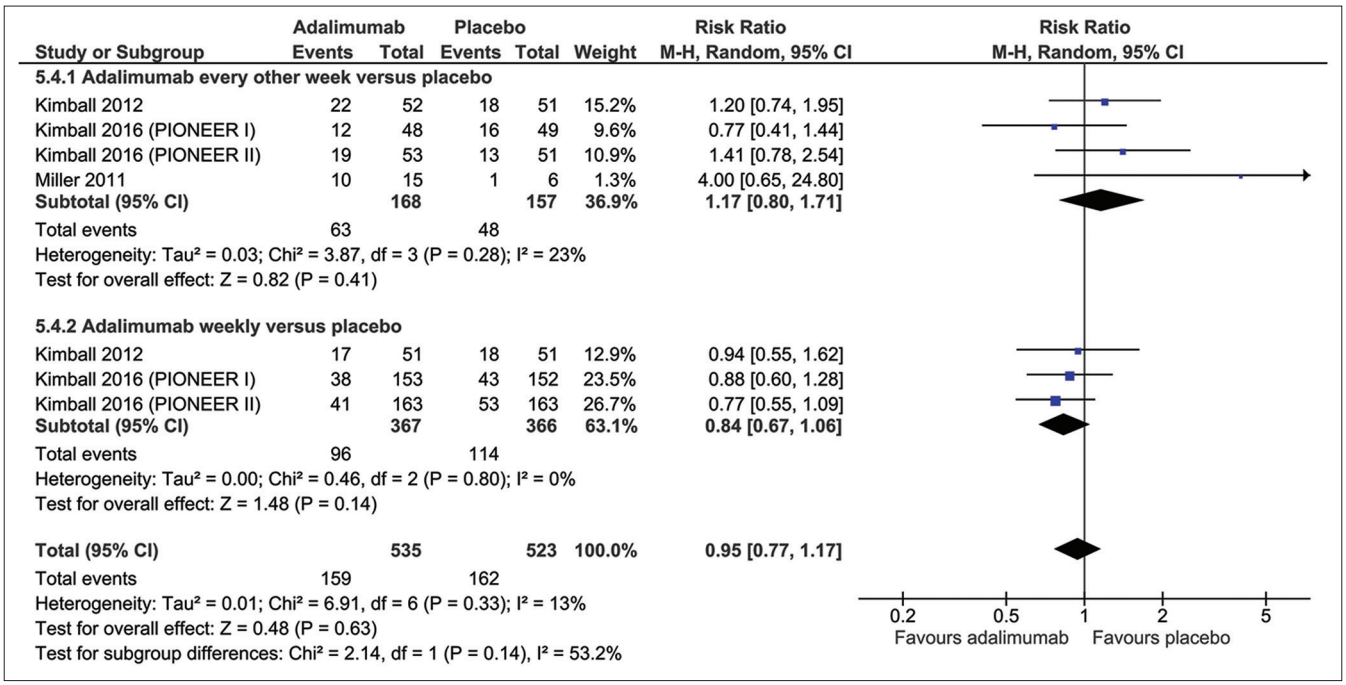

Figure 4b: Forest plot of infection in adalimumab weekly vs. placebo and adalimumab every other week vs. placebo

Laser and radiation therapy

Laser and radiation therapies have been used lately for alleviating hidradenitis suppurativa. A prospective randomized controlled trial on 22 stage 2–3 hidradenitis suppurativa patients were assessed by neodymium-doped yttrium aluminum garnet (Nd:YAG; a hair epilation device) laser. The results showed 65% of all sites, 62% of axillary lesions, 73% of inguinal lesions and 53% of infra-mammary lesions had statistically significant improvement, compared with control patients after 3 months of treatment.[51] In addition to proving the benefits of laser therapy, this study also reinforced the primary follicular pathogenesis of hidradenitis suppurativa. Another study using carbon dioxide laser therapy left the lesions to heal by secondary intention and reported recurrence in just 8% of the lesions after 27 months of follow-up, cementing the long-term benefits of laser intervention.[52]

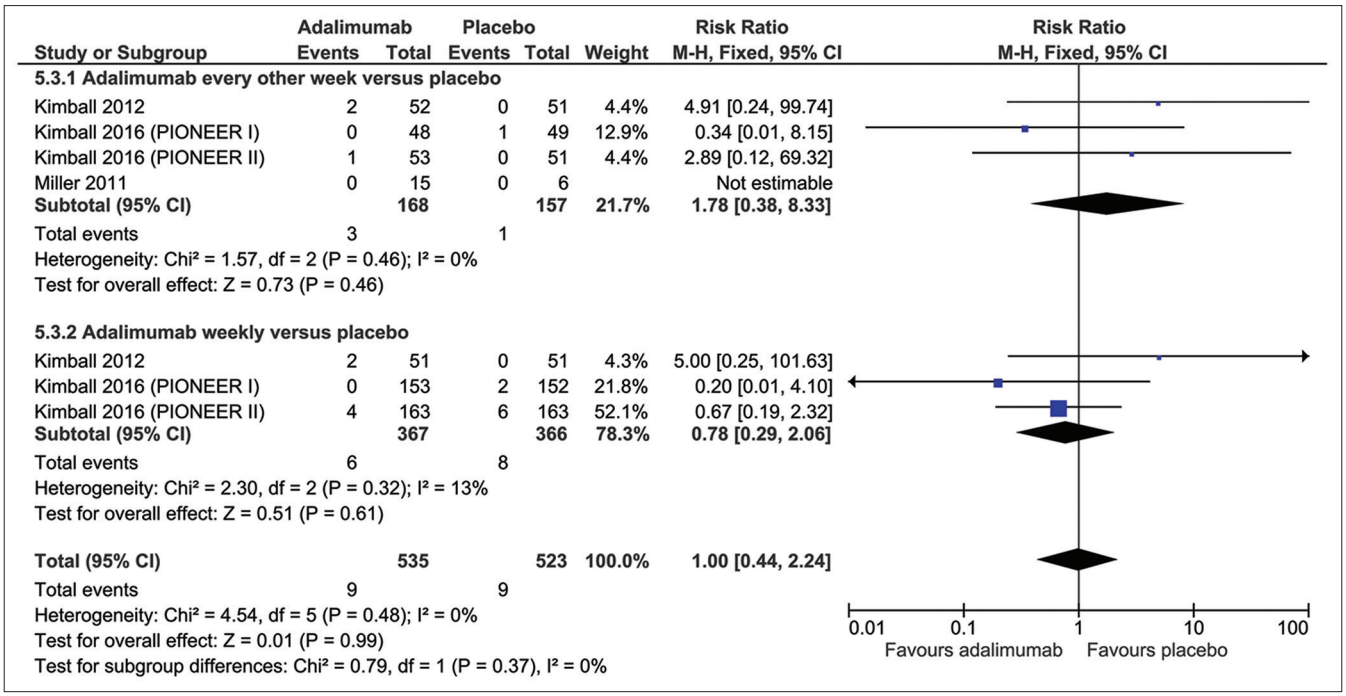

Figure 4c: Forest plot of treatment discontinuation in adalimumab weekly vs. placebo and adalimumab every other week vs. placebo

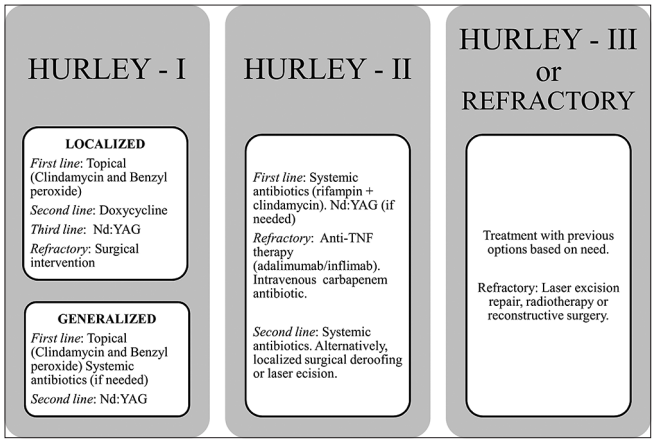

Figure 5: A treatment algorithm based on the evidence from the literature

Highton *et al*. investigated the efficacy of intense pulsed light versus no treatment for hidradenitis suppurativa.[23] There was no significant difference in terms of the participants global assessment for groin and infra-mammary lesions. However, the treatment was associated with worse assessment for axillary lesions. Another trial by Fadel *et al*. investigated niosomal methylene blue gel photodynamic therapy versus free methylene blue gel photodynamic therapy for hidradenitis suppurativa.[22] The Hidradenitis Suppurativa Lesion, Area and Severity Index was significantly better in the niosomal methylene blue gel. Staphage lysate was superior to placebo in improving the physician global assessment, as reported by Angel *et al*.[20]

Discussion

This systematic review discussed the available therapeutic options for hidradenitis suppurativa. We investigated the published literature on several medical, radiation and surgical modalities. Several of these modalities showed good efficacy and tolerability in the included studies. We further performed a meta-analysis of the safety and efficacy of adalimumab in hidradenitis suppurativa patients. The analysis showed that adalimumab is effective when given weekly rather than at every other week. Surgery is reserved for advanced stages, unresponsive cases and extensive scarring.

Compared with general population, hidradenitis suppurativa patients have a 50% higher risk of any type of cancer.[53] These epidemiological studies have also indicated that some cancers such as squamous cell carcinoma, hepatocellular cancer and buccal cancer occur more specifically than others in these patients.[53] However, these findings should be considered with care as smoking was not controlled for in these patients, which is a confounding factor for both the conditions. Finding safe and effective treatments for those patients is therefore necessary.[54]

Strength of evidence

The evidence was evaluated as per the GRADE approach for rating the quality of evidence [Table 2].[55] Further, a treatment algorithm is provided based on our clinical experience and the evidence from this review.

Obscurity and future directions

The limitations of the current study include the low number of available randomized controlled trials in the literature, which prevented meta-analysis for most assessed regimens. Moreover, adequate follow-up information were not reported for several regimens. Currently, there are no set guidelines

Table 2: Strength of recommendation of the therapies for hidradenitis suppurativa based on the quality of evidence

Strength of recommendation	Therapy (quality of evidence, line of therapy)
A	Adalimumab, systemic (Ib, first line) Flap plasty reconstruction (Ia/IIa, surgery) Laser therapy, CO_2 or Nd:YAG (Ib, surgery)
B	Tetracycline, oral (IIb, first line) Total excision, lesion and surrounding skin with hair follicles (IIb, surgery) Second intention healing (IIb, surgery) Infliximab, systemic (Ib, second line)
C	Clindamycin, oral (III, first line) Individual lesion excision/curettage (III, surgery) Primary closure/skin graft (III, surgery) Zinc gluconate/resorcinol (III, second line) Acitretin/etretinate (III, second line)
D	Deroofing (IV, surgery) Intense pulsed light (IV, surgery) Corticosteroid, intralesional/systemic (IV, second line) Colchicine/botulinum toxin/isotretinoin/dapsone/cyclosporine/hormones (IV, third line)

Ia (A): Meta-analysis of RCT, Ib (A): RCT, IIa (B): Controlled nonrandomized study, IIb (B): Quasi-experimental study, III (C): Nonexperimental studies (case-control studies, correlation, comparative studies), IV (D): Expert committee reports. RCT: Randomized clinical trials, Nd: YAG: Neodymium-doped yttrium aluminum garnet

available for the management of hidradenitis suppurativa. A lot remains to be learnt about hidradenitis suppurativa as randomized controlled trials are to be conducted on various aspects. For instance, the different therapies need to be compared for efficacy, duration of treatment necessary and achieving permanent remission. Similarly, combination therapy needs to be established as a second line of treatment if monotherapy fails. There is also need for undertaking trials on immunosuppressive agents as single treatments as well as in combination with antibiotics. Finally, the effectiveness of surgical techniques and postsurgical management practices remains to be studied well.

Conclusion

In this review, we presented an evidence-based evaluation of hidradenitis suppurativa management modalities. Further, we prepared a treatment algorithm based on the evidence and our own experience at our clinic. Owing to the complex nature of hidradenitis suppurativa, the patient will have a better chance of recovery if diagnosed at early stage, followed by proper treatment, preferably based on staging followed by adherence to evidence-based algorithm. All patients may need one or more of adjuvant therapies to manage associated pain, depression, weight loss and infections.

Numerous medical treatments are available for hidradenitis suppurativa such as antibiotics, retinoids, antiandrogens, immunosuppressive and anti-inflammatory agents and radiotherapy for early lesions. Adalimumab, an anti-tumor necrosis factor antibody, was superior to placebo in reducing Sartorius score and pain, when given weekly (not every other week). Combination therapies (such as antibiotics and hyperbaric oxygen therapy) have been tested and showed promising results that are yet to be confirmed. On the basis of quality of evidence, the most recommended treatments for hidradenitis suppurativa include adalimumab and laser therapy. Surgery (either by simple excision or complete local excision followed by skin graft) is the first choice for intractable disease presenting at late stages. The evidence on most of these treatments is deficient and further randomized controlled trials are needed to establish the most efficient therapies for hidradenitis suppurativa management.

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Conflicts of interest

There are no conflicts of interest.

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