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Treatment Options for Hidradenitis Suppurativa: Efficacy, Risks, Benefits

Katherine A. Hennager
University of North Dakota

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Treatment Options for Hidradenitis Suppurativa: Efficacy, Risks, Benefits

By

Katherine A. Hennager PA-S

Bachelor of Science, North Dakota State University, 2015

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ADALIMUMAB FOR HIDRADENITIS SUPPURATIVA

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Abstract

Hidradenitis suppurativa is a chronic, recurrent follicular occlusion disease with painful, sometimes debilitating, cutaneous draining lesions and subcutaneous abscesses (DynaMed Plus, 2016). Hidradenitis suppurativa is understood to be a multifactorial disease that is hard to treat in some patients, especially those with a severe form of the disease. For this project, the efficacy of adalimumab for hidradenitis suppurativa was assessed and whether it is more beneficial than traditional treatments used. Adalimumab is a TNF-alpha inhibitor which belongs to the biologic DMARDs drug class. Kimball et al. (2012) found that at week 16 of their trial 3.9% of the placebo patients, 9.6% of every other week (EOW) dosing of adalimumab patients, and 17.6% of every week dosing of adalimumab patients achieved clinical response. Patient response reports on pain and outcomes were significantly greater in the weekly dosed patients vs. placebo group. A study by Miller et al. (2011) showed a significant reduction in Sartorius score after 6 weeks and an almost significant reduction seen after 12 weeks when compared to the placebo group (-10.7 vs. 7.5, $P=0.024$ and -11.3 vs. 5.8, $P=0.07$). Kimball et al. (2016) showed clinical response rates at week 12 were significantly higher for the groups receiving adalimumab weekly than for the placebo groups: 41.8% versus 26.0% in PIONEER I ($P=0.003$) and 58.9% versus 27.6% in PIONEER II ($P<0.001$). DynaMed Plus, PubMed, and Cochran Library were searched with key words: hidradenitis suppurativa, adalimumab, and treatment.

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Introduction

Hidradenitis suppurativa, or acne inversa, is a recurring chronic inflammatory follicular occlusion that varies in severity from a few pimple-like lesions to deep painful abscesses and can be very debilitating to patients depending on the severity. Commonly a secondary bacterial infection will follow this inflammatory response. Hidradenitis suppurativa is seen in many different sites on the body. “The sites affected in the order of decreasing frequency include: axillary, inguinal, perineal, perianal, mammary and inframammary, buttocks, pubic region, chest, scalp, retroauricular, and eyelid” (Scuderi,2017, p. 96). This disorder has a prevalence of 1-4% worldwide and has a female to male ratio of 3:1 (DynaMed Plus, 2016). The disease has a peak onset in the early twenties and is rarely seen before puberty or after menopause (DynaMed Plus, 2016). Using the Hurley Clinical Staging scale there are three stages to the disease: stage I is single or multiple abscess formation without sinus tracts and cicatrization, stage II is recurrent single or multiple widely separated lesions with tract formation and cicatrization, and stage III is multiple interconnecting tracts and abscesses across entire area with diffuse or near-diffuse involvement (DynaMed Plus, 2016). These stages are used to decide which treatment options would benefit the specific patient.

The etiology of this disorder is not completely understood but it is likely multifactorial with some of the possible contributing factors including: genetics, hormones, and aberrant immune response that causes upregulated cytokines (DynaMed Plus, 2016). Risk factors include family history, smoking, obesity, mechanical friction, and certain medications (DynaMed Plus, 2016). Traditional treatments for this disorder consisted of antibiotics, hormone therapy, retinoids, corticosteroid injections, surgical intervention, pain management, and patient counselling on weight loss and smoking cessation. More recently, the tumor necrosis factor-

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alpha (TNF-alpha) inhibitor adalimumab was approved by the Food and Drug Administration (FDA) for treating hidradenitis suppurativa. Adalimumab (brand name Humira) is a member of the drug class biologic disease-modifying antirheumatic drugs (DMARDs), and this class is used often when treating rheumatic diseases. The use of TNF-alpha inhibitors for hidradenitis suppurativa was an accidental discovery. Patients with Crohn's disease that also had hidradenitis suppurativa were being treated with adalimumab for the Crohn's and there was improvement seen in the hidradenitis suppurativa lesions as well. Adalimumab is a recombinant human immunoglobulin G1 (IgG1) monoclonal antibody that binds to TNF-alpha and blocks its interaction with endogenous cell surface TNF receptors (DynaMed Plus, 2018). Other drugs of this class have been shown to have benefits when treating hidradenitis suppurativa however more studies are needed to be certain of their efficacy and adalimumab is still the only FDA approved TNF inhibitor for treatment of hidradenitis suppurativa. Adalimumab is only available in a subcutaneous injection; however different dosages are available depending on what is being treated.

Statement of the Problem

There is no cure for hidradenitis suppurativa and although there are many treatment options available, the traditional treatments do not provide adequate relief of symptoms for some patients. Adalimumab, though not a cure, may provide more beneficial treatment than these traditional options alone. This review was needed to evaluate research supporting the efficacy of adalimumab for hidradenitis suppurativa and to compare the risks and benefits of using this medication.

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Research Questions

In patients with hidradenitis suppurativa is adalimumab more effective than traditional treatments to include antibiotics, hormone therapy, retinoids, corticosteroid injections, surgical intervention, and pain management in treatment outcomes?

In patients with hidradenitis suppurativa does adalimumab show better treatment outcomes in patients with severe disease vs mild or moderate disease?

In patients with hidradenitis suppurativa are the side effect outcomes associated with adalimumab treatment more significant or detrimental than side effect outcomes associated with the traditional treatment options?

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Review of the Literature

My research methods included searching PubMed, Cochrane Library, and DynaMed Plus for clinical trials that had been done within the last ten years. Through a literature review I searched PubMed for randomized clinical trials that compared the use of adalimumab for hidradenitis suppurative against a placebo group using mesh headings “hidradenitis suppurative” and “adalimumab.” This produced three clinical trials that I used for my research done within the last ten years. I then searched the Cochrane Library database for a systematic review pertaining to adalimumab for hidradenitis suppurativa, this search did produce a review. The topics “adalimumab” and “hidradenitis suppurativa” were accessed on DynaMed Plus, and these topic pages gave me information on the background, etiology, and current treatment guidelines for hidradenitis suppurativa.

Many of the studies had low patient numbers however there are two studies, PIONEER I and II, that had larger patient numbers and these patients were followed for a longer time period. Many of the peer review journal articles I have found reference the PIONEER studies and they are regarded as revolutionary studies for treatment of hidradenitis suppurativa.

I then searched PubMed for clinical trials using the mesh headings “surgical treatment” and “hidradenitis suppurative”, this produced no studies assessing the efficacy of surgical treatment alone for hidradenitis suppurativa. A search of PubMed for clinical trials using the mesh terms “corticosteroids”, “steroids”, “treatment” and “hidradenitis suppurative” produced no studies. I then searched PubMed for clinical trials using the mesh headings “hormone”, “treatment”, and “hidradenitis suppurative” this produced one study which was only done using female subjects and did not have a placebo group and therefore was not used. With another search of PubMed I used mesh headings “anti-bacterial agents,” “antibiotic,” and “hidradenitis

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suppurative” which produced one study comparing two antibiotics to each other but there was no placebo group and so this study was not used. A search was conducted on PubMed for clinical trials using the mesh headings “retinoids” and “hidradenitis suppurative” this search produced two studies however they were both older than ten years and had no placebo control group and were not used in this project.

As you can see by my searches there are not many studies available to show the effectiveness of other treatment options for hidradenitis suppurativa. This disease is not common so finding the patient numbers in a geographical region and having follow up would be difficult. For years this disease has been treated with the traditional treatment options mentioned above without many studies with data backing up their efficacy. With adalimumab for hidradenitis suppurativa there are several more studies available when compared to traditional treatments. However, it is understood that because this is a multifactorial disorder there may be several treatment options and sometimes multimodal treatment that could have some benefit. Much of the treatment for hidradenitis suppurativa is finding what works best for each individual patient.

Theme One: Hidradenitis Suppurativa Etiology and Pathogenesis

As mentioned previously the etiology of hidradenitis suppurativa is not completely understood however it is thought to be a follicular occlusion. “The occlusion is caused by infundibular keratosis and hyperplasia of the follicular epithelium and results in accumulation of cellular debris, leading to cyst formation” (Prens, 2015). Prens et al. (2015) discuss how the follicular occlusion leads to dilation of the hair follicle followed by rupture of the debris into the surrounding dermis, and how this action causes an inflammatory response that attracts neutrophils, lymphocytes, and histiocytes. In this article by Prens et al. (2015) they also discuss how it is theorized that this response follicular occlusion is due to a deficiency in the follicular

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skin immune system, whereas, another theory suggests that it is due to an overactive immune system that causes this inflammatory response to harmless bacteria.

When it was discovered that hidradenitis suppurativa responded to the TNF-alpha inhibitors researches started to dig deeper into the theory of an overactive immune system. Prens et al. (2015) discussed how some studies have shown TNF-alpha at the mRNA and protein levels in the hidradenitis suppurativa affected skin, and increased levels of IL-10 in this skin have also been reported. Other studies have demonstrated increased upregulation IL-1beta in hidradenitis lesions and perilesional skin (Prens, 2015). These findings are all suggestive towards the theory that an overactive immune system has a role in the pathophysiology and development of hidradenitis suppurativa.

Smoking and mechanical stress caused by obesity can also play a part in the development of hidradenitis suppurativa and its severity. When treating a patient with hidradenitis suppurativa they should be counselled on smoking cessation and weight loss, this may require referrals for a dietician. Woodruff et al (2015) state that 35% to 40% of patients with hidradenitis suppurativa report a family history. Lee et al. (2017) mentions in their article that hidradenitis suppurative is associated with multiple comorbidities, such as: obesity, metabolic syndrome, inflammatory bowel disease, and spondyloarthropathy. This is particularly interesting as spondyloarthropathy can also be treated with TNF- alpha inhibitors and inflammatory bowel disease is common in rheumatological diseases. I learned this during my rheumatology rotation whilst enrolled in the UND PA Program.

Hidradenitis can vary in severity from mild to moderate to severe. It can also be classified into one of three stages using the Hurley staging scale, other scales such as Sartorius scale, HS-Physician's Global Assessment, Hidradenitis Suppurativa Clinical Response, and Hidradenitis

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Suppurativa Severity Scale are also used although are not as prominent as the Hurley staging scale in clinical trials. In an article from the Journal of the American Academy of Dermatology written by van der Zee et al. (2015) describes the different clinical presentations of hidradenitis suppurativa to include: regular type, frictional furuncle type, scarring folliculitis type, conglobate type, syndromic type, and ectopic type. The authors of this article point out how there is not much data supporting these different presentation types however in the future they could be important in determining treatment options as certain presentation types may respond better to different types of treatment.

Early diagnosis and aggressive treatment is important because once the disease has advanced and causing destruction of the cutaneous architecture it becomes more difficult to handle. (Woodruff, 2015). Woodruff et al. (2015) also point out that the advanced disease is associated with debilitating medical and psychosocial outcomes. “Diffuse fibrosis and scarring, especially with axillary disease, can lead to limb contractures and impaired mobility.” (Woodruff, 2015, p.1680). Shanmugam et al. (2017) discuss in their review article that hidradenitis suppurativa, like other chronic inflammatory diseases, is associated with a significantly increased risk of cardiovascular disease. “The increased risk of cardiovascular disease may be explained by uncontrolled inflammation” (Shanmugam, 2017, p.3). The diagnosis of hidradenitis is done clinically, there are no diagnostic tests required for diagnosis. Ball et al. (2016) do point out the need to swab any discharge from the abscesses to rule out infection and colonization. Lee et al. (2017) discuss the psychosocial effects of hidradenitis suppurativa, the pain, malodorous discharge, and scarring can lead to impairment of quality of life more so than other skin conditions such as psoriasis and atopic dermatitis. Ball et al. (2016) also discuss the psychosocial effects similarly to Lee et al. “Patients with hidradenitis

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suppurativa have a mean score on the Dermatology Quality of Life Index that is higher than other skin conditions associated with high morbidity including eczema, acne, psoriasis and even chronic urticaria” (Ball, 2016, p.26). These risks show the importance of treating early and aggressively, it is also important because squamous cell carcinoma can develop in the regions of chronic inflammation.

Theme Two: Treatment Options for Hidradenitis Suppurativa

Although aggressive treatment may help more serious manifestations of the disease in the future there are some lifestyle modifications that patients with hidradenitis suppurativa should be counselled on. These lifestyle modifications include smoking cessation, weigh management, and eating a healthy diet. Patients should also be advised to avoid wearing tight fitting clothing as mechanical stress or friction can increase the incidence and severity of exacerbations. of hidradenitis suppurativa. Other nonpharmacologic treatments include warm compresses and antimicrobial soap, patients should be advised to have good personal hygiene.

Ball et al. (2016) points out that although there is no evidence to support the use of topical antiseptics such as chlorhexidine lotion for hidradenitis suppurativa, it is frequently advised. Although there were no randomized placebo controlled studies found for antibiotic use for hidradenitis suppurativa in the last ten years there were discussions in several peer reviewed review articles regarding antibiotic use. Lee et al (2017) state in their review that topical clindamycin is used for more mild cases of hidradenitis suppurative if the affected areas are more localized. Oral antibiotics, usually a tetracycline, seem to be used when the disease is more widespread. Generally, treatment with oral antibiotics need to be continued for two to three months. “After oral antibiotic use its common to have reoccurrence of lesions” (Lee, 2017). Ball et al. (2016) state that if the oral tetracycline proves ineffective a more potent treatment of oral

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clindamycin and rifampicin twice daily for three months is effective in 80% of cases. If antibiotics prove ineffective the next step is usually a retinoid. Ball et al. (2016) discuss that acitretin is more effective than isotretinoin, but because of the teratogenic risk with acitretin, isotretinoin is favored in younger women. Surgical treatment for HS is controversial and has not been studied enough to say whether it is of any benefit. For active abscesses, incision and drainage may be necessary. “It is beneficial in relieving acute pain and suffering, but this approach has been discouraged for long term practice because of the high recurrence rate” (Scuderi, 2017, p.102).

A systematic review retrieved from the Cochrane Library by Ingram et al. (2015) discusses all interventions for hidradenitis suppurativa. This review searched five databases, five trial registers, and searched conference proceedings of eight dermatology meetings for all randomized control trials regarding interventions for hidradenitis suppurativa. “Moderate quality evidence exists for adalimumab, which improves DLQI score when 40 mg is given weekly, twice the standard psoriasis dose. However, the 95% confidence interval includes an effect size of only 1.5DLQI points, which may not be clinically relevant, and the safety profile of weekly dosing has not been fully established. Infliximab also improves quality of life, based on moderate quality evidence” (Ingram, 2015, p.2). “More RCTs are needed in most areas of HS care, particularly oral treatments and the type and timing of surgical procedures. Outcomes should be validated, ideally, including a minimal clinically important difference for HS” (Ingram, 2015, p.2). This systematic review further supports the need for more randomized control studies, not only for adalimumab for hidradenitis suppurativa, but all interventions used to treat this poorly understood skin condition.

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Kerdel (2014) wrote an article discussing many different nonsurgical medications available for hidradenitis suppurativa. This article reviews information about antibiotics, corticosteroids, hormones, metformin, retinoids, and immunosuppressants for hidradenitis suppurativa. Many studies only focus on one type of treatment and this article summarizes almost all of the nonsurgical treatment options. However, it does state under each category what supporting evidence there is out there in the form of clinical trials to support their use and many of the treatment options do not have this evidence from trials to support their use. Kerdel (2014) discusses topical clindamycin for early treatment for hidradenitis suppurativa, and states that an early, small, double blind study did show significant reduction in number of abscesses, inflammatory nodules and pustules when compared to placebo. Kerdel (2014) also discusses the use of hormonal therapy such as spironolactone for hidradenitis suppurativa in women, however there are no studies available to support its use. Metformin which is used to treat type II diabetes is believed to help hidradenitis suppurativa, especially in women, however there are no available studies to support the use of metformin for this disorder (Kerdel, 2014). Corticosteroids are used intralesionally when there are active lesions and this helps settle down the inflammation and pain, systemic corticosteroids such as prednisone have shown beneficial when treating this disorder, however because of the complications that systemic corticosteroids pose with long term use they should not be used to treat this chronic lifelong disease (Kerdel 2014).

Theme Three: Adalimumab for Hidradenitis Suppurativa

Fotiadou et al. (2016) in a review article compares different biologic agents to adalimumab for the treatment of hidradenitis suppurativa. Although other biologics have shown some promise there are just not enough clinical trials to support their use. Adalimumab by far

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has the most support from the evidence supplied by clinical trials in the treatment of hidradenitis suppurativa.

Kimbal et al. (2012) conducted a phase II, parallel, randomized, placebo-controlled trial consisting of a blinded 16-week period (period 1) and an open-label 36-week period (period 2). The study consisted of 154 adult patients with moderate to severe hidradenitis suppurativa that were unresponsive to oral antibiotics. This study pertains to my topic because it assesses the efficacy of adalimumab for HS in a group of patients that did not respond to one of the traditional treatments for HS. I choose this study because it had a relatively high number of subjects when compared to some of the other studies, I also liked how the study was blind to everyone involved for the first 16 weeks of the study to avoid bias. However, period 2 of the study was open label for 36 weeks which was a majority of the study time and knowing which patients were receiving the actual medication could lead to some bias opinion. Also in this study one group of subjects was given every other week (EOW) dose, but this group was switched to an every week dose if results were suboptimal. I would have preferred for the entire study to be blind to avoid bias, and also for each group to continue their original treatment throughout the entire study. At week 16, 3.9% of the placebo patients (2 of 51), 9.6% of the EOW patients (5 of 52) and 17.6% of weekly patients (9 of 51) achieved clinical response. Serious adverse effects rates were 3.9% for placebo, 5.8% for EOW, and 7.8% for the weekly patients. Patient reported outcomes were significantly greater in the weekly dosing group when compared to the placebo group. When the weekly dosing group was switched to the EOW during period 2 of the study, a decrease in response was seen.

Kimball et al (2016) conducted two phase three trials, PIONEER I and II followed 633 patients with HS and the use of adalimumab. These were double-blind placebo controlled studies

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that took course over a 36-week time period. Many other studies and review articles base their information from these two extensive studies. Between the two studies there were 633 patients which is a large patient number compared to many other studies. The study was blind to all involved for the first twelve weeks and there was a placebo control for comparison. “In period I of each study there were significantly more patients in the adalimumab group than the placebo group that met the primary efficacy end point of clinical response at week 12 (PIONEER I: 41.8% vs. 26.0%, $P=0.003$; PIONEER II: 58.9% vs. 27.6%, $P<0.001$)” (Kimball, 2016). Many of my other references refer to these studies in their work or are based from these studies. A review article by Tappenden et al. (2017) reviewed the findings of the pioneer studies and assessed the cost of adalimumab vs other treatment options, taking the effectiveness into consideration. Tappenden et al. (2017) found through their review that adalimumab is a cost-effective treatment for adults with hidradenitis suppurativa whose disease has not responded to conventional systemic therapy.

Miller et al (2011) conducted an earlier study that was used to assess adalimumab for hidradenitis suppurativa treatment. This study was randomized, double-blind, and placebo-controlled. Having the study be blind helps to eliminate bias by the subjects and the conductors of the study, and a placebo control group works well for comparison purposes. The study used primary efficacy endpoints that were changes in the Sartorius and Hurley scoring systems. The Sartorius scoring systems assigns numbers based on the location of lesions, number of lesions, distance between lesions, and dryness of the skin. The Hurley scoring system was explained earlier in the introduction to this paper. This study found a significant reduction of the Sartorius score after 6 weeks and an almost significant reduction after 12 weeks of active treatment when compared to the placebo group (-10.7 vs. 7.5, $P=0.024$ and -11.3 vs. 5.8, $P=0.07$). There was no

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significant change of Hurley score seen. There were only 21 patients included in this study, ideally for a study like this we would like to see larger patient numbers. Hidradenitis Suppurativa, although not rare, is not very common and finding patients for the study in an accessible area would be difficult.

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Discussion

Hidradenitis suppurativa is not common but it is common enough that it is seen in primary care clinics. This disease can be very difficult to treat and there are many factors, it is a disorder that should be referred to dermatology for treatment and follow through. Although there are some studies on adalimumab for HS there are not many good studies for many of the traditional treatments. This does not mean there is no place for traditional treatments when dealing with HS, it is multifactorial and treatment should be patient dependent. There are also non-pharmaceutical aspects to treatment such as weight loss, smoking cessation, and good control of diabetes, that are not mentioned in clinical studies as extensively as pharmaceutical treatments but still very important in the treatment process.

Through the literary review I found three clinical trials and they all found that adalimumab had significant benefit when compared to placebo. I also found several review articles discussing the etiology and epidemiology of hidradenitis suppurativa, and several review articles discussing many of the treatment options for this disease as well.

In patients with hidradenitis suppurativa is adalimumab more effective than traditional treatments to include antibiotics, hormone therapy, retinoids, corticosteroid injections, surgical intervention, and pain management in treatment outcomes?

Kimball et al. (2016) discovered in both of their phase three studies that the results at 12 weeks confirmed that 40 mg of adalimumab weekly was efficacious for the treatment of moderate-to-severe hidradenitis suppurativa. Although, the patients in this study saw significant improvement by week 12 with adalimumab weekly vs. placebo, the patients did not have complete resolution of symptoms. These PIONEER studies were the longest studies with the

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largest patient numbers assessing adalimumab for hidradenitis suppurativa and were used when deciding treatment guidelines and dosing.

Miller et al. (2011) discovered through their study that there was a significant reduction in hidradenitis suppurativa severity after 6 weeks. There was an almost significant improvement seen at week 12. This study was very small and included only 21 patients that were followed for 12 weeks.

Kimball et al. (2012) found through their study that adalimumab dosed once weekly alleviates moderate-to-severe hidradenitis suppurativa. In this study the patients who had the weekly dosing of adalimumab had significant improvement with patient reported outcomes as well as significant improvement in HS-PGA scores, DLQ1 scores, TWPI cores, and PHQ9 scores.

These three studies all proved that adalimumab is efficacious when used to treat hidradenitis suppurativa. However, these studies were done compared to placebo and therefore do not directly measure the results of adalimumab vs the other treatment options. As I have stated throughout this paper, there are almost no studies available to assess the use of any of the traditional treatment options for hidradenitis suppurativa. With that being said, there has historically been very little success with traditional options and there has been some success with adalimumab.

In patients with hidradenitis suppurativa does adalimumab show better treatment outcomes in patients with severe disease vs mild or moderate disease?

The three clinical trials that I used for my research have patients with moderate-to-severe hidradenitis suppurativa that have already failed traditional treatment options. There are no studies assessing adalimumab for mild hidradenitis suppurativa, I believe that this is because in

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the mild stage of the disease some of the traditional treatment options may keep the symptoms dampened down enough to where the patients do not seek more complex treatment. This could also be because patients with a mild form of the disease or in the beginning stages, may not have enough discomfort to search out treatment for their condition.

These studies that focus on adalimumab for moderate-to-severe hidradenitis do not distinguish between the moderate patient's vs the severe patients so it is uncertain whether adalimumab works better for one stage of the disease vs the other. However, Kimbal et al. (2012) did state that patients who had hidradenitis for a longer period of time generally saw better results. It is unknown why this is and there is no data listed to support this claim.

In patients with hidradenitis suppurativa are the side effect outcomes associated with adalimumab treatment more significant and detrimental than side effect outcomes associated with the traditional treatment options?

Adalimumab is a biologic and like any medication there are side effects, some that are serious. Truven Health Analytics Inc. (2018) accessed from DynaMed Plus has all the adverse effects listed. The more common adverse effects being injection site reaction or pain, headache, sinusitis, and upper respiratory infection. There are many more serious side effects that are rarer to include cardiovascular, dermatological, gastrointestinal, hematological, hepatic, immunologic, musculoskeletal, neurologic, and respiratory issues. Because of all the potential side effects patients using adalimumab should be checked for hepatitis B and tuberculosis. Patients should also have liver function checked throughout treatment about every three months and be seen in clinic every 3-6 months which is patient dependent.

Kimball et al. (2016) found in their studies that adverse effects, serious adverse effects, infectious events, or number of patients that discontinued the study drug due to adverse effects

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were similar between the two study group. Worsening of underlying disease was excluded from the rates of adverse effects. “The majority of adverse events were mild or moderate in severity” (Kimball, 2016, p.432). During period one the rates of adverse effects were 1.3% in the adalimumab group and 1.3% in the placebo group for PIONEER I, and 1.8% for the adalimumab group and 3.7% in the placebo group for PIONEER II. During period two the rates were 4.6% or less in all groups for both studies (Kimball, 2016)

Miller et al. (2011) state in their study that although adalimumab was well tolerated, there were more adverse effects seen in the adalimumab group than the placebo group with regard to mild infections. “However, the difference was only almost significant (P=0.16 and P=0.79, respectively)” (Miller, 2011, p.395). All other adverse effects were not significant in the adalimumab group when compared to the placebo group. This study was very short in duration and they do state the disadvantage of not following the patients for a longer amount of time in regard to adverse effects.

Kimball et al. (2012) assessed adverse effects, laboratory values, and vital signs throughout the study. In this study there were no deaths, cancer, or tuberculosis events that occurred (Kimball, 2012). The rates of adverse effects in the EOW and weekly adalimumab groups was higher than those of the placebo group (Kimball, 2012). “Fifteen patients had one or more serious adverse events during exposure to adalimumab, with the most common events being hidradenitis suppurativa worsening or infectious complications of hidradenitis suppurativa, and anemia” (Kimball, 2012, p.852). After the first 16 weeks of this study patients who were receiving the EOW dosing of adalimumab were switched to weekly dosing if they had not reached satisfactory results on EOW dosing. The adverse effect in this group was similar to rates of adverse effects in the group that had EOW dosing throughout the study.

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Applicability to Practice and Guidelines

For this project, I consulted Dr. Angela Aakhus, she is a dermatologist working at Sanford Health in Bemidji, MN. She is a graduate from the University of Minnesota and has been working in Dermatology for 6 years. Currently, Dr. Aakhus has four patients she is treating for HS that are all using adalimumab. All four of her patients report success with this medication, also none of them have experienced any side effects from this medication. Dr. Aakhus states that in her experience the traditional treatment options for hidradenitis suppurativa provide little relief for patients. She states that in her practice she will start patients on adalimumab after they have failed topical treatments, incision and drainage with steroid injections, and oral antibiotics, if the patient does not have any other health concerns that would prevent them from using adalimumab. Even with patients on adalimumab and seeing success she discusses how incision and drainage with steroid injection may still be necessary for active lesions. During my time in my dermatology rotation I saw two hidradenitis suppurativa patients, one had more moderate-severe disease and has been started on adalimumab 3 months ago. The other patient had more mild hidradenitis suppurativa and had not yet tried traditional treatments. The woman who is on adalimumab reports good results and her active nodule count has improved, however she did have an active nodule that needed incision and drainage with corticosteroid injection even when on the adalimumab. The woman with the milder form of the disease will start with topical treatments first and oral spironolactone, patient is to follow up in three months' time.

Current guidelines for treating Hurley Stage I hidradenitis suppurativa were found on DynaMed Plus for this study and are as follows: consider antibiotics in patients with Hurley stage I disease and only a few flares/year, topical therapy, warm compresses, apply clindamycin 1% lotion topically morning and evening, benzoyl peroxide wash, oral therapy - consider short

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course (7-10 days) of oral antibiotics, including tetracyclines (doxycycline, minocycline) amoxicillin-clavulanate (may be most effective for acute flares) clindamycin (DynaMed Plus, 2016).

For treating Hurley Stage II hidradenitis suppurativa DynaMed Plus lists the following for guidelines: for patients with well-controlled stage II disease, use stage I treatment regimen to treat flares, in patients with little scarring and severe inflammation consider clindamycin 300 mg twice daily plus rifampin 300 mg twice daily orally for 3 months for maintenance therapy, consider tetracyclines (doxycycline, minocycline) or dapsone 25-200 mg/day orally.

For treating Hurley Stage III hidradenitis suppurativa DynaMed Plus lists the following for guidelines: consider anti-inflammatory antibiotics (clindamycin plus rifampin) in patients refractory to antibiotics, consider immunosuppressants, tumor necrosis factor (TNF) inhibitors. “Adalimumab 40 mg/week associated with clinical improvement in adults with moderate-to-severe hidradenitis suppurativa (level 2 [mid-level] evidence)” (DynaMed Plus, 2016).

DynaMed Plus (2016) also mentions surgical options to include: consider surgical unroofing in patients with scarring and/or sinus tracts that have not progressed to advanced branching lesions of stage III disease for patients with Hurley stage III hidradenitis suppurativa refractory to medical management, consider wide excision to remove all affected tissue carbon dioxide (CO₂) laser excision reported to reduce lesions of hidradenitis suppurativa (level 3 [lacking direct] evidence).

After discussing treatment guidelines for the different stages of hidradenitis suppurativa DynaMed Plus then discussed each treatment in more detail and lists the recommendation score and level of evidence to support each treatment. Almost all of the treatment options, although listed by DynaMed Plus and recommended, do not have very high level of evidence to support

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their use. This has been a reoccurrence throughout this project that there is little evidence to support most of the treatments.

The current guidelines do recommend adalimumab for moderate-to-severe hidradenitis suppurativa, which is supported by my research. These guidelines from DynaMed are very applicable to clinic use, but there is no cure and treatment is patient dependent with much trial and error. Hidradenitis suppurativa is difficult to treat and should not be treated in primary care, this should be maintained by the dermatology department. Some lifestyle modifications such as smoking cessation, good control of blood sugars with diabetic patients, and weight loss can be encouraged in a primary care setting.

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