

Chronic folliculitis of the scalp: New classification of one spectrum related variants

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Abstract

Background Chronic scalp folliculitis is a chronic inflammatory process of hair follicles that results from a change in the microbiome of hair follicles rather than actual pathogenic microbial infection.

Objective To gather all cases that present with chronic folliculitis of the scalp and the associated related diseases like acne vulgaris and hidradenitis suppurativa and classify them.

Methods This is case series descriptive study that was carried out during the period from 2014-2021 where all patients with chronic scalp folliculitis were collected and analyzed. Full history and examination were done including the types of folliculitis whether superficial or deep, widespread or localized, scarring or none scarring and moth eaten pattern hair alopecia or not. In addition to record and evaluate the associated skin disease like acne vulgaris and hidradenitis suppurativa (HS).

Results Analysis of eighty-seven patients with chronic scalp folliculitis showed that 85 (97.7%) males and 2 (2.29%) females, their ages ranged from 18-36 years. The duration of the disease ranged from 0.6-4 years. Three types of scalp folliculitis were recognized: **The first one**, superficial folliculitis in 23 (26.43%) patients, with 22 (95.65%) males and one (4.34%) female while 16(69.56%) cases had also associated acne vulgaris with varying severity including two patients with HS. **The second type**, deep superficial folliculitis so called folliculitis decalvans were noticed in 28 (32.18%) patients, with 27 (96.42%) males and one (3.57%) female. These patients had usually single patches in 22 (78.57%) cases while multiple in 4 (14.28%) cases and 2 (7.14%) cases presented with diffuse moth eaten alopecia. Concomitant facial acne vulgaris was seen in 2 (7.14%), truncal folliculitis in 2 (7.14%) and HS in 2 (7.14%) cases. **The third type** so called deep cystic folliculitis (dissecting cellulitis) accounting for 36 (41.37%) patients that presented with deep cystic masses in variable severity, and all cases were males. It was associated with 10 (27.77%) cases of HS involving axillae, buttocks and groins and 26 (72.22%) cases with cystic acne vulgaris of face and trunk.

Conclusion Chronic scalp folliculitis is a common skin problem consisting of three variants and was commonly associated with acne vulgaris and hidradenitis suppurativa. These variants share the same etiopathogenesis and the clinical pictures hence they are parts of one spectrum. Alopecia usually a moth eaten pattern was seen in all these 3 types of scalp folliculitis but was permanent in folliculitis decalvans and non-scarring in superficial type and deep cystic folliculitis.

Key words

Chronic scalp folliculitis, microbiome, folliculitis decalvans, deep cystic folliculitis, acne vulgaris, hidradenitis suppurativa.

Introduction

Folliculitis is an inflammatory reaction of hair follicles (HF) with possible involvement of the

follicular opening and the perifollicular area. Chronic folliculitis frequently affects adult males.¹ Human skin colonized by huge varieties of microbes.^{2,3} Any imbalance in the host-

microbiota interaction system (dysbiosis), can lead to development of different diseases.^{4,5} Bacterial,⁶ fungal⁷ and viral infection⁸ have been described as possible etiology of chronic folliculitis.

The usual classification of folliculitis based on histopathological or laboratory features, topographic distribution, infectious agents, duration of the disease, recognized mechanism, and localization within the pilosebaceous unit.¹

In comparison to the widely researched skin surface microbiome,⁹⁻¹³ the specific microbiome of human hair follicles has been comparatively under-investigated, beyond pathogen-induced bacterial or fungal folliculitis,¹⁴ folliculitis decalvans (FD),¹⁵ hidradenitis suppurativa (HS),¹⁶⁻¹⁹ and acne vulgaris.²⁰⁻²⁵

The HF microbiome are similar to the skin microbiome²⁶⁻²⁸ with an profusion of Firmicutes, with predominance of Staphylococci and Streptococci, Actinobacteria, particularly Corynebacteria and Propionibacteria; and Proteobacteria, such as Pseudomonas and²⁹ Moraxella spp. and Acinetobacter spp.³⁰ Further, Propionibacterium acnes (P. acnes)^{30,31} biofilms have been identified initially in the epithelium of distal HF,³² suggesting differential distribution of distinct bacterial species throughout the HF.

Folliculitis decalvans is a rare primary cicatricial alopecia.³³ Its etiopathogenesis is not well known but dysbiosis of HF microbiome might have triggering effects through excessive secretion of neutrophil-attracting chemokines.³⁴

Dissecting cellulitis of the scalp is a chronic inflammatory disease of scalp HFs manifesting as multiple painful nodules and abscesses that interconnect via sinus tracts.³⁵

Acne may best be viewed as a primary HF disease that arises from the distal outer root sheath (infundibulum), with sebocytes and P. acnes possibly being only of secondary importance.³⁶⁻³⁸

So, the aim of the study is to gather all cases that present with chronic folliculitis of the scalp and the associated related diseases like acne vulgaris and hidradenitis suppurativa and to do full clinical evaluation trying to get insight into their related etiopathogenesis and clinical picture.

Methods

This is case series descriptive study that was carried out during the period from 2014-2021 where all cases with chronic scalp folliculitis were collected and evaluated. The gathered data included the age, gender, disease duration, personal and family medical history, and comorbidities such as association with acne vulgaris or HS. Full history and examination were done including the localization of the lesions whether superficial or deep, the involved area, dissemination of the lesions, in addition the affected areas were carefully examined for any previous hypertrophic, keloidal or atrophic scars. Also the progress of the disease and relapses were carefully monitored. Furthermore, informed consent was obtained from each patient after explanation of the nature of the

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Table 1 Showing type of folliculitis and its relation to sex, mean of age and level of inflammation.

Type of folliculitis	Sex	Mean of age± SD	Level of inflammation	Presentation
Superficial	22 males 1 female	25.2±5.5 years	Infundibulum and orifice of hair follicle	Superficial folliculitis that healed rapidly without scarring
Folliculitis decalvans	27 males 1 female	27±5.6 years	Around the bulge.	Folliculitis, hard in consistency, on healing leaving well defined scarring plaques.
Deep cystic folliculitis	36 males	25±5.2 years	Around hair bulb, deep dermis and subcutaneous tissue.	Deep cystic folliculitis that take long time for resolution but without scarring.

study. All patients agreed to share their pictures in the current study.

According to the type of scalp folliculitis, the patients were divided in to:

Group 1: Superficial folliculitis.

Group 2: Deep superficial folliculitis (folliculitis decalvans).

Group 3: Deep cystic folliculitis (dissecting cellulitis).

Diagnosis was based initially on the clinical presentation together with history, clinical examination and the associated symptoms.

Results

Eighty-seven patients including 85 (97.7% males and 2 (2.29%) females with chronic scalp folliculitis were included in this study, their ages ranged from 18-36 years with a mean of 28 years (**Table 1**). The duration of the disease ranged from 0.6-4 years. Three types of scalp folliculitis were recognized: **The first one**, superficial folliculitis in 23 (26.43%) patients, 22 (95.65%) males and 1 (4.34%) female, their age ranged from 18-35 years with a mean±SD of 25.2±5.5 years. In all 23 patients with superficial folliculitis, recurrent small follicular pustules (**Figure 1**) of the scalp that quickly ruptured leaving small crusted lesions were the chief complaint, majority of those patients experienced varying degree of itching, and no scarring had been noticed upon resolution of

these lesions. Among those 23 patients, 16 (69.56%) cases had also acne vulgaris with varying severity; in 11 (11/16, 68.75%) patients, the acne was mild in severity while moderate acne severity had been recorded in 5 (5/16, 31.25%) cases. While only 2 of the 16 cases of acne vulgaris had concomitant HS affecting the axillae and groins.

The locations of the papules and pustules were as follows: 14 (60.68%) occipital, 5 (21.73%) temporo-parietal, 3 (13.04%) vertex and 1(4.34%) entire scalp.

The second type, deep superficial folliculitis, so called folliculitis decalvans were noticed in 28 (32.18%) patients affecting the males more commonly than females 27 (96.42%)males and one (3.57%) female. The age of the affected patients ranged from 14-35 years with a mean±SD of 27±5.6 years. The duration of the disease ranged from 0.6-4 years. These patients had usually single plaque in 22 (78.57%) cases while multiple in 4 (14.285) cases and 2 (7.14%) cases presented with diffuse moth eaten alopecia simulating exactly moth eaten alopecia of follicular lichen planus (**Figures 2&3**). These lesions were variable in size (5-17cm) and usually consisting of superficial folliculitis hard in consistency leaving well defined scarring plaques with hair tufting and crusting. The vertex was the most commonly involved area in 19 cases (67.85%) followed by occipital in 3 cases (10.71%), whereas 4 cases (14.28%) presented with 2 or more involved areas of the



Figure 1 Twenty-seven years old male patient showing superficial folliculitis of the scalp.



Figure 2 Twenty-three years old male patient showing severe folliculitis decalvans involving most of scalp.



Figure 3 Thirty years old male patient with folliculitis decalvans showing diffuse moth eaten scarring alopecia involving the entire scalp.



Figure 4 Twenty-five years male patient showing (A) multiple cystic lesions of deep cystic folliculitis of the scalp and (B) face.

scalp and 2 (7.14%) patients presented with diffuse moth eaten alopecia involving the entire scalp. Pain was reported in 18 (64.28%) cases while itching was seen in 10 (35.71%) cases. Pustules and crusts were recorded in 21(75%)

cases, erythema in 20 (71.42%), tufted hairs in 14 (50%) and alopecic atrophic lesions in 14 (50%) cases. Concomitant facial acne vulgaris in 2 (7.14%), truncal folliculitis in 2 (7.14%) and HS in 2 (7.14%) cases. **The third type** of scalp folliculitis observed was deep cystic folliculitis (dissecting cellulitis) accounting for 36 (41.37%) male patients but no females, the age of patients ranged from 15-35 years with a mean±SD of 25±5.2 years. The duration of the disease ranged from 4months to 3 years. Among these 36 patients with deep cystic folliculitis, 26 (72.22%) patients also had cystic acne vulgaris of face and trunk, 9 (25%) patients had associated HS, and one had both mild acne vulgaris of face and trunk and HS of the axillae and groins (**Figures 4&5**).



Figure 5 Twenty eight years old male patient showing (A) deep cystic folliculitis of the occipital part of the scalp and (B&C) hidradenitis suppurativa of the axilla and groin.

Fourteen (14/36, 38.88%) patients were overweight or obese, while 6 (6/10, 60%) of the HS patients were overweight or obese. Multiple deep painful cystic masses in variable severity, some oozing purulent fluid principally located on the vertex in 18 (50%) cases, occipital in 14 (38.88%) cases and diffuse over the entire scalp in 4 (11.11%) cases. All patients usually presented with depressed or elevated solid areas of moth eaten alopecia but on follow-up and following long course of resolution, there was complete hair growth. Patients with HS had all features like inflammatory nodules, abscesses, sinuses and scarring affecting axillae and groin and some with buttock involvement.

In many patients, the lesions started as one variant and then over time moved to other sites of the body to change to another variant after healing the first one or both they remained active at the same time. For example, in some patients, the disease started as acne vulgaris and then changed into HS and then the scalp was involved. These lesions presented as all together at the same time or in different periods.

The prognosis of hair loss was variable as very good in superficial folliculitis but scarring in FD while in deep cystic folliculitis usually had good prognosis as they did not leave scarring alopecia although had long course of resolution (**Table 1**).

Discussion

Chronic folliculitis is a common problem affecting adult people with different causes such as bacterial, most commonly due to *S. aureus*; viral and fungal.¹

A close association between chronic superficial scalp folliculitis and acne vulgaris had been well evaluated by Sharquie *et al.*³⁹ who confirmed that there is a well related etiopathogenesis and

similarities in clinical course of both problems. This encouraged us to conduct the present work by relating chronic scalp folliculitis and its association with acne vulgaris, HS or body folliculitis.

In the present study, chronic superficial folliculitis had been observed in (26.43%) of patients. The concomitant acne vulgaris with chronic folliculitis of the scalp was noticed in 69.56% cases and this is comparable to another study.³⁹ The clinical presentations of superficial folliculitis in the affected (23) patients were recurrent small follicular pustules of the scalp quickly ruptured leaving small crusted lesions, a finding that consistent with another study.¹⁴ The mean age of the affected patients was 25.2 years and males were more commonly affected (95.65%). This finding is consistent with previous studies where young male patients are the usual victims of superficial folliculitis.^{14,39,40} The occipital part of the scalp was the most commonly involved site in (60.68%) patients. This finding is on line with another study.¹⁴

Folliculitis decalvans, in the present work, had been observed in 32.18% patients with a mean age of the affected patients was 27 years and the vast majority of the affected patients were male (96.42%). This finding was comparable to what was previously reported.^{41,42}

Tufted hair was a common finding in FD patients, with an occurrence in 50% among all patients. This observation was closely related to another study in which 51% of patients with FD had tufted hair,⁴³ but in contrary to another report were only 15% of the FD patients had tufted hair.⁴¹ So, our observation presumed that tufted hair could be a sign of severity of the disease and not an essential part for diagnosis.

Regarding involved site, the vertex was the most commonly involved area (67.85%) and these

results were convenient to those of other published studies.^{33,41,44,45} Also in the present study, diffuse moth eaten alopecia simulating moth eaten alopecia of follicular lichen planus had been observed in 2 patients with FD, but follicular pustular lesions had been observed on close examination ultimately raising the diagnosis of diffuse FD. This might lead into misdiagnosis with follicular lichen planus⁴⁶ if it is not well examined for the follicular pustules.

The arguments for the association between biofilm-like structure and chronic scalp folliculitis development are based on the fact that biofilm-like structure consisting of *P. acnes* were identified within hair follicles of patients with FD.^{47,48} Furthermore, the persistence of FD despite a temporarily effective antimicrobial therapy, neutrophilic infiltration in histology, which destroy the hair follicle but are not able to destroy the biofilm, and normal immune background of patients. As it is currently hypothesized, an initially non-pathogenic biofilm may transform into a pathogenic form and become more extensive causing an inflammation. Antibiotics may kill the planktonic form of bacteria released from biofilms and even temporarily eliminate symptoms and signs, but the remaining biofilm cells act as a nidus of chronic infection.^{47,49}

In all patients with deep cystic folliculitis, multiple deep painful cystic masses in variable severity, some oozing purulent fluid principally located on the vertex in 50% cases, these clinical presentations were consistent with the other studies.^{35,50,51} The male predominance (100%) and predilection to vertex involvement (50%) observed in the present work are in agreement with previous reports.⁵⁰⁻⁵²

In the present study, 14 (14/36, 38.88%) patients were overweight or obese, while 6 (6/10, 60%) of the HS patients were overweight or obese.

Obesity is commonly associated with HS,⁵³⁻⁵⁵ but its association with deep cystic folliculitis is unclear. Obesity-associated chronic inflammation and release of pro-inflammatory cytokines from adipose tissue with resultant augmentation of follicular epithelium inflammation might be the possible explanation.⁵⁵

Deep cystic folliculitis and HS share many clinical, pathogenetic characteristics and histopathologic features, treatment options and comorbid conditions. On the other hand, deep cystic folliculitis and HS can be considered the spectrum of the same disease and the differences in their clinical presentation can be easily interpreted by differences in skin thickness and the amount of hair follicles between the scalp and the apocrine gland-rich areas of the body. So, we presumed that deep cystic folliculitis can be identified as regional variants of the HS or more precisely HS of the scalp.⁵⁶

Furthermore, microbiota may play an important role as alloantigens in the etiopathogenesis of deep cystic folliculitis.⁵⁷ All these diseases in this study could be sharing the same microbiome rather than related to the actual pathogenic organisms.

In the present study, all three types of scalp folliculitis can present initially as moth eaten alopecia that completely healed after short period in superficial folliculitis without any scar formation while FD was ending with well-defined scarring plaque while deep cystic folliculitis takes long time for healing but without scar formation.

Accordingly, from the results of the present study, we can speculate that chronic scalp folliculitis, HS and acne vulgaris could share the same etiopathogenesis as all these conditions could be associated with each other and all these

diseases occur in the same age and sex group. Also, chronic superficial scalp folliculitis and acne vulgaris respond to the same therapy.³⁹ In addition our experience showed that all variants of folliculitis responded to the same regime of topical and systemic treatments which is going to be published soon.

In this work, swab sampling was not carried out as it is limited to superficial microorganisms of the skin and their hair follicles and cannot access organisms such as bacteria located in the deeper part of follicle, dermis and panniculus.⁵⁸ Also sampling yield negative sterile cultures as mentioned by other studies.^{14,40}

Although there is a general agreement that microorganisms are a potential component of many skin diseases, including those mentioned here, little is understood about their contribution and how it relates to the genetic and environmental variation that also contributes to the disease.^{59,60}

Conclusion

Chronic scalp folliculitis is a common skin problem and was commonly associated with acne vulgaris and hidradenitis suppurativa. These three variants share the same etiopathogenesis and the clinical pictures hence forming one scalp problem and one spectrum. Alopecia usually a moth eaten pattern was seen in all these 3 types of scalp folliculitis but the prognosis of hair loss was variable as very good in superficial folliculitis but scarring in FD and in deep cystic folliculitis usually also had a good prognosis as they did not leave scarring alopecia. No actual pathogenic microorganism could be blamed but having the same microbiome. Metagenomic analysis to clarify the full complement of microbial genes for hair and skin microbiome and their functions could provide a path for identifying the exact

etiopathogenesis of these various skin diseases.

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