

CHRONIC NON-SCARRING FOLLICULITIS OF THE SCALP

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Abstract. Forty patients with recurrent follicular pustules of the scalp but without obvious necrosis or residual scarring were re-examined (mean 8.3 years after onset of lesions). The most common age at onset was 20-40 years. The sex ratio (M/F) was 3:1. Only 7 of 40 patients had concomitant acne vulgaris on the face. All patients still had active, recurring scalp lesions, although 7 out of 40 had had temporary remissions. Post-lesional scarring was not observed. Oral low-dose tetracyclines had a symptomatic effect in 7 of 11 patients. Most of the patients treated topically with steroids and alcoholic lotions experienced little or no effect. Histopathology disclosed a neutrophilic folliculitis. Bacteriological examinations showed only the usual resident microflora of the scalp with *P. acnes* being the most frequent species. In 3 cases (5 examined pustules), *P. acnes* was isolated from the content of the pustules without being found on the skin surface over the pustule. Chronic non-scarring folliculitis of the scalp probably constitutes a disease entity.

Key words: Folliculitis; Acne vulgaris; *P. acnes*; Tetracyclines

Recurrent folliculitis of the scalp can be a problem in dermatological practice. Occasionally a bacterial or mycotic infection is the obvious cause but in most instances no infective agent has been demonstrated (13). In Scandinavia such patients are generally diagnosed as having acne necrotica miliaris (6) in spite of the fact that a necrotic component is as a rule not obvious, clinically. Maibach & Hackel, in a recent textbook (13), considered acne necrotica miliaris to be a mild variant of scarring acne varioliformis.

Maibach, in 1967, reported 6 cases of non-scarring folliculitis of the scalp which he attributed to a *Corynebacterium acnes* infection (12). To the best of our knowledge, this syndrome has not been further studied. We therefore wish to present a clinical and bacteriological study of the natural history of non-scarring folliculitis of the scalp.

MATERIAL AND METHODS

Patients

The data on patients who attended with recurrent or persistent (for more than 6 months) follicular pustules of the

scalp without tendencies to spontaneous necrosis or residual scarring have been collected from the outpatient departments of dermatology at Lundby Medical Center and Sahlgren's Hospital during the years 1968-1975. Forty patients who satisfied these clinical criteria were re-examined in 1975. None was on systemic antibiotics prior to the onset.

Controls

Eight healthy individuals without scalp disorders from the department's staff were included in the microbiological study.

Microbiological analysis

The skin over the pustule was prepared, utilizing the following steps:

1. Cleansing with hydrogen peroxide 10% of the skin over the pustule until foaming ceased.
 2. Application of iodine tincture 5% for about 2 min.
 3. Inactivation of the iodine with sterile sampling-thiosulphate fluid (VMG I (15) plus sodium-thiosulphate 5%).
- The bacteriological status of the operation field was analysed by sampling from the skin surface by sucking up some of the sampling fluid with a charcoal impregnated cotton pellet which was transferred to a transport medium VMGA III (15). The pustule was then punctured and a sample was taken with charcoal-impregnated absorbent paper points which were transferred to another vial with transport medium VMGA III as above. The samples were transported to the laboratory and handled within 4 hours as follows.

The vials containing the transport media were warmed to 37° and shaken for about 30 sec in a shaking machine (Whirly mixer, Fisons Scientific Apparatus, Leicestershire, England) in order to distribute the sample evenly in the medium. The cotton pellet from the sampling field and the paper points from the pustule were each transferred to a tube of HCMGA-Sula² semifluid culture medium (15). In addition, 1 ml of the transport medium was transferred to each of HCMGA-Sula and HCMGA-Sull media and 0.1 ml was distributed on each of the following plates: blood

¹ The original VMG III medium was anaerobically prepared, sterilized and stored under oxygen-free nitrogen. This medium was designated VMGA III.

² The original HCMG base was anaerobically prepared, sterilized and stored under oxygen-free nitrogen. This culture medium base was designated HCMGA.

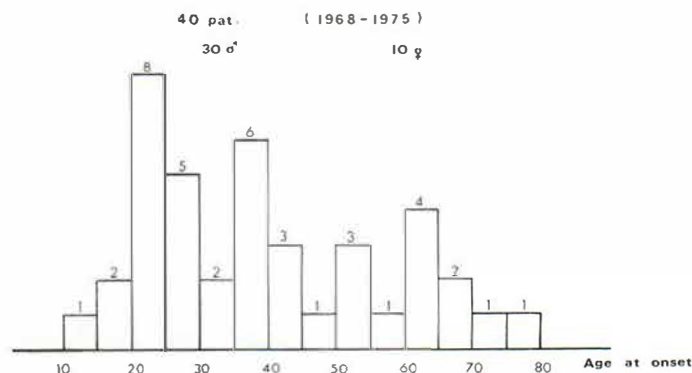


Fig. 1. Age at onset in 40 patients with recurrent non-scarring folliculitis of the scalp.

agar medium (Blood agar base no. 2, Oxoid with 5% defibrinated horse blood), aerobically incubated; blood agar medium as above, pre-reduced and anaerobically incubated in anaerobic jars (hydrogen combustion method (15)). 0.1 ml of the transport medium was also distributed on each of the following media: two plates of haematin agar medium (placental agar with 7% defibrinated horse blood, heated at 80°C for 10 min) (15), one plate incubated in an aerobic atmosphere containing 5% CO₂ and the other pre-reduced and incubated anaerobically. Finally one plate of pre-reduced BHI_{AcyYe} agar medium (15) was incubated anaerobically. All anaerobic plates were incubated for 8 days and the others for 3 days.

At the end of the incubation period, the solid media were examined for growth and the proportions of the different bacterial strains calculated. Pure cultures from each colony type were made. The semisolid media were examined for growth every second to third day for 3 weeks. If growth had occurred, about 0.1 ml of the medium containing visible growth was transferred to each of the solid media described above. From each colony type obtained, pure cultures were made. The colonies on the anaerobic plates were inoculated on one aerobic as well as on one anaerobic blood agar plate for determination of anaerobic growth. The anaerobic strains were identified according to Bergey's Manual of Determinative Bacteriology, 8th ed., 1974, and the VPI Anaerobe Laboratory Manual (7) by means of morphology, Gram-stain, gas chromatography and biochemical tests.

Histopathology

A 3 mm punch biopsy was taken from 6 patients with pustular scalp lesions. The specimens were fixed in neutral formalin and embedded in paraffin. Multiple sections were stained according to routine procedures.

RESULTS

Clinical study

At the re-examination all patients still had symptoms of the scalp disease. They were all in good general health.

Sex and age distribution. There were 30 men and

10 women. A preponderance of males was also reported by Maibach (12). The most usual age at onset was between 20 and 40 years (range 10-76 years) (Fig. 1).

Location of pustules. Scattered pustules on the scalp were present in 12 patients. 28 patients noticed certain areas of predilection: 7 in the frontal region, 16 in temporal regions, 14 in the parietal region and 16 in the occipital region.

Associated skin symptoms. Nineteen patients considered themselves to have greasy hair and an oily facial skin. Seven patients reported a dry scalp and 6 of them considered their complexion dry. These data, however, are subjective assessments and no sebum excretion rates were measured.

A history of pubertal acne was reported by 23 patients. At the re-examination 7 patients had concomitant acne vulgaris of the face. Four patients had a few follicular pustules on the face similar to those on the scalp.

Among other skin symptoms dandruff was obvious in 8 males and 1 female. Seborrhoeic eczema was seen in 1 man and male pattern baldness in 11 men.

Course and seasonal variations. Scalp lesions were constantly present in 33 patients. Arithmetic mean duration 8.3 years (range 1-38). Seven patients had intermittent symptoms (5 had free periods for a few weeks and 2 for a few months).

Seasonal variations occurred in 19 patients: 17 considered their folliculitis to be least pronounced in the summer and 2 in the winter.

Dietary factors. Two patients thought alcoholic beverages exacerbated the condition. Nobody, however, felt that spicy food influenced the disease. Three patients considered emotional factors to be detrimental.

Table I. Bacterial findings in samples from surface of pustules after disinfection, and from content of pustules

Bacterial findings	Number of samples	
	Surface of pustules	Content of pustules
<i>Propionibacterium acnes</i>	3	6
<i>P. acnes</i> + <i>Staph. epidermidis</i>	10	9
<i>P. acnes</i> + <i>Staph. aureus</i>	—	1
<i>P. acnes</i> + <i>Strep. mitis</i>	—	1
<i>P. acnes</i> + <i>Peptostreptococci</i>	1	1
<i>Staph. epidermidis</i>	1	—
<i>Staph. aureus</i>	1	—
Combination of <i>P. acnes</i> and two of the above bacteria	1	4

Treatment. Thirty patients received topical treatment with alcoholic scalp lotions. Seventeen of them also received corticosteroidal tinctures. Five patients were satisfied with this treatment, 8 patients experienced a moderate effect and 17 considered local treatment ineffective. Eleven patients had received oral tetracyclines for at least 3 months. Seven of them could keep themselves free of pustules but the result was moderate in 2 and poor in another 2 patients. The dose generally prescribed was not higher than 0.25–0.5 g tetracycline hydrochloride per day.

Microbiology

Microbiological examination of the samples from 8 persons with normal scalp revealed, after disinfection of the skin, sparse to moderate growth of *Propionibacterium acnes*,¹ which in 5 subjects was associated with *Staph. epidermidis*.

From 17 patients with folliculitis, 22 cultures were obtained. The bacterial findings from the entire series, including samples from the surfaces of the pustules as well as from the pustular contents, are presented in Table I. In most cases bacteria recovered from the surface of the pustules were also found within the pustules. The amount of bacteria varied from very sparse to heavy growth. On the average, the samples from the content of the pustules showed more bacteria than the samples from the skin surface.

In 5 samples (from 3 patients) no bacteria were isolated from the surface of the pustules following disinfection of the skin. The bacteria isolated from

Table II. Bacteriological results in three patients with folliculitis capitis

In the control sample from the pustular surface no bacteria were isolated

±, Very sparse growth (1–10 colony forming units (CFU) on the plates); +, sparse growth (10–100 CFU); ++, moderate growth (100–1 000 CFU)

Patient	Bacterial findings in content of pustules	Semi-quantitative assessment of growth
M. J. (3 pustules)	<i>P. acnes</i>	±
	<i>Strep. mitis</i>	±
	<i>P. acnes</i>	±
	<i>P. acnes</i>	±
P. M. A. (1 pustule)	<i>P. acnes</i>	±
	<i>Peptostreptococci</i>	±
	<i>Staph. epidermidis</i>	±
M. L. (1 pustule)	<i>P. acnes</i>	±
	<i>Staph. epidermidis</i>	++

the content of these pustules are listed in Table II. *P. acnes* was isolated from all these samples. In addition *Peptostreptococci* were found in one sample and *Staph. epidermidis* in two.

Histopathology

The histopathological findings were similar in all the specimens. The hair follicle was dilated and in its upper part contained a small neutrophilic abscess. There was a superficial, moderate perifollicular infiltration and some neutrophils were seen migrating through the epithelium of the follicular wall. Fungi could not be seen in the perifollicular inflammation.

DISCUSSION

The chronic course of the scalp condition, irrespective of the age of onset, is noteworthy. The clinical features at the initial and the follow-up examinations were the same with superficial, follicular pustules and with no evidence of scarring. It is our impression that these patients constitute a clinical entity.

Clinically the pustules are acneiform. Their relationship to acne vulgaris is open to discussion, how-

¹ In Bergey's manual, ed. VII, designated *Corynebacterium acnes*.

ever, Maibach considered this entity to be a scalp analogue of facial acne (12). The skin lesions of the present patients differed from ordinary acne in some respects:

1. There are no comedones. We have only seen a superficial folliculitis, and it has been proposed that the designation acne vulgaris requires comedones (11).

2. The onset mostly occurs many years after the usual acne age. Many of our patients had suffered from acne, however, and also presented an oily skin at the re-examination. The question of a linkage to acne should remain open until a special acne disposition can be established, e.g. by genetic markers.

The sampling technique employed in microbiological examinations is crucial for obtaining reliable results. As the scalp harbours an enormous resident microflora (16), the risk of false-positive samples by contamination from the surrounding skin necessitates a control of the sterility after disinfection. To avoid false negative samples caused by remnants of antimicrobial agents on the surface, a specific inactivating agent for halogens was used. The present combination of techniques for sampling, transport and cultivation has been found to give superior results with samples from oral infectious processes (15). By using this combination, unequivocal occurrence of *P. acnes* within the pustules could be demonstrated in 3 patients. *P. acnes* is present in normal follicles (16), however, which may explain why the pretreatment failed to produce a sterile scalp surface in the other patients. It is conceivable that *P. acnes* inhabited all pustules. From some pustules there was a sparse growth of *P. acnes*. A sparse growth of bacteria is nevertheless often found in pus as a result of the action of leukocytes. Naturally the occurrence of bacteria in these pustules does not necessarily mean that *P. acnes* is the primary etiological agent. Despite the fact, however, that *P. acnes* was found in most cases on the surface as well as in the content of the pustules, one may be allowed to surmise that this bacterial species is of some relevance for this disease. It is of interest that *P. acnes* has recently been recognized as a pathogen, causing actual, though rare, infections, mostly in humans with altered defence mechanisms or implanted foreign bodies: bacteraemia, bacterial meningitis, central nervous system shunt infections, hip arthroplasty infections, immune complex glomerulonephritis, endocarditis, hepatitis and wound infections (1, 4, 8, 9, 10). Recently, it

has been suggested that *P. acnes* may produce a factor(s) which is (are) chemotactic for neutrophilic leukocytes (5, 14). If this substance can pass through the follicular wall, an inflammatory process would start. Another pathogenetic factor may be hypersensitivity to *P. acnes* antigens (cf. 17).

The results of topical treatment are clearly not satisfactory. Those with the more severe disease were given oral tetracyclines. The majority became free from postules but some smarting (rather than itching) could still occur. The mechanism of drug action requires further elucidation; both an antibacterial effect and inhibition of leukocytic migration (2, 3) may be of importance.

In conclusion, we suggest that the entity of chronic non-scarring folliculitis of the scalp should receive more attention. The condition does not seem to be uncommon, at least in Scandinavia, and it has a long-term course. Further studies on these pustules may increase our knowledge of the inflammatory potential of *P. acnes*. In addition, it is evident that it is very difficult to make the scalp surface totally free from bacteria when using an adequate bacteriological analysis technique.

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ADDENDUM

Antisera against *P. acnes* group I and group II according to Voss (1970) were produced by subcutaneous injection of intra- and extracellular material (as described by Holm, 1967) from strain *P. acnes* ATCC 6922 and *P. acnes* Voss D34, respectively. Each serum was absorbed with the heterogenous strain. Culture filtrate of the isolated propionibacteria strains as well as of the reference strains were used as antigens for examination with precipitation reaction (double diffusion in gel according to Ouchterlony, 1949, modified as a microplate method by Wadsworth, 1962). All *P. acnes*-strains belonged to serological group I.

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