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Histopathology of *Lupus Erythematosus* of the Scalp

Hitherto microscopic pictures relating to *lupus erythematosus* (2, 5, 8, 9) have been mainly obtained from hairless parts of the body. It is reasonable to assume however, that erythematous patches on the scalp may present characteristic histopathological features.

MATERIAL AND METHODS

Twenty-three patients whose ages ranged from 24 to 62 years, 8 men and 15 women, were examined.

The patients were divided into three groups. In group I the duration of the disease did not exceed 6 months, in group II — 2 years, and in group III the lesions persisted more than 2 years. In 17 patients the erythematous lesions were limited to the scalp in the parietal temporal and occipital regions. In 6 patients the face was also affected. The scalp lesions consisted of erythematous patches showing keratotic scaling and follicular plugging, crusting of a dirty-brown colour and deficiency of hair. Atrophic scarring of the patches was visible in 10 cases. The microtomic sections were fixed in Bouin's solution and stained with hematoxylin-eosin, resorcin-fuchsin, with PAS and van Gieson stain.

OBSERVATIONS

The Epidermis

In group I in which the duration of the symptoms did not exceed 6 months, the epidermis was composed nearly always of 5—10 layers and lacked rete ridges. In groups II and III, the patients in whom the disease had began earlier, the epidermis showed a more distinct atrophy. The number of all layers was 1—4.

The Horny Layer. Hyperkeratosis was observed in 2 persons only in whom the lesions persisted for some years. The keratotic lamellae

were arranged loosely in some sections, showing exudative fluid. The initial atrophic period of the hair follicles was characterized by large keratotic plugs located within the hair follicles. Later the follicles became smaller and contained a lower number of keratotic lamellae. Sometimes, sheaths of the hair were destroyed and some corneous material could be seen directly in the upper dermis. The areas of parakeratosis were visible only in 3 cases. Sometimes they could be found in the keratotic plugs. Extensive parakeratosis was where the epidermis was thicker and the rete ridges were elongated.

The Granular Layer. In patients in whom the duration of the disease did not exceed 2 years the granular layer consisted of 1—2 layers of cells and did not show any distinct degenerative changes. In sections with extensive parakeratosis the granular layer was absent, which would suggest the occurrence of a similar type of keratinisation as in psoriasis. In the sections in which the erythematous patches were observed for 2 years, the granular layer often consisted of one layer of cells or was absent.

The Malpighian layer. In sections obtained from patients of group III atrophy of prickle cells was more marked than in those of groups I and II. In some sections the layer consisted of 1—2 layers of cells. Occasionally, cells of individual keratinisation occurred and vacuolated nuclei of cells had a rudimentary form or resembled clubs, rings and half-moons.

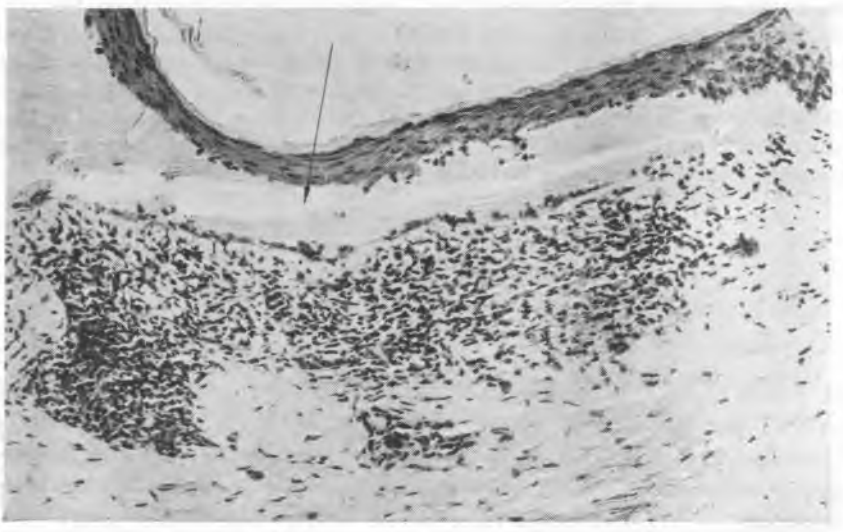

Fig. 1. Section from a patient aged 54. The duration of the lesions on the scalp is one year. Marked atrophy of the epidermis. Beneath the epidermis there is a flat bulla, within the oedema fluid and few inflammatory cells. H — e stain. 180 ×.

The Basal Layer. Half of sections of groups I and II of patients revealed liquefaction degeneration, and in group III in almost every case. The areas of liquefaction degeneration were usually small. There were also areas where the basal layer was completely destroyed. The presence of clefts and bullae was observed in 7 sections between the epidermis and dermis (Fig. 1). The basis of the bullae and clefts was formed by a basement-membrane or by the upper part of the dermis, the roof-by a basement-membrane or by the basal layer, sometimes by prickle layers. A few inflammatory cells were visible in the fluid.

The Dermis

The Sebaceous Glands. These underwent atrophy very early and were usually completely absent, whereas the hair follicles were still present. Occasionally, as a result of degeneration and atrophy, remnants of the sebaceous glands were visible and the cysts which filled with structureless mass stained PAS positive.

The Hair Follicles. In early stages extensive keratinisation of the hair follicles occurred; the upper parts of the hair follicles showed marked distention and large horny plugs. In later stages the hair follicles were reduced in number and atrophied. Hydropic degeneration of the basal layer of the outer sheath of the hair seemed to be responsible for the atrophy of the follicle. Hydropic degeneration in the basal layer of the outer sheath of the hair was often more pronounced than in the basal layer of the epidermis, and, occasionally, was distinct enough to result in the formation of clefts and bullae. The cells of the basal layer of the outer sheath of hair also showed in many cases, pyknosis and disintegration of the cytoplasm and nucleus. The cells became flat and similar to keratotic lamellae. In some sections a complete atrophy of the outer sheath of the hair was observed and there were noted some keratotic plugs in direct contact with the dermis. The periodic use of acid-Schiff reaction made the basal layer of the outer hair sheath stain dark violet, thus showing a high accumulation of glycogen. In early lesions a correlation was observed between the atrophy and degeneration of the epidermis and the atrophy and degeneration of the hair follicles. More marked atrophy and degeneration of the epidermis corresponded to that of the hair follicles. In late lesions the hair follicles were completely absent and replaced by the connective tissue, whereas the epidermis showed distinct atrophy.

Muscles. Muscles were preserved even in advanced lesions in the sections where the hair follicles and the sebaceous glands were completely absent. In a few sections the muscles of group II and III showed hydropic degeneration and disintegration of fibres and nuclei.

The Elastic and Collagen Fibres. In the dermis elastic tissue stain revealed swollen fragments of irregular clumped fibres, split and curled. In some sections the areas of accumulation alternated with those lacking fibres. Plexus of elastic fibres, varying in thickness, was frequently found around the hair follicles. An elastic fibre plexus was a very characteristic feature which was very often associated with progressing atrophy of the hair follicle (Fig. 2). Usually in 15 sections beneath the epidermis the elastic fibres were few in number, thin and delicate. In some sections of group III remnants of elastic fibres occurred, or were absent. The fibres were also absent in places with dense infiltration. Basophilic degeneration of the collagen fibres was found in 3 patients. It was observed in the upper part of the epidermis and occasionally around atrophic follicles; it stained dark violet with resorcin fuchsin, green with van Gieson stain, and purple with PAS. In early lesions the collagen bundles showed, at first, fraying dissociation, and later destruction throughout the dermis whenever inflammatory infiltrations or oedema occurred. In these areas they often stained green with van Gieson stain. In old lesions the collagen varied in thickness, being often thin. Instead of lying parallel to the surface of the skin they ran in various directions, and, frequently, the formation of young collagen between the degenerated bundles was noted. The degeneration of the collagen fibres in some sections of the dermis resulted in thinning

Fig. 2. Section from a woman aged 55. The duration of the lesions on the scalp is two years. The fragments of the hair follicle are surrounded by thick plexuses of elastic fibres. Resorcin—fuchsin stain. 180 ×.

them out. In sections of group III, fibrinoid degeneration of collagen fibres was observed (Fig. 3). Homogenous fibrinoid material was also noted as an irregular conglomerate within subepidermal oedema; it surrounded the vessel walls and hair follicles in which atrophy was under way.

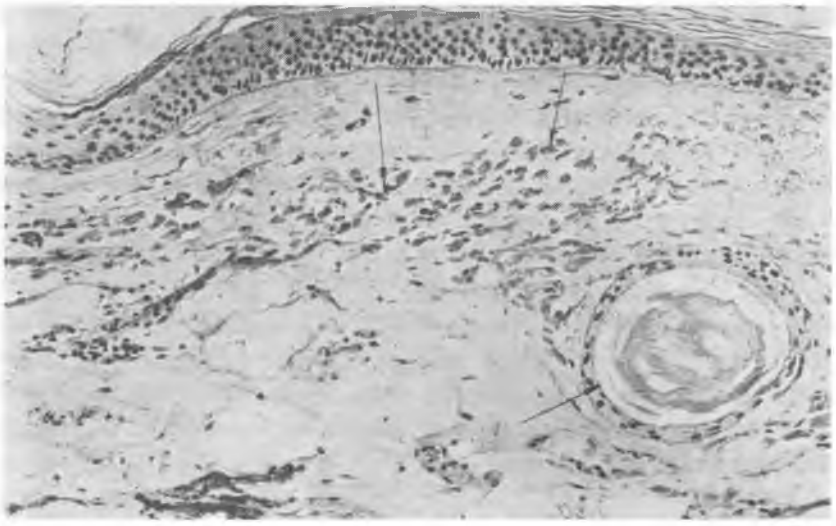

Fig. 3. Section from a patient aged 54. The erythematous patches of the scalp appeared some years ago. The basement membrane is thin. In the upper dermis the collagen bundles show a positive periodic acid-Schiff reaction. The late stage of the hair follicle atrophy. Mc Manus stain, 180 ×.

Blood Vessels. The upper part of the dermis contained, especially in the oedematous areas, dilated capillaries and lymphatics. Very often blood vessels revealed oedema and seldom positive periodic acid--Schiff reaction. Usually the blood vessels which fed the hair follicles showed thickening and positive periodic acid-Schiff reaction of their walls, narrowing or obliteration of the lumen, sometimes the proliferation of their endothelial lining. In sections which revealed a subacute form of *lupus erythematosus* the size of arterioles and venules considerably increased, and the walls appeared considerably thickened, and stained PAS positive.

In 15 sections beneath the epidermis a zone of oedema, varying in thickness, was present. It was also found around some blood vessels and, often, in patches of inflammatory infiltration. In sections showing similar changes with *lupus erythematosus subacutus* subepidermal oedema was very pronounced. As mentioned above, oedematous changes in the upper dermis were associated with hydropic degeneration of the

basal cells of the epidermis. In 7 sections the oedema in the upper dermis and the liquefaction degeneration of the basal cells was distinct enough to result in the formation of the clefts and bullae between the dermis and epidermis and between hair follicles and interstitial stroma.

The Inflammatory Infiltrate. In the active stage inflammatory infiltration appeared in patches around vessels and hair follicles. It was also observed beneath the epidermis. In some areas the inflammatory infiltrate invaded the epidermis and destroyed its basal layer; sometimes it was associated with oedema of the epidermis and upper dermis and with migration of inflammatory cells through the epidermis. It consisted almost entirely of lymphocytes with an addition of histiocytes and, sometimes, of melanophores; in a few sections of group I it contained also a small number of plasma and epithelioid cells. In the late stage of sclerosis a slight perivascular infiltrate was noted.

The Basement Membrane. With the use of periodic acid--Schiff reaction it usually appeared distinctly stained and narrow (Fig. 3) in those sections which showed changes similar to *lupus erythematosus subacutus* and it was thickened. In those areas in which the epidermis was affected by the inflammatory infiltrate the basement membrane was destroyed and absent.

DISCUSSION

In the early stage the examined sections show characteristic features, intrafollicular hyperkeratosis and partial or complete atrophy of the sebaceous glands. We may assume that enormous keratotic plugs, occluding the lumen of the hair follicles and stopping sebum, result in the early atrophy of the sebaceous glands. In the later stage degenaration, destruction and, finally, complete atrophy of the hair follicles was observed. At first the external sheath undergoes atrophy. Hydropic degeneration of this sheath is often very distinct and more pronounced than that of the epidermis. It is very hard to explain the role of the elastic fibre network surrounding the atrophic hair follicles. This network can persist for a time revealing the localization of earlier hair follicles (Fig. 2). Basophilic degeneration of collagen fibres is seen in 3 cases. In the early stage the collagenous fibres in the areas of oedema and inflammatory infiltrate are dissociated or absent. The degenerated fibres in these areas stain green or yellow with van Gieson stain, or dark violet with resorcin and fuchsin. Within the zone of subepidermal oedema the collagen is present as homogenous fibrinoid material which surrounds the capillaries in irregular conglomerates. In the late stage of the disease the collagen fibres become thin, less eosinophilic, and are disarranged.

In *lupus erythematosus chronicus* of hairless parts of the body, blood vessels show no fibrinoid degeneration of their walls. In *lupus erythematosus chronicus* of the scalp, the vessels near the hair follicles always show narrowing or obliteration of the lumen and positive periodic acid--Schiff reaction of the walls. The blood vessels of the scalp can be compared with chandelier which supplies 2—4 hair follicles (1). The occlusion of a few branch vessels cuts off the blood supply to a large number of hair follicles and causes their atrophy (1).

In the examined specimens distinct, occasionally very pronounced oedema is often observed. This oedema is usually associated with hydropic degeneration of the basal layer resulting in the formation of clefts and bullae between the epidermis and dermis and also between the external sheath of the hair follicles and the interstitial stroma (Fig. 1). In areas of pronounced oedema in the upper dermis inter- and intracellular oedema of the epidermis and the presence of oedema fluid between lamellae of the keratotic layer can be observed. In such cases clinical examination reveals the presence of crusts in the erythematous patches. The histopathological picture in 3 sections resembles *lupus erythematosus subacutus.*

Other sections also show features which are considered (1, 2) to be characteristic of subacute and acute forms: diffuse inflammatory infiltrate beneath the epidermis, fibrinoid degeneration of collagen fibres and blood vessels, the presence of crusts in the keratotic layer, pronounced oedema in the upper dermis, formation of clefts and bullae. These changes are often and distinctly observed in the section obtained from the patient in whom disease started more than 2 years ago (III group).

These observations show that histopathological changes in *lupus erythematosus chronicus* depend on the localisation of lesions, and duration of the disease; the changes, varying in intesity, are similar to those observed in chronic, subacute and acute forms, but more or less prominent.

P a s z k o w and B i e l a j e w a investigated the histopathology of *lupus erythematosus chronicus* of the lips and found clefts and bullae beneath the epidermis (7). Their observations confirm the above mentioned opinion. L a y m o n (3) compared histopathological changes of *psoriasis, neurodermitis, lichen ruber, dermatitis seborrhoica* and *lupus erythematosus chronicus* located on the scalp (3).

The above described changes of *lupus erythematosus* do not differ from those usually observed in sections of the hairless parts of the body.

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Zmiany histopatologiczne w liszaju rumieniowatym owłosionej skóry głowy

Streszczenie

Badanie histologiczne zmian w liszaju rumieniowatym przewlekłym owłosionej skóry głowy wykonano u 23 pacjentów w wieku od 24 do 62 lat, u 8 mężczyzn i 15 kobiet. Preparaty barwiono hematoksyliną i eozyną, rezorcyną i fuksyną wg metody van Giesona i PAS.

Najważniejszymi zmianami, które obserwowano były: występowanie pęcherzy i szczelin w naskórku i w obrębie pochewki zewnętrznej włosa, częsta obecność nasilonego obrzęku w skórze właściwej i naskórku, wczesny zanik gruczołów łojowych, zanik całkowity lub częściowy mieszków włosowych, tworzenie się gęstych splotów włókien sprężystych dookoła zanikających mieszków włosa, niekiedy odmienna barwliwość włókien kolagenowych. Prawie we wszystkich preparatach ścianki naczyń wykazują dodatni odczyn przy barwieniu metodą PAS. W dwóch preparatach zmiany przypominają podostrą postać liszaja rumieniowatego, w trzech obecne zwyrodnienie zasadochłonne.

OBJASNIENIA RYCIN

Ryc. 1. Chora lat 54. Czas trwania zmian na owłosionej skórze głowy 1 rok. Naskórek bardzo wyraźnie ścieńczały. Brak sopli naskórkowych. Widoczny płaski pęcherz wypełniony płynem i pojedynczymi elementami komórkowymi. Dno pęcherza stanowi miejscami warstwa podstawna, otoczona jest naciekiem z limfocytów i histiocytów. Barwienie hematoksyliną i eozyną. Pow. 180 ×.

Ryc. 2. Chora lat 55. Czas trwania zmian na owłosionej skórze głowy 2 lata. Daleko posunięty zanik gruczołów włosa. Widoczne tylko szczątki mieszków włosa

otoczone gęstymi splotami włókien sprężystych. Barwienie rezorcyną i fuksyną. Pow. 180 ×.

Ryc. 3. Chory lat 54. Od kilku lat zmiany na owłosionej skórze głowy. Sople naskórka wygładzone. Błona podstawowa cienka. Pod naskórkiem widoczne pęczki włókien kolagenowych barwiących się PAS dodatnio. Na prawo mieszek włosa w okresie daleko posuniętego zaniku. Barwienie według metody Mc Manusa. Pow. 180 ×.

Гистопатологические изменения красной волчанки, локализованной на волосатой части кожи головы

Резюме

Гистологические исследования изменений хронической волчанки волосатой части головы проводились на 23 пациентах в возрасте от 24 до 62 лет (8 мужчин и 15 женщин). Препараты окрашивались гематоксилином, эозином, резерцином и фуксином по методам фон Гисона и ШИК. Важнейшими наблюдаемыми изменениями были: появление пузырей и трещин в эпидермисе наружной волосяной сумки, частое присутствие интенсивных отёков в дерме и эпидермисе, ранняя атрофия сальных желёз, частичная или полная атрофия волосяных фолликул, образование густых эластических сплетений волокон вокруг регрессивных волосяных фолликул, иногда различная окраска коллагеновых волокон. Почти во всех препаратах стенки кровеносных сосудов проявляют дополнительную реакцию при окрашивании по методу ШИК. В двух препаратах изменения напоминают субхроническую форму красной волчанки, в трех случаях наблюдалась базофильная дегенерация.

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