Infestation with *Collembola* insects and *Rotifera-like organisms* in a woman

I. Clinical and histological investigations

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**SUMMARY.** The two months investigations carried out on a 80-year-old woman affected by parasitic delusions, who complained of a "beetle attack" on her skin revealed an actual parasitism with *Collembola* insects, manifested by: insomnia, anxiety, pallor, present appetite, grey furfuraceous exfoliation, dry zones of 20-25 cm length and 4-5 cm width, placed under breasts, ulcers of 0.5-1.0 mm surrounded by a congestive or a cyanotic zone, disposed on vertical tracts, on the right posterior thorax zone, and horizontally, on the lumbar zone. We could notice congestive nodules of 2-3 mm diameter on the skin of her face, head and buttocks, and also between her toes.

Histologically, one can observe dermo-epidermal lesions, with a fan form and centrifugal promotion to the superficial stratumas of the epidermis, gaps with and without erythrocytes and intraepidermical tunnels, full of erythrocytes tending to fusion. Inside some gaps, transversally-sectioned parasites were found. Into the epidermis were found other parasitical stages, looking like pupa. None of these parasites were isolated by granulomatous reactions. Around the lesions, with or without parasites, there was no inflammatory cellular answer.

**Key words:** infestation, *Collembola*, symptoms, histological exam.

The cutaneous lesions are accompanied by subjective and/or objective symptoms and have varied consequences and evolution, depending on the causative agent, on the action time and on the force of its aggression and, also, on the reactivity and sensitivity of the organism. These symptoms and lesions may be the effect of a real parasitism with synchronic evolution [23]. The subjective symptoms may reappear at variable intervals, after the successful treatment of a parasitological infection [27] or these may not have a real cause, becoming parasitical delusions, accompanying a hypothetical parasitism [27].

Among the pathogenic agents, able to attack the skin, there are ectoparasitic arthropods (insects, acarians and crustaceans). The arthropods may generate well-known affections with a long evolution [10, 17, 20, 21, 31, 35], sometimes severe, depending on the ectoparasitic's aggressiveness and on the patient's health condition, but also psychical disturbances (delusions and phobias) [6, 22, 23, 24, 26, 27, 29].

The parasitical delusions are usually considered manifestations accompanying a certain type of cutaneous lesions, which don't have a real parasitical cause. These delusions are frequently met in over 50 years old patients, affecting especially women comparing to men [24]. The patients suffering of parasitical delusions are convinced that they are parasited, presenting as proofs the visible lesions made by themselves. There are cases when the patient doesn't invent things, when she/he is really infested with many ectoparasitic arthropods species, like *Sarcoptes, Pediculus, Phthirus*, and *Cheyletiella* or with
Acarians, which primarily parasite the birds and only accidentally the people [23].

The skin's symptoms accompanying the parasitical delusions look like those from the parasitical dermatitis [6, 24, 26] and they are able to appear during the evolution of the dermatitis or after a certain period of its healing [27].

The skin's reactions to the arthropods' aggression may be, under certain limits, very much alike, but at the same time there are features, depending on the person's health condition [13, 18, 25, 37] and on the causative agent's pathology [2, 3, 11, 13, 17, 26, 32]. The ectoparasitic arthropods produce different cutaneous lesions, according to their morphology [17], physiology, biology [3, 4, 7, 8, 14, 17, 25] and their bionimy [15, 16]. The histological changes generated by the ectoparasitic arthropods depend on depth of the causative agent's penetration, on the way of penetrating the epidermis, on its lasting period into the cellular stratum of the skin, on the feeding method [33] and on its ability of inoculating the necrosant, anticoagulant, histolitical enzymes [15, 16]. Generally, the cutaneous lesions produced by the ectoparasitic arthropods have a way of centripetal promotion to the deep strata of the skin [1, 9, 19].

This work contains the result of the clinical and histological investigations made on a woman whose diagnosis was parasitical delusions.

**Material and method**

The investigations were made on an 80 years old woman, ex-nurse in a radiology clinic, who was complaining for six months of a "constant beetle attack", expressed by feelings of rapid bites in the skin, successive, repeated at different intervals and a rebel pruritus. The patient showed nodular lesions and little cutaneous ulcers. The body's hygiene was irreproachable. Initially, the woman was under a medical supervision at home, for about two months, while she was clinically examined every week.

Blood samples were taken for the hematological and biochemical test. Skin scraping from the affected zones of the body was weekly made. And the epidermic material obtained by the patient was separately collected in alcohol. The two samples were microscopically examined.

For the histological exam, skin biopsies were made from the thorax back zone and the lumbar zone. The biopsies were executed at the moment and from the places that the patient was complaining of quick painful stingy sensations. Three biotic skin samples were taken at a three weeks' interval. The samples were fixed in formalin 10%, introduced in paraffin, sectioned at 10 μm and coloured HE and PAS.

**Results**

The anamnesis showed that the disease made its debut suddenly, six months before the medical exam, through a rebel nasal pruritus. Two months later, the patient was given the diagnosis of lambliasis and a specific treatment was recommended to her. At the end of it, the patient complained of a "beetle moving" sensation and of progressive stings. Later, "pruriginous nodules with swarthy apex appeared in this area under her breasts".

After an evolution, whose duration couldn't be specified by the patient, the submammary area lesions have spontaneously healed and the nodules appeared on the lumbar zone. From here, they appeared successively and at different times on the face's, head's and buttocks' skin and also between her toes. In these places, she felt the same "quick stings", intermittently repeated, with a variable duration, very difficult to be set and with an almost constant frequency: four times during the night and three times during the day, accompanied by intermittent pains, very much alike "the saw cut". The spare time between the stages was of 2-6 hours. The patient said that the hot baths she had, three times per day and four times per night, had a soothing effect and increased the interval between two successive attacks. The scratching didn't have a soothing effect. During the evolution of the disease, the patient showed insomnia, anxiety, pallor a lost of weight (7 kg in six months) even with preserving her usual appetite.

In the epidermic samples obtained by scraping, the patient saw "little white worms, looking like threads, with a round head, with a black stripe on the back, covered with a crust and dark-brown insects, which became black at the contact with the air. Getting out of the skin, those little insects laid down little black round points".
In the case history, the patient declared that she suffers from cardiac insufficiency and arterial high blood pressure.

The clinic examination established that the patient is time-spatially oriented and that she is conscious. The skin test revealed changes of various intensities in the under breasts zone, in the lumbar zone, on the right posterior hemithorax, on the buttocks and between her toes.

In the under breasts zone there has been noticed the presence of dry grey furfuraceous exfoliation, on linear surfaces of 20-25 cm length and 4-5 cm width.

In the other affected areas there were nodules and little ulcers of 0.5-1.0 cm diameters, surrounded by a cyanotic congestive indurate area with an oval form of 1.0 x 1.5 cm. A normal hemorrhagical tissue represented the ulcers' basis. The ulcers were successively disposed, at unequal distances, on vertical linear discontinuous tract, placed on the right posterior hemithorax, and on horizontal tracts in the lumbar area. These tracts didn't intersect. In the same areas, red short linear subepidermal tracts, which had an ulcer, placed at extremities, have been noticed. In the other affected areas, only little nodules surrounded by a little congestive zone have been noticed. The nodules were reddish and had a diameter of 2-3 mm. Both lesions, the ulcers and the nodules had tracks of scratching.

The results of the chemical histological exam were between normal limits: hematocrit 45%, leukocytes 6200/mmc, polinuclear neutrofiles 70%, eosinophiles 2%, lymphocytes 22%, monocytes 6%, urea 35%, Na 145 meq/l, K 4.8 meq/l, Cl 97.4 meq/l, total bilirubins 0.32 mg/100 ml, proteins 82.2 g/100 ml.

The histological exam showed a thickening of the horny layer (stratum corneum) of the skin and centrifugal dermo-epidermic lesions.

There appeared into the derm and epidermis lacunar spaces wich initially were centred on the dermic centrifugal papilla. The gaps were round, placed on the transversal sections, looking like centrifugal galleries on a longitudinal section, close to one another and full of erythrocytes. The gaps were separated by septum, formed by cells belonging to the cellular stratum of the Malpighi’s epithelium and had different diameters. There has been noticed an obvious tendency of increasing their transversal diameter only in the promotion zone towards the exterior and of confluence during their promotion towards the horny layer of the skin. In some of the gaps, transversal sections of living parasitical structures were found. These parasitical structures were also found in the gaps where no erythrocytes could be found.

The gaps looked like a tunnel, with the derm as a starting point and their promotion way was centrifugal (towards the horny layer of the epidermis). The fusion of the sanguine gaps drove to the disappearance of the malpighian cellular stratum up to the horny layer. These spaces created through the gaps’ fusion had a larger transversal diameter towards the horny layer, giving the impression that 3-4 close gaps had a common starting basis from the derm.

An enlargement of the gaps’ dermis base was noticed in the advanced gaps through the total disappearance of the septums. Finally, a dermo-epidermic discontinuity has been created and it looked like a bubble covered with a ceiling formed from the horny layer of the epidermis. Probably, the ceiling’s breaking took place during the parasitical migration towards the exterior and led to the appearance of the cutaneous ulcers observed at the clinical exams.

In the epidermis, there have been found, as well, living parasite organic structures, oriented towards the horny layer, without being surrounded by a gap. There was no conjunctive reaction.

We must notice the fact that all these lesions didn't give an inflammatory cellular answer, which means that the encountered parasitical elements were alive.

**Discussions**

In patients over 50 years old, there may appear cutaneous lesions which can be attributed to a real parasitism [23, 29] or to an imaginary parasitical attack upon the skin [23].

In the case of the investigated patient, there were some clinic elements, which permitted the suspicion of a real parasitism; this is the reason...
for which the patient was monitored for some time.

Some of the suspicion elements of a real parasitism were: the multitude of successively affected cutaneous areas at random and at a longer distance, in space and time; the disposal on liniar tracts of the cutaneous lesions in the affected areas; the existence of lesions on areas of the body that the patient wasn't able to touch with her hands, to scratch and create these lesions.

These elements of suspicion suggested the idea of a parasite which moves through jumping at random, all over the skin's surface. This way of movement provided, on one hand, the explanation for the lesions' liniar tracts and, on the other hand, the reason for which the affected cutaneous areas are situated at long distances.

The lapse of time between the affected bodily areas could be explained by the fact that the parasite would survive in the patient's clothes or even in her bed. These possible locations would explain the reinfection, too.

The force, the movement and the great frequency of the "stingy" sensation of the parasite: the long evolution with periods of apparent remission; the impossibility of a fast detection of the etiologic agent and the vehemence with which the patient claims being the victim of a "beetle attack"; all these, associated with the resemblance of the macroscopic aspect of the cutaneous lesion produced by the parasite and the one produced by the patient would explain why these patients are diagnosed with parasitical delusions. Of course, not all the patients who complain of a "beetle attack" or of "unknown parasites" have a real parasitism. In this case, they are the victims of their own illusions.

The appearance of the cutaneous lesions on body surfaces that the patient cannot touch with her hands, the spontaneous healing of the lesions in other areas and their liniar aspect constitute other elements of a suspicion real parasitism.

The subepidermic presence of some short congestive tracts, marked by little development stages of ulcerations would suggest the possibility of a dermo-epidermic migration of a certain causative agent, which may have been an arthropod.

The histopathological modifications that we met had a particular character: dermal basis centrifugal promotion and a fan aspect. The lesions were produced by some parasitical organisms; we provisionally called them "larva". These organisms created by histophagy centrifugal tunnels. The tunnels were initially centred on the dermic papilla and they had a lacunar aspect in the transversal section.

The presence or erythrocytes in most of the gaps, the absence of some necrotic cell inside them, the enlargement of the transversal diameter and the disappearance of the interlacunar septums certify the histophagy of parasites. The confluence of the gaps and tunnels, the enlargement of the transversal diameter and their promotion only towards the epidermis suggested the idea of motion of the causative agent through "come and go" and laterality movements.

The histophagy is the mechanism of producing histopathological changes and would constitute the cause of the "quick, repeated and painful stings" accused by the patient. The character of these bites would probably depend on the development stage of the parasite.

Inside Malpighi's epithelium there were found parasitic elements which seemed immobile, which could have been pupas and were not sequestered through a granulomateous structure. Besides, in all the lesions we met, with or without parasitical elements, there was no inflammatory cellular answer. This suggested that the causative agent was alive. The explanation of this answer's absence would consist in the capacity of the living parasite to avoid the defensive forces of the organism by a phenomenon of molecular mimesis or by other mechanisms.

The cutaneous ulcers were hemorrhagical and didn't show purulent secretions and, after the parasite left, they healed "per primam intentionem". A furfuraceous exfoliation appeared after the healing.

The type of histologic lesions seen in this patient are different from the lesions which accompany other cutaneous parasitical infestations quoted in literature [1, 3, 8, 9, 11, 12, 13, 14, 15, 16, 19, 25, 33, 37].
Conclusions

1. A 80 years old woman was investigated; she complained of a "cutaneous attack of beetles" and accused sensations of "quick, repeated (from 2 to 6 hours) bites, intensive pruritus on the affected body areas: under breasts, lumbar and dorsal thoracic areas, on the skin of the face and head and buttocks, and between her toes".

2. The general clinic examination emphasized the fact that the patient was spatially and temporally oriented, that she also was conscious and suffered from cardiac insufficiency and arterial high blood pressure.

3. The skin's examination showed: dry grey furfuraceous exfoliation, disposed under breasts, on a surface of 20-25 cm length and 4-5 cm width, ulcers of 0.5-1.0 mm diameter, surrounded by oval congestive or cyanotic areas, of 1.0 x 1.5 cm, successively disposed on linear horizontal tracts, in the lumbar zone, and on vertical tracts in the right dorsal thoracic zone. In some of the areas there could be seen only little ulcers, surrounded by a little rough congestive portion. In the other affected body areas, we observed little reddish nodules of 2-3 mm diameter, surrounded by congestive portions with grattage marks.

4. The histological exam presented lesions with a fan aspect, situated in derm and epidermis, with centrifugal promotion; sanguine gaps and tunnels produced through histophagy. The gaps and the tunnels confluated. Finally, a bubble covered with a horny ceiling was created through the successive disappearance of the cellular stratum.

5. Into the sanguine gaps were found living parasites, transversally sectioned and into the epidermis were met inactive development stages (probably a pupa) of the parasite. There was no granulomatous reaction around the parasite.

6. There was no inflammatory cellular answer in any of these lesions.

Bibliography


Figure 1
Dermo-epidermical centrifugal lesions (x24, HE)
Figure 2
Parasitical structure – transversal section (x160, HE)
Figure 3
Large sanguin gap created by the septums’ disappearance (x80, HE)
Figure 4
Epidermical bubble covered by a horny ceiling (x24, HE)
Figure 5
Parasitical structure similar to a pupa (x80, HE)