

ORIGINAL ARTICLE

The identification of trichoscopic features of allergic scalp contact dermatitis: a pilot-study of a single center

Michela STARACE^{1,2}, Francesca BRUNI^{1*}, Maria T. MARCONDES³,
Aurora ALESSANDRINI¹, Bianca M. PIRACCINI^{1,2}¹Unit of Dermatology, IRCCS AOU Bologna, S. Orsola-Malpighi Polyclinic, Bologna, Italy; ²Department of Medical and Surgical Sciences, Alma Mater Studiorum University of Bologna, Bologna, Italy; ³Faculty of Medicine, University of Caxias do Sul, Caxias do Sul, Brazil*Corresponding author: Francesca Bruni, Unit of Dermatology, Department of Experimental, Diagnostic and Specialty Medicine, University of Bologna, Via Massarenti 1, 40138 Bologna, Italy. E-mail: francesca.bruni3@studio.unibo.it

ABSTRACT

BACKGROUND: Very few reports have described trichoscopic patterns of allergic scalp contact dermatitis (ASCD), which is usually an exclusion diagnosis on hair disorders. Trichoscopy is a simple, diffused method for investigating scalp diseases and may help to establish the characteristic findings of ASCD.**METHODS:** A retrospective chart review was conducted on patients who visited the outpatient hair consultation at the Department of Experimental, Diagnostic, and Specialty Medicine of the University of Bologna, Italy, from January 2020 to September 2021. The inclusion criteria were based on the previous diagnosis of ASCD, patch test positivity; recover after allergen suspension and absence of other scalp diseases besides androgenetic alopecia on the patients in use of topical minoxidil. All trichoscopic features were described.**RESULTS:** ASCD was observed in 12 patients. The allergens were as follows: topical minoxidil (58.33%), p-phenylenediamine (PFD) (33.33%), wig, nickel, methylchloroisothiazolinone, and methylisothiazolinone (MCI/MI-Kathon CG) in one patient each, with multiple positive patients. Scales were classified as diffuse, patchy, white, and yellowish, and vascular patterns were classified as arborizing vessels, twisted red loops, simple red loops, bushy red loops, red dots, and globules besides atypical vessels. The main findings were erythema (100%), white scales (100%), arborizing vessels (91.2%), and simple red loops (91.2%).**CONCLUSIONS:** Trichoscopy is a useful tool to help on the diagnosis of ASCD.

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KEY WORDS: Dermatitis, allergic contact; Scalp; Dermoscopy; Patch tests.

Allergic scalp contact dermatitis (ASCD) is an uncommon form of dermatosis of the scalp, even if a large number of products are daily used on it. This low occurrence may be explained by the huge number of pilosebaceous units, whose sebum acts as a natural barrier from possible allergens.¹ ASCD is classified such as an inflammatory scalp disease. The common inflammatory scalp diseases, such as psoriasis, seborrheic dermatitis, lichen planopilaris, discoid lupus erythematosus, contact dermatitis, or pemphigus may share similar clinical features.²

When ASCD is suspected, usually as exclusion diagnosis after ruling out other more common pathologies, a careful allergological anamnesis involving all possible

allergenic substances in current or past use is fundamental.^{1,3} In this perspective, the patch test is an indispensable tool, which helps to identify the correlated allergen and to aid in diagnosis.

Trichoscopy is a noninvasive method for visualizing, giving or helping the diagnosis of hair disorders.³ A recent systemic analysis indicates that trichoscopy may be used with high accuracy in the differential diagnosis of inflammatory scalp diseases.²

In this perspective, currently, there are no established criteria for giving ASCD diagnosis based only on scalp dermoscopy. Nonetheless, some correlated findings have already been described in literature, as the presence of ar-

borizing vessels⁴ and twisted red loops,⁵ although these vascular patterns are not specific for this type of scalp dermatitis and its presence demands the exclusion of other more common pathologies.

As the trichoscopic signs of allergic scalp dermatitis are not yet well established, the aim of this article is to provide a pilot descriptive study regarding the trichoscopic patterns visualized in twelve cases of ASCD in the absence of other inflammatory scalp diseases: more in details, some cases presented in concurrence with androgenetic alopecia, a disease with settled trichoscopy criteria, which allow us to differentiate typical androgenetic alopecia findings from the ones ASCD related) and to arouse the standards to its diagnose based on scalp dermoscopy.

Materials and methods

A retrospective chart review was conducted on patients attending the Outpatient's Hair Consultation of the Department of Experimental, Diagnostic and Specialty Medicine (DIMES) of the University of Bologna, Italy, from January 2020 to September 2021, in which all patients who had a confirmed diagnosis of ASCD and, at the same time, had a local patch test positivity of ++- or +++ intensity related to scalp products were enrolled in the study. Clinical, trichoscopic and allergy data were collected and organized in Supplementary Digital Material 1 (Supplementary Table I).

The inclusion criteria were: an allergic scalp contact dermatitis diagnosis based on clinical examination, patient history, and patch-testing positivity, besides the recovery of the eczema after suspending the identified trigger in the absence of other scalp diseases, except in the cases in which patients presented a clinic of ASCD while applying topical minoxidil on the scalp because of an underlying diagnose of androgenetic alopecia.

With the clinical suspicion of allergic scalp contact dermatitis, we performed scalp dermoscopy and all patients underwent patch testing with the Italian baseline series maintained by the Italian Society of Allergological, Occupational and Environmental (SIDAPA), hairdressing series with allergens from FIRMA Diagent (Florence, Italy), and possible allergens present in patients' own products. Topical minoxidil was tested employing the product itself applied on Curatest®, from Lohmann-Rausche directly on the skin. In the case the own patient's product was a shampoo, it has been applied as semi open patch test. No topical or systemic treatments, which could unmask the diagnosis of contact dermatitis, as corticosteroids, were administered

prior to the patch test execution or trichoscopy evaluation. The readings were performed on day 2 and day 4, 48 and 96 hours after the test application respectively. Patients with suspicion of ASCD who had negative or weak reactions to the patch test were promptly excluded. Trichoscopy evaluation was performed in all selected patients using Fotofinder® system to obtain x70 magnified images. All recognized trichoscopic features were described in Supplementary Table I in correlation to clinical and allergic data. After having the patch test results, patients suspend the use of all recognized allergens and sequential evaluations regarding the eczema solving were carried out with the resolution of the symptoms in all of the cases.

Results

Allergic scalp contact dermatitis was present in 12 patients aged 18-78 years old, from which most were female (83.33%).

The most prevalent allergens were, in decreasing order: topical minoxidil in 7/12 (58.33%) of the patients, p-phenylenediamine (PFD) in 4/12 (33.33%) — one case associated with topical minoxidil and three cases in exclusive use of PFD, wig (tested with the standard, plastic and glues and acrylates series; positive ++- to 2-hydroxyethyl methacrylate 2% pet) in 1/12, nickel in 1/12 (a single case associated with topical minoxidil use), and methylchloroisothiazolinone and methylisothiazolinone (MCI/MI – Kathon CG) in 1/12, with multiple positive patients.

Trichoscopic features including the presence of erythema, scales (subdivided by distribution: patchy and diffuse and by color: white and yellow), vesicles, and few vascular patterns (arborizing vessels, twisted red loops, simple red loops, bushy red loops, red dots and globules and atypical vessels) are described in correlation to clinical data and patch test intensity in Supplementary Table I.

Erythema

Erythema, a characteristic finding of allergic contact dermatitis, was observed in 100% (12/12) of the patients during trichoscopy exam.

Scales

Scaling patterns: distribution and colors

We divided scaling presentation by distribution — diffuse and patchy — and by color — white and yellowish scales. We observed a prevalence of diffuse scales in 75% of the patients, while patchy scales occurred in 25% of the pa-

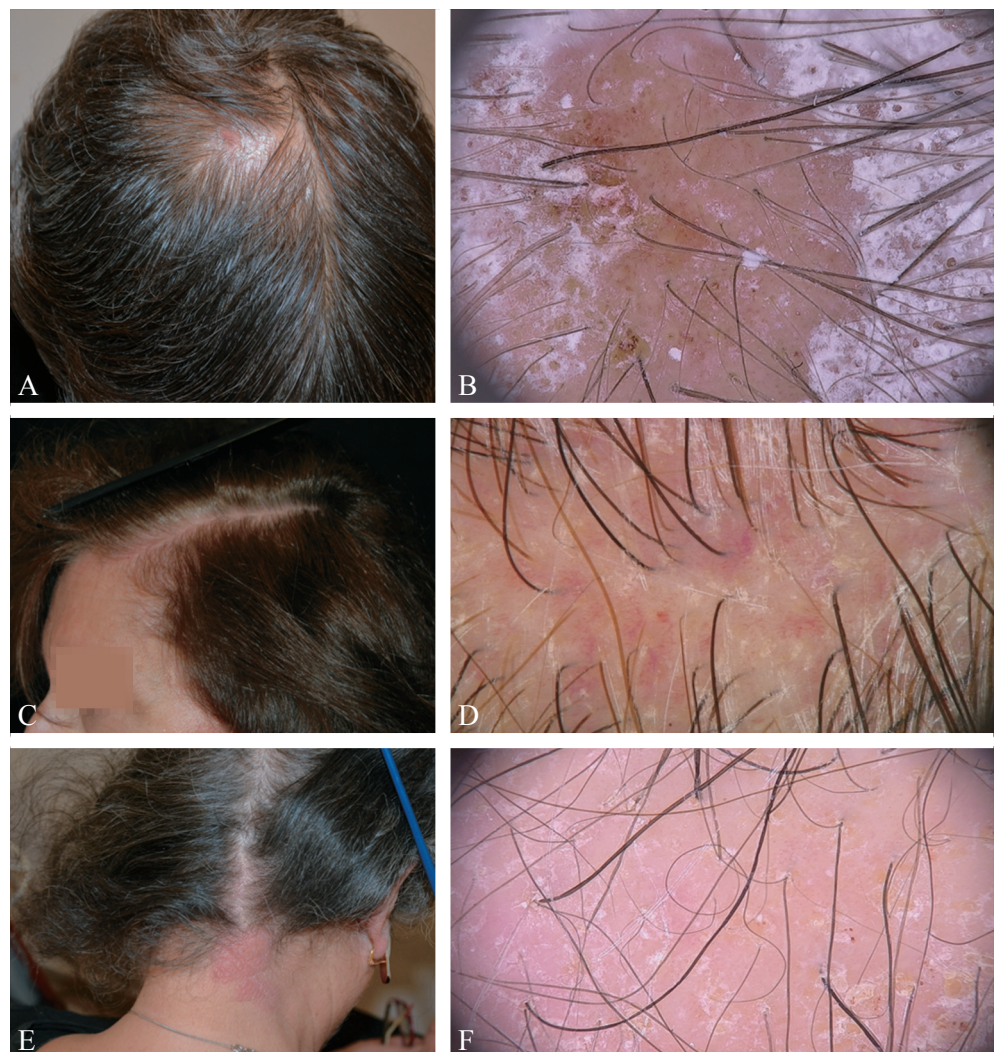


Figure 1.—Different types of scalp scaling. Clinical (A) and trichoscopic (B) images of patchy scales; clinical (C) and trichoscopic (D) images of yellowish scales; clinical (E) and trichoscopic (F) image of diffuse scales.

tients. White scales were present in 100% of the cases, with an association with yellowish scales in 33.33% (Figure 1).

Diffuse scales

Diffuse scaling was seen in 9/12 (75%) of our cases: 9/9 presented white diffuse scaling and 2/9 presented yellowish diffuse scaling, always in concurrence with the first one.

Patchy scales

A non-homogeneous scaling distribution or patchy pattern was observed in 3/12 of our patients (25%). Of these, 2/3 revealed yellowish and white patchy scales, and 1/3 revealed white patchy scales only.

White scales

White scales were present in 100% of the patients. White scaling was diffuse in 9/12 (75%) patients and patchy in 3/12 (25%) patients.

Yellowish scales

Yellowish scales were observed in 4/12 (33.33%) of the patients, 2/4 were diffuse and 2/4 with a patchy distribution. In all cases presenting with yellowish scales, white scaling also occurred.

Vesicles

Vesicles were observed in 2/12 (16.67%) of the patients (Figure 2).

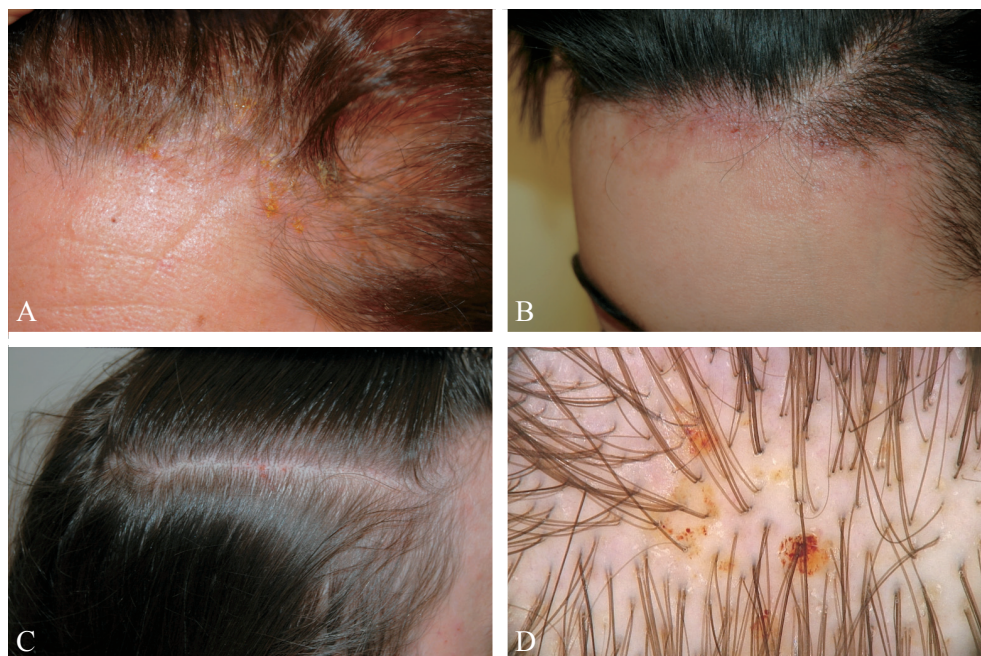


Figure 2.—Clinical images (A, B) of scalp vesicles. Clinical (C) and trichoscopic (D) images of vesicles in a late stage.

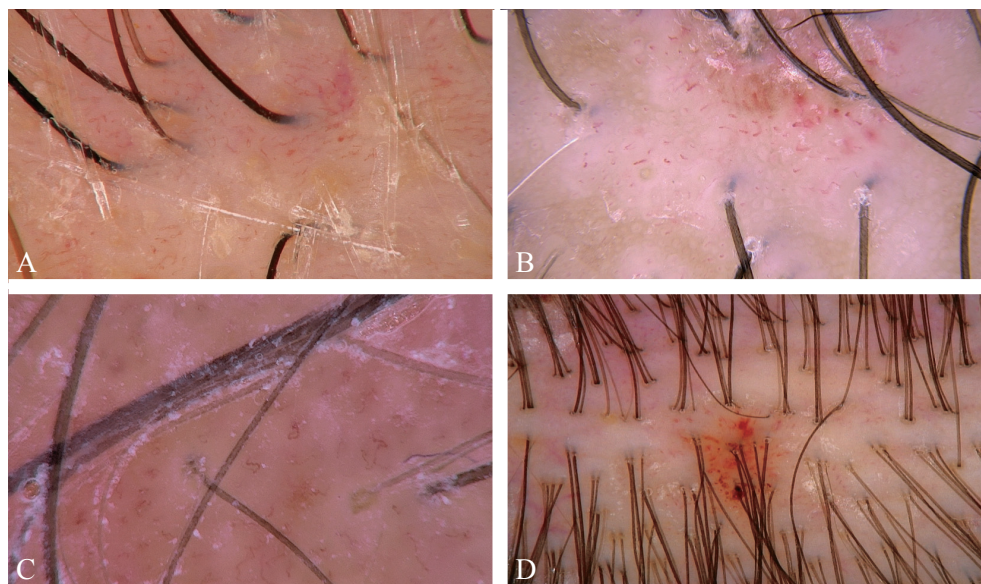


Figure 3.—Vascular patterns. A) Arborizing vessels; B) simple red vessels; C) bushy red loops; D) atypical vessels.

Vascular patterns

Vascular patterns are shown in Figure 3 and here are listed:

- arborizing vessels: in our sample, this pattern was seen in 11/12 (91.2%) of the patients;
- simple red loops: simple red loops could be seen in 11/12 of the patients (91.2%);
- twisted red loops: twisted red loops were identified in only 2/12 of the sample (16.67%);

- atypical vessels: atypical red vessels were seen in 2/12 of the group (16.67%);
- red dots and globules: none of our patients presented this pattern;
- bushy red loops: none of our patients presented this pattern.

Scaling presented mainly in diffuse form when compared to patch presentation. White scales occurred in

100% of the patients, sometimes associated with yellowish scaling. Arborizing vessels and simple red loops were statically more common than other vascular patterns, despite the fact that other vascular presentations were also present in a smaller percentage as twisted red loops and atypical vessels.

Discussion

Allergic scalp contact dermatitis is an uncommon condition caused by an allergic reaction developed after the exposure of the resistant scalp skin to an allergen, which is usually related to substances present in shampoos, hair conditioners, dyes, and topical drugs. The typical clinical presentation includes erythema, scales and itching as principal symptom. A recent systemic analysis indicates that trichoscopy may be used with high accuracy in the differential diagnosis of inflammatory scalp diseases.² In addition, the diagnosis of allergic scalp contact dermatitis is not always easy and requires patch testing for diagnostic confirmation; in some cases also an invasive biopsy can be performed, revealing spongiosis as principal histological feature.

Our sample is the biggest one to evaluate patients with ASCD by performing trichoscopy and correlating clinical, trichoscopical and allergic data. Only patients with strong patch test reaction due to substances present in hair care products were admitted.

The scalp dermoscopy of twelve patients (10 females and 2 males) with previous diagnose of ASCD enrolled in our study revealed the following findings: erythema in 12/12 (100%) patients, diffuse scales in 9/12 (75%), and patchy scales in 3/12 (25%). By scales' color, white scales were seen in 12/12 (100%) and yellowish scales in 4/12 (33.33%). Vesicles were observed in only 2/12 (16.67%) of the patients. Among the identified vascular patterns, the most visualized were arborizing vessels and simple red loops, both of which were present in 11/12 (91.2%). Twisted red loops were present in 2/12 (16.67%) patients, and atypical vessels were observed in only 2/12 (16.67%) of the patients.

Erythema, itch, and scaling are well-known clinical signs of ASCD. These manifestations are usual in other scalp conditions as, but not only, in seborrheic dermatitis of the scalp and scalp psoriasis. Both entities present scaling as one of its main signs and both of them play a role between the most common differential diagnosis of ASCD. On trichoscopy, both seborrheic dermatitis and ASCD present with arborizing vessels, whereas psoriasis

presents with a prevalence of red dots at low magnification and twisted capillary loops at high magnification,⁶ but does not have a supposed allergic report associated.

Usually, mild diffuse scaling may be present in healthy people with dry skin, while moderate to severe diffuse scaling is observed in scalp psoriasis (typically with white diffuse scales), ASCD (white scales where observed in all patients also by Makowska *et al.*⁷) and seborrheic dermatitis (usually with yellowish diffuse scales).⁸ According to trichoscopic evaluation of our sample, scaling is an always-present feature in ASCD trichoscopy.

Considering the scales' colors, we divided them into yellow and white. White scales were the rule (100% presented with white scalp scaling), whereas yellowish scales appeared in a smaller percentage (33.3%). Yellowish scaling was associated with sensitivity to topical minoxidil, PFD, and nickel in the patch test, but was not correlated to stronger patch test reaction than white scales presentation isolated. Makowska *et al.*⁷ identified the coexistence of white and yellowish scaling in four of five (80%) patients when analyzing a sample with the diagnose of ASCD, while our study found it in concurrence in 33.33%. Also, diffuse white scaling in trichoscopy is related to allergic dermatitis according to Rudnicka *et al.*⁸

When searching for vesicles, we identified vesicles in 2/12 (16.67%) patients. For the authors best knowledge, the presence of vesicles have not been prior described by other authors in ASCD trichoscopy.⁹ In our study, vesicles on scalp dermoscopy were not related to stronger reactions on patch test.

Regarding vascular patterns, arborizing vessels and twisted red loops have been correlated with ASCD^{5-7, 10} in the literature. Our study revealed a high prevalence (91.2%) of arborizing vessels, in accordance with observes of other authors. This pattern is also visualized in seborrheic dermatitis, as described by Golińska *et al.*² in a systematic review, defining its sensitivity on diagnosing ASCD in the range of 10%, while its specificity range from 78.4% based on prior studies.

Concerning the presence of simple red loops in 11/12 of the patients, this vascular feature has not been described in ASCD trichoscopy by other authors, while it seemed to have a higher prevalence than twisted red loops in our sample in comparison with other reports.

Twisted red loops were observed in two (16.67%) of our patients. It is important to note that this feature is strongly related to scalp psoriasis, as proposed by Bruni *et al.*,¹¹ although none of the patients of our study presented previous, current or concurrent diagnosis of psoriasis of the

scalp. Makowska *et al.*⁷ also observed them in 40% of a smaller sample, suggesting it may be a minor feature of trichoscopy in allergic scalp contact eczema. According to a review by Golińska *et al.*,² the sensitivity of twisted red loops in trichoscopy of ASCD is 20%, while its specificity is 79.5%. This psoriasiform presentation in ASCD has already been reported in two cases of acute telogen effluvium after an allergic reaction to topical minoxidil.⁵ In our study, the identified allergens were PFD in one case and PFD associated with minoxidil in the second case. To the best of our knowledge, PFD has not been associated with psoriasiform ASCD.

Atypical red vessels have not been previously reported in trichoscopy for ASCD and have been correlated with seborrheic dermatitis² and psoriasis¹² in other reports. We reaffirm that our patients did not present with any of these diseases in concurrence and this finding may reveal another trichoscopic clue to ASCD.

Red dots and globules were not seen in any of our patients and were related to psoriatic manifestations on scalp dermoscopy, as in plaque psoriasis (red dots) and seborrheic dermatitis (red dots and globules).¹¹ The absence of red dots, globules and bushy red loops may aid dermatologists in seeking a differential diagnosis of scalp psoriasis when these findings are observed in a patient with diffuse scales with suspected ASCD.

Since ASCD is a diagnosis of exclusion, ruling out other hair disorders is essential. The main one that also presents with erythema, pruritus and diffuse scaling is seborrheic dermatitis and related to microbiota dysfunction and overproduction of sebum. According to a systematic review which evaluated the accuracy of trichoscopy in inflammatory scalp diseases held by Golińska *et al.*,² the most common vascular pattern of seborrheic eczema are arborizing red vessels, twisted red loops, atypical and glomerular vessels. Among our patients, we were able to identify arborizing vessels in 91.2%, while twisted red loops and atypical vessels in only 16.6%. None presented with glomerular vessels on our study. Predominantly perifollicular white scaling was described over yellow scaling also in seborrheic dermatitis. When observing scales, as seen in 100% of our patients, one may withdraw the diagnosis of scalp psoriasis by scratching the scale surface in order to identify typical vascular patterns related to it as proposed by Bruni *et al.*¹¹ Plaque psoriasis is marked by twisted red loops plus red dots and globules, meanwhile in seborrheic dermatitis we can observe all types of vessels in an homogeneous distribution. Regarding vascular patterns, according to Kibar *et al.*,¹² whose study enrolled 112 patients with

seborrheic dermatitis, the typical signs in trichoscopy are twisted red loops and comma vessels, while in ASCD we found the most arborizing vessels and simple red loops.

We could not assess whether the dermoscopy features were related to the intensity of the patch test reaction since most of our patients (91.2%) presented +- positivity and no findings were observed only in +++ cases. Erythema, white scales, and simple red loops were observed in all patients with +++ reaction in the test, suggesting it may represent a higher correlation of these findings with ASCD. In this sense, the present article is a pilot study and the analyses of bigger samples are needed to confirm some correlations proposed by our report.

Correlations of allergens to trichoscopic findings are scarce, since the small size of our sample. Despite of that fact, in our sample, minoxidil usually presents with erythema, white diffuse or white patchy scales, and sometimes yellowish scales, typically with arborizing vessels and simple red loops. On trichoscopy, PFD revealed erythema, diffuse white scales, sometimes yellowish scaling, vesicles, arborizing vessels, twisted red loops, and simple red loops. Kathon CG, wig, and nickel, each of which was identified on patch testing in only one patient, require further studies to better define their characteristic patterns on scalp dermoscopy. Specific studies assessing patch test results in cases of ASCD may help to elucidate it better in the future.

Conclusions

In conclusion, although our study had some limitations due to its small sample size, it was the first one to access patch test results considering its intensity and correlating to the respective allergen, patient's gender and age. The summarization of our data, in addition to trichoscopic images, allowed the elucidation of new features when performing trichoscopy in ASCD. Careful observation considering the intersection of some dermatoscopic findings in allergic scalp contact eczema with other scalp inflammatory disorders is important for establish a correct differential diagnosis, but most of all, to remember the physicians about the role of ASCD between the differential diagnoses in these cases.

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Conflicts of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions

All authors read and approved the final version of the manuscript.

History

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Supplementary data

For supplementary materials, please see the HTML version of this article at www.minervamedica.it