Dermocopic Features of Noncicatricial Alopecia

Margareth Raisa Magdalena Hutabarat*, Nelva Karmila Jusuf, Imam Budi Putra****

* Post Graduate of Dermatology and Venereology, Medical Faculty, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Medan, Indonesia
** Department of Dermatology and Venereology, Medical Faculty, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Medan, Indonesia

DOI: 10.29322/IJSRP.9.07.2019.p91133
http://dx.doi.org/10.29322/IJSRP.9.07.2019.p91133

Abstract- Noncicatricial alopecia (NCA) is hair loss without scar tissue formation. The mostly found NCA are androgenetic alopecia (AGA), alopecia areata (AA), and telogen effluvium (TE). These three NCA are difficult to distinguish clinically that additional examinations are needed to support the diagnosis. A descriptive cross-sectional study was conducted to determine dermoscopic features of NCA, which included 30 NCA patients, comprised of 15 AGA patients, 5 AA patients, and 10 TE patients. In this study, the mean age of NCA patients was 35,7 years (mean age: AGA: 46,93 years; AA: 16,4 years; TE: 25,3 years). AGA was found mostly in men (80%), whereas AA and TE were found mostly in women (60% and 90%, respectively). AGA was also found mostly with marital status (86,7%) and history of alopecia in father (66,7%). The mean duration of alopecia in NCA were varies (mean duration of disease: AGA: 16,4 years; AA: 5,4 months, TE: 10 months). The pattern of alopecia in AGA was found mostly as Hamilton-Norwood III (26,7%) in male pattern hair loss (MPHL) and Ludwig II (13,3%) in female pattern hair loss (FPHL), whereas the pattern of alopecia in AA was found mostly as multiple patches (60%). Dermoscopic features were found as diversity of hair diameter > 20% in all AGA patients (100%), yellow dot in all AA patients (100%), and empty follicle in all TE patients (100%). Other dermoscopic features were found with different frequency. Dermoscopy examination is beneficial in diagnosing NCA.

Index Terms- androgenetic alopecia, alopecia areata, dermoscopy, noncicatricial alopecia, telogen effluvium.

I. INTRODUCTION

Hair is a cylindrical keratin filament, with or without pigment, which grows from hair follicle in the epidermal layer of mammals. Hair growth is influenced by the rapid division of matrix cells on the base of hair follicle.[1,2] Humans have 100.000-150.000 hair on the scalp.[3] A number of 90% of the hair is in the anagen phase and 10% of the hair is in the telogen phase. After 2-3 months of telogen phase, hair falls off and is replaced with new hair in the same hair follicle.[1-5] Failure of hair regrowth causes baldness (alopecia).[4,5]

Alopecia is classified into cicatricial alopecia (CA) and noncicatricial alopecia (NCA). CA is associated with permanent destruction of hair follicle unit, whereas NCA is not associated with scar tissue formation.[2,4,5] The mostly found NCA are androgenetic alopecia (AGA), alopecia areata (AA), and telogen effluvium (TE).[5,6]

AGA is a genetically inherited and androgen-dependent hair disorder.[7,8] In men, AGA is known as male pattern hair loss (MPHL). Whereas, for women, AGA is known as female pattern hair loss (FPHL).[6,9] AGA can be found from prepubertal period until the eighth decade of life.[7] AA is a genetic, noncicatricial disorder in the anagen hair follicles mediated by the immune system.[4,10] AA is found 0,2% worldwide with an estimated risk of AA in life of 1.7%.[11,12] AA has been found in age of 3 months[13] up to the seventh decade of life.[14] The highest prevalence is at the age of 30-59 years.[14] TE is a diffuse terminal hair loss throughout the scalp.[5] Generally, chronic TE is found in women aged 30-60 years.[4] These three NCA are difficult to distinguish clinically that additional examinations are needed to support the diagnosis, such as trichogram, dermoscopy, and biopsy.[6-8]

Dermoscopy is a noninvasive diagnostic tool that can visualize the epidermal layer and its underlying structure. Dermoscopic examination of hair and scalp abnormalities is also called trichoscopy.[6,15] Chiramel et al. describe the role of dermoscopy in the differential diagnosis of various alopecia with almost 90,5% of cases are difficult to diagnose clinically.[16] The study by Elzbieta et al. obtained the sensitivity and specificity of dermoscopy as a diagnostic method in FPHL of 96% and 98% compared to clinical diagnosis. In TE, the sensitivity and specificity of the dermoscopy examination were 85% and 98%.[17] The dermoscopic features in the form of black dot, hair vellus, differences in hair diameter, yellow dot, exclamation hair, and thin hair were statistically significant in diagnostic procedures and treatment evaluation for alopecia, both NCA and CA, but differences in dermoscopic findings are still found in several studies.[17,18]

II. MATERIAL AND METHODS

Study sample

This descriptive cross sectional study was conducted in Cosmetic Division, Department of Dermatology and Venereology, Medical Faculty, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Medan, Indonesia, from December 2017 until December 2018. The study was approved by the Health Research Ethical Committee, Medical Faculty, Universitas Sumatera Utara, Medan, Indonesia.

This study included 30 NCA patients aged ≥ 5 years, comprised of 15 AGA patients, 5 AA patients, and 10 TE patients. Demographic data and medical history were taken, including age, gender, marital status, course and duration of alopecia, previous disease and treatment history, also family history of alopecia. Clinical examination on hair and scalp was performed to determine the pattern of alopecia. In AGA, pattern of alopecia was classified based on Hamilton-Norwood classification for MPHL and Ludwig classification for FPHL. In AA, pattern of alopecia was classified into single patch, multiple patch, reticular pattern, ophiasis pattern, sisaipho pattern, alopecia totalis (AT), and alopecia universalis (AU). Diagnosis was made based on medical history and clinical examination.

Patient who agreed to participate and signed informed consent was included in this study. Patients with hair and scalp treatment (systemic and topical corticosteroid, minoxidil, biologic agent) in the past 6 months, congenital hair and scalp disorder (trichorrhexis nodosa, trichorrhexis nodosa, trichorrhexis invaginata and Netherton syndrome, pili torti and Menkes syndrome, monilethrix, Marie-Unna hypotrichosis, pili annulati), or infection of hair and scalp (folliculitis, tinea capitis, secondary syphilis, pediculosis capitis, scabies) are excluded.

Methods

Dermoscopy examination was performed with a video dermoscope (Firefly® DE300 Digital Video Dermoscope; Firefly Global, Belmont, USA) that was connected to a desktop computer (Hewlett-Packard All-in-One 20-c429d; HP Inc., Palo Alto, USA) with installed FireflyPro Software. Alcohol as immersion liquid was used before examining each patient to clarify the observation. Only hair loss regions were observed. At least 3-5 images were taken with video dermoscope at a 10 to 30-fold magnification. Each dermoscopic image were reviewed to determine dermatologic features, such as diversity of hair diameter > 20%, perifollicular brown depression, short vellus hair, yellow dot, black dot, broken hair, and empty follicle.

Statistical description

Data on demographic characteristic, clinical characteristic, and dermoscopy features of NCA patients were computed into a master data form in Microsoft Excel 2010. Statistical description was performed by using SPSS 17.0.

Table I. Demographic characteristic of NCA patients

Variable		AGA	AA	TE
Age (years)	5-15	0 (0%)	1 (20%)	0 (0%)
	16-25	0 (0%)	2 (40%)	4 (40%)
	26-35	4 (26,7%)	2 (40%)	6 (60%)
	36-45	3 (20%)	0 (0%)	0 (0%)
	46-55	3 (20%)	0 (0%)	0 (0%)
	56-65	5 (33,3%)	0 (0%)	0 (0%)
Gender	Male	12 (80%)	2 (40%)	1 (10%)
	Female	3 (20%)	3 (60%)	9 (90%)
Marital status	No	2 (13,3%)	2 (13,3%)	5 (50%)
	Yes	13 (86,7%)	13 (86,7%)	5 (50%)
Family history of alopecia	No	5 (33,3%)	4 (80%)	8 (80%)
	Father	10 (66,7%)	1 (20%)	1 (10%)
	Mother	0 (0%)	0 (0%)	1 (10%)

III. RESULTS

Demographic and clinical characteristic of NCA patients

In this study, the mean age of NCA patients was 35,7 years (age range: 8-65 years). Male and female patients were found in the same amount (50%).

AGA patients (n = 15)

The mean age of AGA patients was 46,9 ± 12,6 years (age range: 30-65 years). There were more males, with a male to female ratio of 4:1. Most AGA patients were found with marital status (86,7%) and history of alopecia in father (66,7%) (Table I). The mean duration of alopecia in AGA patients was 16,4 ± 11,4 years. Hamilton-Norwood III (26,7%) was mostly found in MPHL, whereas Ludwig II (13,3%) was mostly found in FPHL (Table II).

Table II. Clinical characteristic of AGA patients

Variable		n	%
Duration (years)	< 10	5	33,3
	10-20	4	26,7
	> 20	6	40
Pattern of alopecia	Hamilton-Norwood I	0	0
	Hamilton-Norwood II	3	20
	Hamilton-Norwood III	4	26,7
	Hamilton-Norwood IV	1	6,7
	Hamilton-Norwood V	2	13,3
	Hamilton-Norwood VI	2	13,3
	Ludwig I	1	6,7
	Ludwig II	2	13,3
	Ludwig III	0	0

AA patients (n = 5)

The mean age of AA patients was 22,8 ± 11,0 years (age range: 8-35 years). There were slightly more females (60%) than males (40%). Most AA patients were found without marital status (80%) and history of alopecia (80%) (Table I). The mean duration of alopecia in AA patients was 5,4 ± 4,2 months. The pattern of alopecia in AA was found mostly as multiple patches (60%) (Table III).

Table III. Clinical characteristic of AA patients

Variable		n	%
Duration (months)	≤ 6	4	80
	> 6	1	20
Pattern of alopecia	Single patch	1	20
	Multiple patch	3	60
	Reticular pattern	0	0
	Ophiasis pattern	0	0
	Sisaipho pattern	0	0
	Alopecia totalis	0	0
	Alopecia universalis	1	20

TE patients (n = 10)

The mean age of TE patients was 25,3 ± 4,3 years (age range: 17-31 years). There were more females, with a male to female ratio of 1:9. Most TE patients were found without history of alopecia (80%) (Table I). The mean duration of alopecia in TE patients was 10,0 ± 5,9 months.

Dermoscopy features of NCA patients

AGA patients (n = 15)

Diversity of hair diameter > 20% was found in all AGA patients (100%). Other dermoscopic features that were found, from high to low frequency, including perifollicular brown depression (46,7%), short vellus hair (33,3%), and yellow dot (20 %) (Table IV).

Table IV. Dermoscopic features of AGA patients

Dermoscopic features	n	%
Diversity of hair diameter > 20%	7	46,7
Perifollicular brown depression	15	100
Short vellus hair	5	33,3
Yellow dot	3	20

AA patients (n = 5)

Yellow dot were found in all AA patients (100%). Black dot and broken hair were found in the same frequency (40%) (Table V).

Table V. Dermoscopic features of AA patients

Dermoscopic features	n	%
Yellow dot	5	100
Black dot	2	40
Broken hair	2	40

TE patients (n = 10)

Empty follicle were found in all TE patients (100%) (Table VI).

Table VI. Dermoscopic features of TE patients

Dermoscopic features	n	%
Empty follicle	10	100

IV. DISCUSSION

Dermoscopy is a noninvasive diagnostic tool that can visualize the epidermal layer and its underlying structure.[6,15] The dermoscopic features were statistically significant in diagnostic procedures and treatment evaluation for alopecia, both NCA and CA.[17,18] The mostly found NCA are AGA, AA, and TE.[5,6] These three NCA are difficult to distinguish clinically that additional examinations are needed to support the diagnosis.[6-8]

There are several dermoscopic features that can be found in AGA, including diversity of hair diameter > 20%, perifollicular brown depression, short vellus hair, and yellow dot.[18] Similar to previous study by Mani et al, diversity of hair diameter > 20% is the most typical dermoscopic feature in AGA.[19] This dermoscopic feature is usually found in early AGA,[20] which describes progressive miniaturization in hair follicle.[21,22] Other dermoscopic feature in early AGA is perifollicular brown depression. In this study, this dermoscopic feature was found in 46,7% AGA patients, as reported by Ruiming et al in MPHL (44%) dan FPHL (44,5%) patients.[23] Perifollicular brown depression is lymphocyte inflitration in the superficial perifollicle.[21,22] Histopathologically, it shows perifollicular inflammation in Caucasians or post inflammation perifollicular pigmentation in Asians.[20]

In Surabaya, Indonesia, Paramita et al also reported short vellus hair in all AGA patients.[24] This dermoscopic feature describes severe hair miniaturization in late AGA.[21] Other dermoscopic feature in late AGA is yellow dot. In this study, yellow dot was only found in 20% AGA patients. Yellow dot is caused by increased sebum production in follicle without terminal hair.[19] Ruiming et al. reported positive correlation between yellow dot and AGA severity.[23]

Dermoscopic features that can be found in AA are yellow dot, black dot, and broken hair. As reported in this study, Inui et al. in Osaka, Japan, also found yellow dot as the most found dermoscopic feature in AA (63,7%).[25] Yellow dots are hyperkeratotic plugs that fill the follicular infundibula.[26] Mahmoudi et al reported positive correlation between yellow dot and AA severity.[27]

However, Mani et al in India reported black dot as the most found dermoscopic feature in AA (76%).[19] Black dot ("cadaverous hair") are pigmented residues of hairs destroyed and broken at scalp level. This dermoscopic feature is a marker of active disease.[26] These different results may be related with different skin type of patients in each study. In dark skin type patient, there are more pigments on the skin caused by darker rete rigde and narrow epidermis underlying the dermal papilla.[28]

In TE, there is no spesific dermoscopic feature. Dermoscopic features that can be found are hair density reduction and empty hair follicle.[19,20]

V. CONCLUSION

Dermoscopic features of NCA are typical that promote application of dermoscopy as one of examination procedure in hair and scalp disorders.

REFERENCES

[1] Breitkopf T, Leung G, Yu M, Wang E, McElwee KJ. The basic science of hair biology: what are the causal mechanisms for the disordered hair follicle? *Dermatol Clin*. 2013; 31: 1-19.
[2] Chu TW, Santos L, McElwee KJ. Biology of the hair follicle and mechanisms of nonscarring and scarring alopecia. *Semin Cutan Med Surg*. 2015; 34: 50-6.
[3] Marsh J, Gray J, Tosti A. *Healthy hair*. Springer International Publishing, Cham. Healthy hair: form and function; 2015: 1-28.
[4] Otberg N, Shapiro J. Hair growth disorders. In: Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, Wolff K, editors. *Fitzpatrick's dermatology in general medicine*. Volume 1. Eighth edition. New York: The McGraw Hill Companies; 2012: 979-1008.
[5] Patel DR. Disorders of hair loss. *Int J Child Health Hum Dev*. 2015; 8 (1): 13-20.
[6] Shapiro J, Otberg N. *Hair loss and restoration*. Second edition. CPC Press (Taylor and Francis Group), Boca Raton; 2015: 85-146.
[7] Messenger AG. Disorders of hair: anatomy and physiology. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. *Rook's textbook of dermatology*. Volume 4. Seventh edition. Massachusetts: Blackwell Publishing; 2004: 63.1-18.
[8] Werner B, Mulinari-Brenner F. Clinical and histological challenge in the differential diagnosis of diffuse alopecia: female androgenetic alopecia, telogen effluvium and alopecia areata - part II. *An Brass Dermatol*. 2012; 87 (6): 884-90.
[9] Messenger AG. Androgenetic alopecia. In: McMichael AJ, Hordinsky MK, editor. *Hair and scalp diseases: medical, surgical, and cosmetic treatments*. New York: Informa Healthcare; 2008: 107-18.
[10] Hordinsky MK, Caramori APA. Alopecia areata. In: McMichael AJ, Hordinsky MK, editor. *Hair and Scalp Diseases: Medical, Surgical, and Cosmetic Treatments*. New York: Informa Healthcare; 2008: 91-105.
[11] Olsen EA. Female pattern hair loss. In: Blume-Peytavi U, Tosti A, Whiting DA, Trüeb RM, editor. *Hair growth and disorders*. Berlin: Springer-Verlag; 2008: 171-86.
[12] Mirzoyev SA, Schrum AG, Davis MDP, Torgerson RR. Lifetime incidence risk of alopecia areata estimated at 2.1 percent by Rochester

Epidemiology Project, 1990-2009. *J Invest Dermatol*. 2014; 134 (4): 1141-2.
[13] Al-Refu K. Hair loss in children: common and uncommon causes; clinical and epidemiological study in Jordan. *Int J Trichology*. 2013; 5(4): 185-189.
[14] Seetharam KA. Alopecia areata: an update. *Indian J Dermatol Venereol Leprol*. 2013; 79: 563-575.
[15] Lallas A, Argenziano G. Dermatoscope - the dermatologist's stethoscope. *Indian J Dermatol Venereol Leprol*. 2014; 80: 493-4.
[16] Chiramel MJ, Sharma VK, Khandpur S, Sreenivas V. Relevance of trichoscopy in the differential diagnosis of alopecia: a cross-sectional study from North India. *Indian J Dermatol Venereol Leprol*. 2016; 82 (6): 651-8.
[17] Kowalska-Oledzka E, Slowinska M, Rakowska A. Sensitivity and specificity of the trichoscopy. *Indian J Dermatol Venereol Leprol*. 2012; 78 (5): 636-7.
[18] Miteva M, Tosti A. Hair and scalp dermatoscopy. *J Am Acad Dermatol*. 2012; 67: 1040-8.
[19] Mani S, Manickam N, Goppalan K et al. Role of dermoscopy in the diagnosis of alopecia. *Journal of Pakistan Association of Dermatologists*. 2018; 28(3): 320-328.
[20] Rossi D, Aktan S, Bilgin M. Scalp dermatoscopic findings in androgenetic alopecia. *Ann Dermatol*. 2016; 26 (4): 478-84.
[21] Vincenzi C, Tosti A. Trichoscopy patterns. In: Tosti A, editor. *Dermoscopy of the hair and nails*. Edisi kedua. Boca Raton: CPC Press (Taylor and Francis Group); 2016: 1-20.
[22] Tosti A. *Dermoscopy of hair and scalp disorders with clinical and pathological correlations*. Informa Healthcare, London. Chapter 2, Androgenetic alopecia; 2007: 15-25.
[23] Ruiming H, Feng X et al. Trichoscopic findings of androgenetic alopecia and their association with disease severity. *J Dermatol*. 2015; 42: 1-6.
[24] Paramita K, Listiawan MY, Rahmadewi. Gambaran dermoskopik pasien alopesia. *BIKKK*. 2015; 27 (3): 163-9.
[25] Inui S, Nakajima T, Itami S. Scalp dermoscopy of androgenetic alopecia in Asian people. *J Dermatol*. 2009; 36: 82-5.
[26] Rudnicka L, Olszewska M, Rakowska A, Czuwara J. Alopecia areata. In: Rudnicka L, Olszewska M, Rakowska A, editors. *Atlas of trichoscopy: dermoscopy in hair and scalp disease*. London: Springer-Verlag; 2012: 205-20.
[27] Mahmoudi H, Salehi M, Moghadas S, Ghandi N et al. Dermoscopic findings in 126 patients with alopecia areata: a cross-sectional study. *Int J Trichology*. 2018 May-Jun; 10(3): 118–123.
[28] Pimrez H, Tosti A. Trichoscopy tips. *Ann Dermatol*. 2015; 34 (2): 342-7.

AUTHORS

First Author – dr. Margareth Raisa Madgalena Hutabarat, Post Graduate of Dermatology and Venereology, Medical Faculty, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Medan, Indonesia, email: gayethutabarat@gmail.com.
Second Author – Dr. dr. Nelva Karmila Jusuf, Sp.KK(K), FINSDV, FAADV, Department of Dermatology and Venereology, Medical Faculty, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Medan, Indonesia**.**
Third Author – Dr. dr. Imam Budi Putra, MHA, Sp.KK, FINSDV, FAADV, Department of Dermatology and Venereology, Medical Faculty, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Medan, Indonesia.

Correspondence Author – dr. Margareth Raisa Madgalena Hutabarat, email: gayethutabarat@gmail.com.