Dermatology Practical & Conceptual

Dermoscopy of Linear Basal Cell Carcinomas, a Potential Mimicker of Linear Lesions: a Descriptive Case-series

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ABSTRACT

Introduction: Among the various widely recognized basal cell carcinoma (BCC) clinical patterns, linear basal cell carcinoma (LBCC) is an uncommon morphologic variant of BCC.

Objectives: Describe the clinical and dermoscopic characteristics of LBCC.

Methods: Retrospective study including LBCC cases from 5 dermatology centers in North and South America. Biopsy-proven primary BCCs, that presented with at least 3:1 length:width ratio on physical examination, irrespective of tumor subtype or location, were included. Clinical and dermoscopic analysis were performed by 2 experts in dermoscopy.

Results: Eighteen cases of LBCC met our inclusion criteria and were included in the study. Median age at diagnosis was 86.0 years, 10 patients (58.8%) were males. Regarding anatomic location, 11/18

(61.1%) were located on the head and neck, 5/18 (27.7%) cases were found on the trunk, and 2 on lower extremities (11.1%). Under dermoscopy, 15/18 (83.3%) of LBCC were pigmented. All tumors displayed at least one of the BCC-specific dermoscopic criteria the most common being blue-grey globules (72.2%).

Conclusions: Dermoscopy might be useful in the differentiation of LBCC from other diagnoses presenting as linear lesions such as scars, scratches/erosions, and tattoos, among others. Some of these lesions might be confused by naked eye examination alone.

Introduction

Basal cell carcinoma (BCC) is the most common skin cancer worldwide [1]. Several BCC classifications have been proposed based on its clinical and histopathological characteristics [2]. Among the various widely recognized BCC clinical patterns, linear basal cell carcinoma (LBCC) is an uncommon morphologic variant of BCC which was described by Lewis et al [3]. It was defined as 'a lesion that extends preferentially in one direction, resulting in a tumor or plaque with a length much greater than its width greater than 3:1 ratio' [3-5]. Due to this linear morphology, LBCC can clinically mimic scars, scratches, striae, or tattoos, among other diagnoses. Although there is an extended literature with regards to the dermoscopic findings of BCC in general [6-9], little is known regarding the structures and patterns seen in LBCC under dermoscopy. Additionally, LBCC clinical features have been scarcely described.

Objectives

We sought to evaluate and describe the dermoscopic appearance and clinical characteristics of LBCC.

Methods

This retrospective observational study was approved by the IRB of Pontificia Universidad Católica de Chile (#201127004). We examined all cases of LBCCs between January 2016 to January 2021 from 6 dermatologic centers in 3 countries (Santiago, Chile; Sao Paulo, Brazil; Miami, FL, and New York, NY). A search was performed using clinical images of diagnosed BCCs. Eligibility criteria were based on clinical (not histopathological) features of BCC. Biopsy-proven primary BCCs, that presented with at least 3:1 length:width ratio on physical examination, irrespective of tumor subtype or location, were included. Recurrent BCCs were excluded, as they may present with a 'false-positive' linear appearance due to the nature of linear closures.

Patients demographics (age, gender) and subsequent treatment were recorded and maintained in a deidentified database. Clinical and dermoscopic images were obtained with 2 different devices depending on the center: A digital camera coupled with a digital dermatoscope (VEOS DS3, Canfield INC) and/or a Samsung Galaxy S5 coupled with a Dermlite DL3 dermatoscope (3Gen). Clinical images evaluated pigmentation status (yes/no) and whether tumors followed skin tension lines according to Newell et al [10]. Dermoscopic analyses were performed by 2 investigators (C.N-D. and A.A-A) based on the latest dermoscopic consensus by Kittler et al [11]. and the most updated BCC criteria [12]. Images were evaluated in both polarized and non-polarized mode. When there was disagreement in dermoscopic interpretation, a third investigator served as a referee (M.A.M.).

Statistical Analysis

Data was analyzed using SPSS 23.0 (SPSS, Armonk). Measures of central tendency were calculated. Unless otherwise noted, all values are expressed as mean and standard deviation (SD).

Results

Eighteen cases of LBCC on 17 patients met our inclusion criteria and were included in the study; 1 patient contributed with 2 lesions. Median age at diagnosis was 86.0 years (SD 7.6; range 67 – 91 years), 10 patients (58.8%) were males; 72.2% (N = 13) were Hispanic/Latino and 27.8% (N = 5) were Caucasians.

In all, 11/18 (61.1%) cases were nodular, 5/18 (27.7%) cases were superficial, 1 case was morphea-form (5.5%), one case was infiltrative (5.5%). Regarding anatomical location, 11/18 (61.1%) were located on the head and neck, 5/18 (27.7%) cases were found on the trunk, and 2 on lower extremities (11.1%). When evaluating skin tension lines, 15/18 (83.3%) followed these lines. All tumors were submitted to pathological analysis with the clinical/dermoscopic diagnosis of BCC. Regarding treatment, 10/18 (55.5%) were treated with simple excision, 6/18 cases (33.3%) with Mohs micrographic surgery, and 1 case (5.5%) with electrodessication and curettage. One case was lost to follow-up.

Dermoscopic Analysis

Under dermoscopy, 15/18 (83.3%) of LBCC were dermoscopically pigmented and all had absence of reticular network. All tumors displayed at least one of the BCC-specific

dermoscopic criteria (Table 1) [12]: blue-gray globules (72.2%), in-focus dots (66.6%), short-fine telangiectasia (55.5%), leaf-like areas (61.1%), milky-red background (38.8%), ovoid nests (38.8%), ulceration/erosions (44.4%), shiny white blotches and strands (33.3%), arborizing vessels (22.2%), concentric structures (16.6%), and spoke-wheel structures (5.6%) (Figures 1-4).

Conclusions

In this retrospective study including 18 LBCC, we described the dermoscopic features of LBCC. Dermoscopy might be a useful tool for the diagnosis of this uncommon morphological subtype of BCC, as it presented with classic dermoscopic BCC criteria. No specific or novel dermoscopic findings appear to be associated with LBCC. The most common histopathologic subtype corresponded to the nodular subtype. Despite the broad clinical differential diagnosis of linear lesions (i.e. scars, scratches, striae, tattoos, among others), dermoscopy might be of aid in the diagnosis of LBCC, as the presence of at least one of the BCC-specific features described elsewhere in dermoscopy was seen in all our cases [6,12]. However, additional studies that include other linear lesions as controls are needed to confirm our results.

The most common location in our series was the head and neck. Some studies have shown the lower eyelid as the most frequent anatomic location [13] which was not confirmed by the present larger, multicentric study including 18 cases. Based on our study findings, LBCC can appear in any anatomical location. To the best of our knowledge, this is the largest study examining the clinical and dermoscopic presentation of LBCCs from diverse clinical settings [5-14].

An interesting finding of our series was that dermoscopically pigmented variants comprised >80% of LBCC (Figure

Table 1. Dermoscopic features seen in the 18 cases of linear basal cell carcinoma (in alphabetical order).

Dermoscopic feature	N (%)
Absence of pigment network	18 (100)
Arborizing telangiectasia	4 (22.2)
Blue-grey globules	13 (72.2)
Concentric structures	3 (16.6)
In-focus dots	12 (66.6)
Leaf-like structures	11 (61.1)
Milky-red background	7 (38.8)
Ovoid nests	7 (38.8)
Shiny white blotches and strands	6 (33.3)
Short-fine telangiectasia	10 (55.5)
Spoke-wheel like areas	1 (5.5)
Ulceration/erosion	8 (44.4)

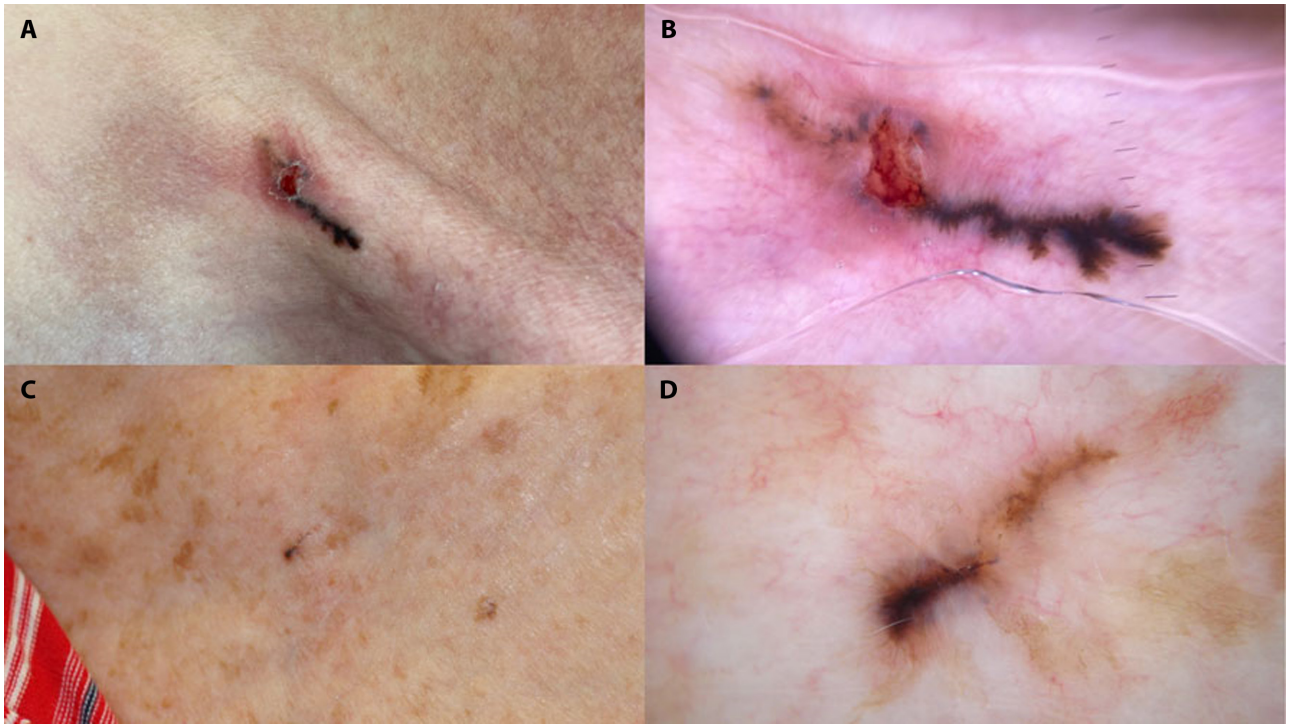

Figure 1. Linear Basal Cell Carcinoma, pigmented. (A) Clinical photograph showing a linear pigmented plaque on neck following Langer lines on the clavicle. (B) Dermoscopic features showing blue-grey globules, ulceration, and leaf-like structures (polarized light, original magnification 10X). (C) Clinical photograph showing a linear, inconspicuous, pigmented plaque on chest following Langer lines. (D) Dermoscopic features showing leaf-like structures and in-focus dots (polarized light, original magnification 10X).

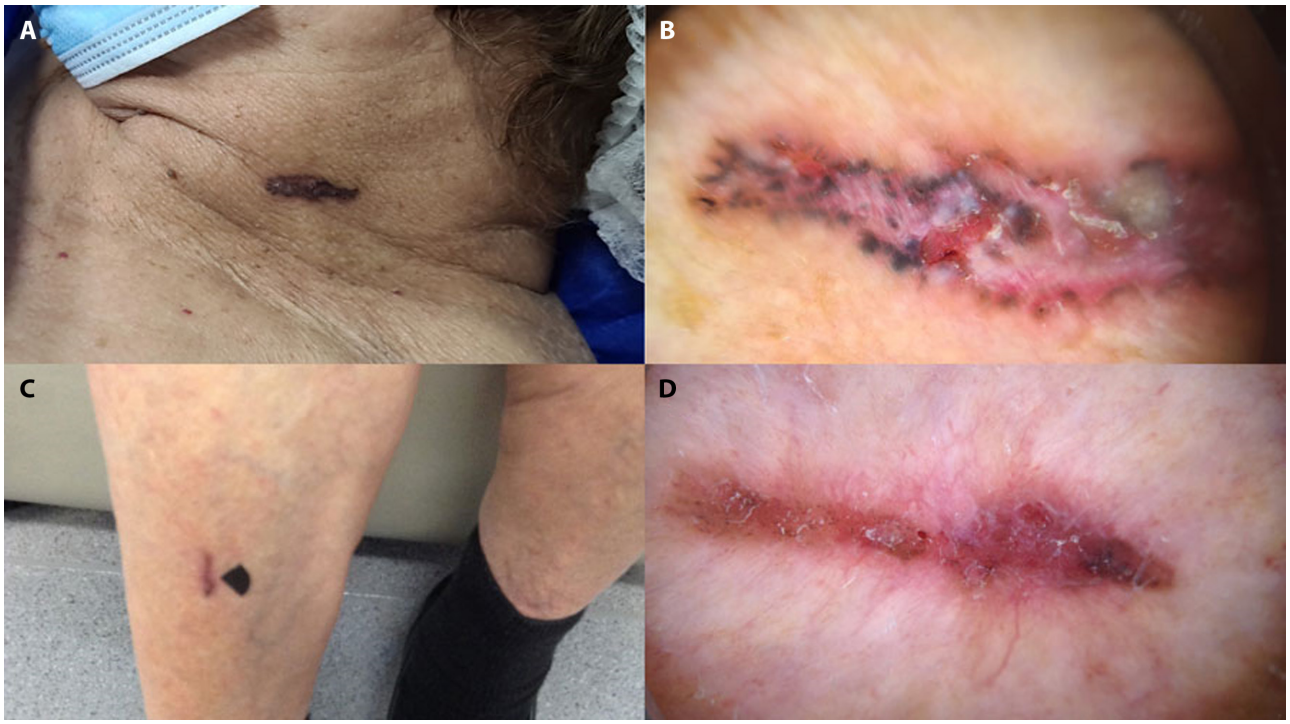

Figure 2. Linear basal cell carcinomas, pigmented. (A) Clinical photograph showing a linear black ulcerated tumor on the lateral neck following Langer lines. (B) Dermoscopic features blue-grey globules, leaf-like structures, and shiny white blotches and strands (polarized light, original magnification 10X). (C) Clinical photograph showing a linear pigmented plaque on the anterior leg following Langer lines. (D) Dermoscopic features showing blue-grey globules, leaf-like structures, in focus-dots, ulceration, and shiny white blotches and strands (polarized light, original magnification 10X).

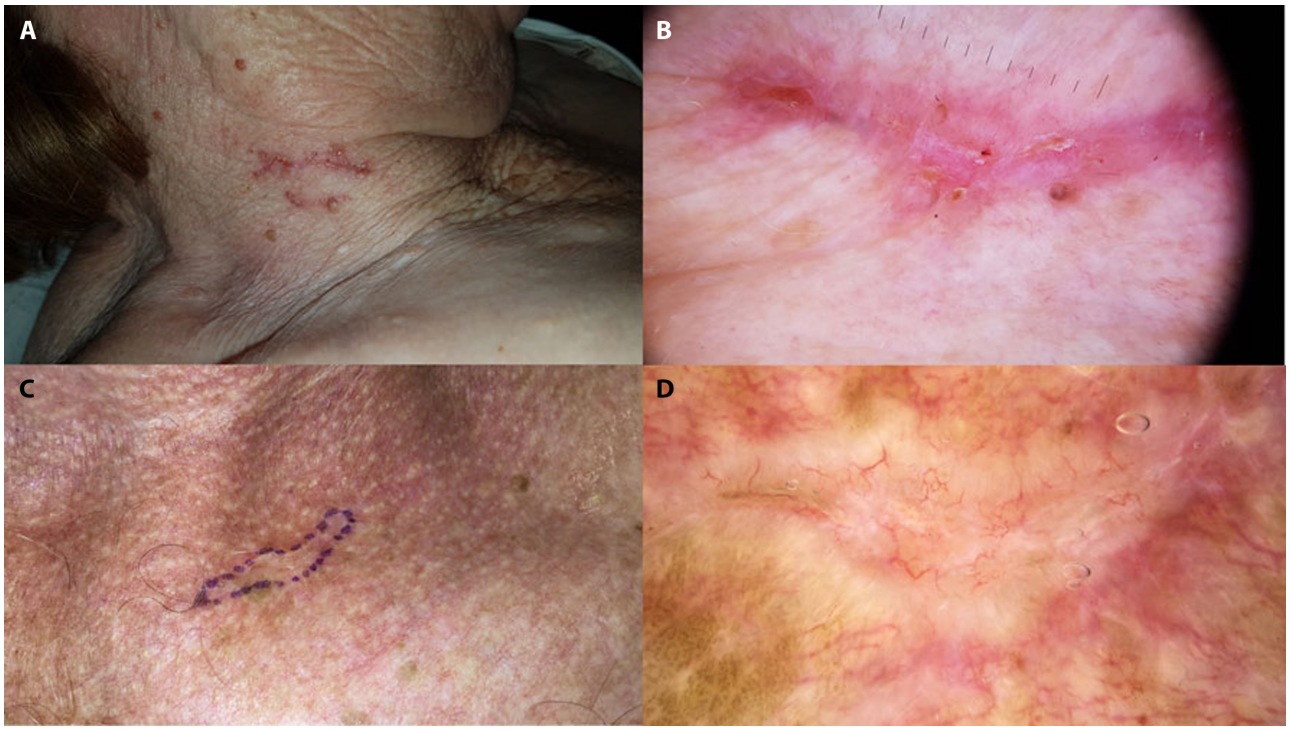

Figure 3. Linear basal cell carcinoma, non-pigmented. (A) Clinical photograph showing 2 linear erythematous plaques on the neck following Langer lines. (B) Dermoscopic features showing short-fine telangiectasia, ulcerations, and shiny white blotches and strands (polarized light, original magnification 10X). (C) Clinical photograph showing a linear, inconspicuous pink plaque (demarcated by blue pen) on the neck following Langer lines. (D) Dermoscopic features showing arborizing vessels and shiny white blotches and strands (polarized light, original magnification 10X).

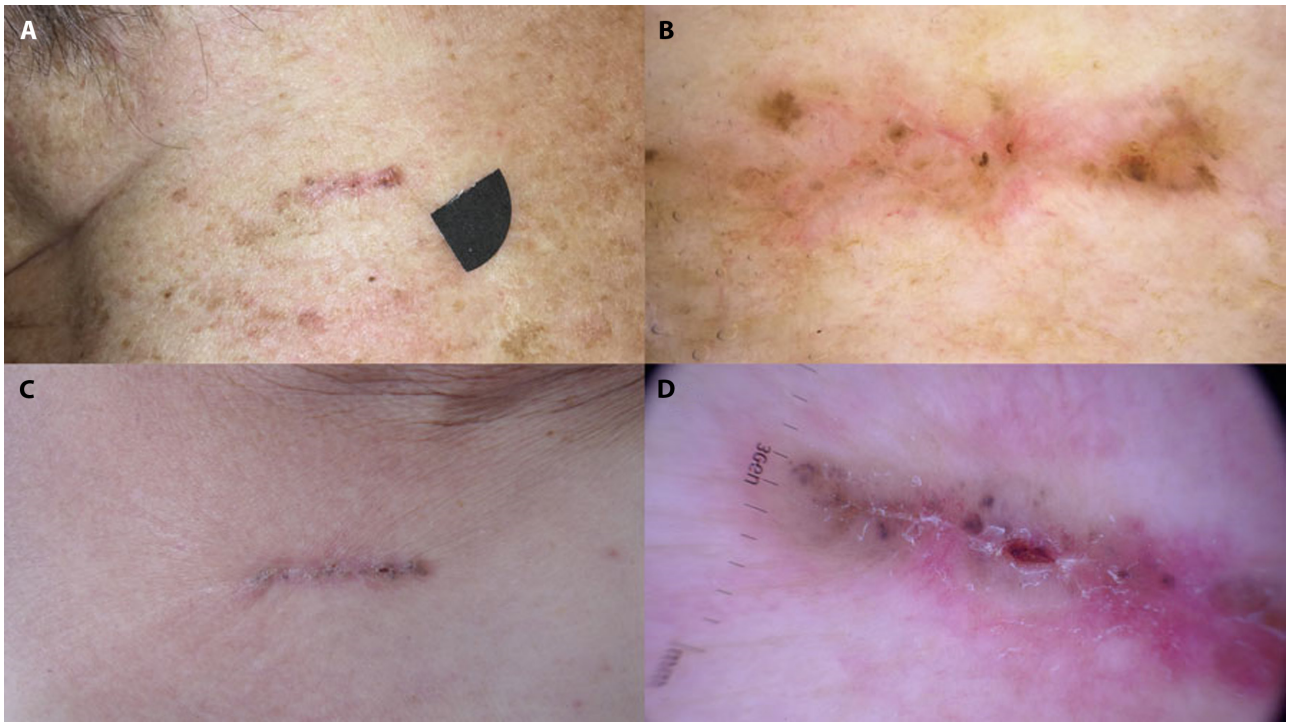

Figure 4. Linear basal cell carcinomas, lightly pigmented. (A) Clinical photograph showing a linear erythematous plaque on the back of the neck following Langer lines. (B) Dermoscopic features showing short-fine telangiectasia, leaf-like structures, concentric structures, and shiny white blotches and strands (polarized light, original magnification 10X). (C) Clinical photograph showing a linear erythematous plaque on the anterior chest following Langer lines. (D) Dermoscopic features showing short-fine telangiectasia, leaf-like structures, ulceration, concentric structures, and blue-gray globules (polarized light, original magnification 10X).

1-2). These findings are similar to previous reports on LBCC that showed a higher incidence of pigmented variants [6]. However, the rate of pigmented LBCC should be interpreted with caution, since the pigmentation status of BCC could be attributed to ethnic features of our population (>70% Hispanic/Latino) or by 'inclusion' bias: non-pigmented variants may be harder to visualize as linear than their pigmented counterpart (Figure 3-4).

The mechanism behind the linear morphology of LBCC has not yet been elucidated. Trauma and Koebner phenomenon have been suggested as potential etiologic factors [13]. Recently, Yamaguchi et al demonstrated lower expression of p27 and higher expression of PCTAIRE1 and PTCH1 mutation in a LBCC case. They hypothesized that LBCC might be generated by extensions along the wrinkles or Langer lines, due to histological fragility of the sites [15]. Interestingly, more than 80% LBCC in this series followed the skin tension lines. The reason why certain BCCs tend to grow within these lines while and others grow in a more haphazard fashion remains unknown. Other tumors such as melanoma have also been reported to grow in a linear fashion [16]. Additional studies are needed to understand the interplay of tumor and stroma which might explain this uncommon morphology. The advent of new non-invasive technologies such as reflectance confocal microscopy or optical coherence tomography might help to elucidate in vivo the tumor and stroma interaction [17,18].

The main limitations of our study are its retrospective nature, the lack of a control group, cases being non-consecutive subject to selection and recall bias, and its small sample size. Further, larger studies are needed to confirm our findings.

Dermoscopy might be useful in the differentiation of LBCC from other diagnoses presenting as linear lesions such as scars, scratches/erosions, and tattoos, among others. Some of these lesions can be confused by naked eye examination alone. Additional case-control studies are needed to confirm our findings. The dermoscopic features seen in LBCC are similar to those commonly found in classic BCCs.

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References

1. Rogers HW, Weinstock MA, Feldman SR, Coldiron BM. Incidence Estimate of Nonmelanoma Skin Cancer (Keratinocyte Carcinomas) in the U.S. Population, 2012. *JAMA Dermatol*. 2015;151(10):1081-1086. DOI: 10.1001/jamadermatol.2015.1187. PMID: 25928283.
2. Lomas A, Leonardi-Bee J, Bath-Hextall F. A systematic review of worldwide incidence of nonmelanoma skin cancer. *Br J*

Dermatol. 2012; 166(5):1069-1080. DOI: 10.1111/j.1365-2133.2012.10830.x. PMID: 22251204.

3. Lewis JE. Linear basal cell epithelioma. *Int J Dermatol*. 1989;28(10):682-684. DOI: 10.1111/j.1365-4362.1989.tb02444.x. PMID: 2592134.
4. Al-Niaimi F, Lyon CC. Linear basal cell carcinoma: a distinct condition? *Clin Exp Dermatol*. 2011;36(3):231-234. DOI: 10.1111/j.1365-2230.2010.03908.x. PMID: 20659116.
5. Lim KK, Randle HW, Roenigk RK, Brodland DG, Bernstein SC, Marcil I. Linear basal cell carcinoma: report of seventeen cases and review of the presentation and treatment. *Dermatol Surg*. 1999;25(1):63-67. DOI: 10.1046/j.1524-4725.1999.08104.x. PMID: 9935098.
6. Altamura D, Menzies SW, Argenziano G, et al. Dermatoscopy of basal cell carcinoma: morphologic variability of global and local features and accuracy of diagnosis. *J Am Acad Dermatol*. 2010;62(1):67-75. doi: 10.1016/j.jaad.2009.05.035. PMID: 19828209.
7. Reiter O, Mimouni I, Dusza S, Halpern AC, Leshem YA, Marghoob AA. Dermoscopic features of basal cell carcinoma and its subtypes: A systematic review. *J Am Acad Dermatol*. 2021;85(3):653-664. DOI: 10.1016/j.jaad.2019.11.008. PMID: 31706938. PMCID: PMC9366765.
8. Navarrete-Dechent C, Liopyris K, Rishpon A, et al. Association of Multiple Aggregated Yellow-White Globules With Nonpigmented Basal Cell Carcinoma. *JAMA Dermatol*. 2020;56(8):882-890. DOI: 10.1001/jamadermatol.2020.1450. PMID: 32459294. PMCID: PMC7254446.
9. Lallas A, Apalla Z, Argenziano G, et al. The dermatoscopic universe of basal cell carcinoma. *Dermatol Pract Concept*. 2014;4(3):11-24. DOI: 10.5826/dpc.0403a02. PMID: 25126452. PMCID: PMC4131992.
10. Newell K. Wound closure. In: RW. D, DP A (eds). *Essential Clinica Procedures* Philadelphia: Saunders, 2007.
11. Kittler H, Marghoob AA, Argenziano G, et al. Standardization of terminology in dermoscopy/dermatoscopy: Results of the third consensus conference of the International Society of Dermoscopy. *J Am Acad Dermatol*. 2016;74(6):1093-1106. DOI: 10.1016/j.jaad.2015.12.038. PMID: 26896294. PMCID: PMC5551974.
12. Navarrete-Dechent C, Bajaj S, Marchetti MA, Rabinovitz H, Dusza SW, Marghoob AA. Association of Shiny White Blotches and Strands With Nonpigmented Basal Cell Carcinoma: Evaluation of an Additional Dermoscopic Diagnostic Criterion. *JAMA Dermatol*. 2016; ì152(5):546-552. DOI: 10.1001/jamadermatol.2015.5731. PMID: 26792406. PMCID: PMC5037958.
13. Rodriguez-Garijo N, Redondo P. Linear basal cell carcinoma of the lower eyelid: Reconstruction with a musculocutaneous transposition flap. *JAAD Case Rep*. 2018;4(7):633-635. DOI: 10.1016/j.jdcr.2018.03.001. PMID: 30094304. PMCID: PMC6072646.
14. Alcantara-Reifs CM, Salido-Vallejo R, Gonzalez-Menchen A, Garcia-Nieto AV. Linear basal cell carcinoma: Report of three cases with dermoscopic findings. *Indian J Dermatol Venereol Leprol*. 2016;82(6):708-711. DOI: 10.4103/0378-6323.190850. PMID: 27643546.
15. Yamaguchi Y, Yanagi T, Imafuku K, et al. A case of linear basal cell carcinoma: evaluation of proliferative activity by immunohistochemical staining of PCTAIRE1 and p27. *J Eur Acad Dermatol Venereol*. 2017;31(8):e359-e362. DOI: 10.1111/jdv.14159. PMID: 28168733.
16. Cohen PR. Linear Malignant Melanoma In Situ: Reports and Review of Cutaneous Malignancies Presenting as Linear Skin Cancer. *Cureus*. 2017;9(9):e1696. DOI: 10.7759/cureus.1696. PMID: 29159004. PMCID: PMC5690489.
17. Navarrete-Dechent C, Cordova M, Liopyris K, et al. In vivo imaging characterization of basal cell carcinoma and cutaneous response to high-dose ionizing radiation therapy: A prospective study of reflectance confocal microscopy, dermoscopy, and ultrasonography. *J Am Acad Dermatol*. 2021;84(6):1575-1584. DOI: 10.1016/j.jaad.2020.07.130. PMID: 32827607. PMCID: PMC7892640.
18. Navarrete-Dechent C, Cordova M, Sahu A, et al. Optical imaging guided- 'precision' biopsy of skin tumors: a novel approach for targeted sampling and histopathologic correlation. *Arch Dermatol Res*. 2021;313(7):517-529. DOI: 10.1007/s00403-020-02126-6. PMID: 32844312.