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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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POSTTRAUMATIC SUBUNGUAL ACRAL NODULAR MELANOMA WITH BONE INFILTRATION TREATED VIA AMPUTATION OF THE DISTAL AND MIDDLE PHALANX: DESCRIPTION OF A CASE AND UPDATE ON THE TOPIC

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Abstract.

Acral lentiginous melanoma (ALM) is a rare type of cutaneous malignant melanoma, predominantly affecting the acral sites and subungual regions of the upper and lower extremities. Unlike other melanoma types, UV exposure is not considered a ac significant etiological factor. Instead, mechanical stress, particularly traumatic injury, is recognized as a potential contributor to ALM development, especially in weight-bearing areas such as the sole. The presence of pre-existing pigmented lesions may serve as precursors.

While diagnostic and therapeutic approaches for skin cancer are well-established in existing guidelines – such as those proposed by the European Joint Committee (EJC) and the American Joint Committee on Cancer (AJCC) – certain limitations are evident. These standardized protocols may not be fully beneficial for each patient, which highlights the need for a more personalized, patient-focused approach. In response, alternative methodologies, including the personalized One Step Melanoma Surgery (OSMS), have been introduced. OSMS offers a single-stage surgical intervention that minimizes both financial and psychological burdens compared to the conventional two-step approach protocol by the EJC and AJCC guidelines.

We present a 57-year-old woman with a tumor-like lesion on the right hallux. A prior injury 30-years earlier was reported, after which a pigmented lesion developed and remains stable for decades. Following a recent domestic trauma, the lesion underwent rapid malignant transformation into an aggressive subungual acral nodular melanoma with subsequent bone infiltration, staged IIC T4bN0M0, Clark level IIC, Breslow thickness > 4mm. Amputation of the right distal and proximal phalanx of digitus I (hallux) was performed. BRAF testing, re-excision with a 1.7 cm margin with a sentinel lymph node biopsy within 2-4 weeks, and initiation of immunotherapy or targeted therapy, were recommended.

Key words. Acral melanoma, subungual melanoma, nodular melanoma, bone infiltration, surgery, amputation.

Introduction.

Acral lentiginous melanoma, or acral melanoma, is a rare and distinct subtype of cutaneous malignant melanoma characterized by a low mutational burden [1]. It occurs on the upper and lower extremities, including the hands, palms, soles, fingers, toes, and nail units [1]. Unlike other types of melanoma, UV-radiation is not regarded as a key contributor to the carcinogenesis of acral melanoma [1].

Subungual melanoma, a rare type of acral lentiginous melanoma, represents 1.9% of all cutaneous melanomas, and is associated with poor prognosis [2]. The most frequently affected sites are the nails of the great toes and thumbs, with fingers being more commonly involved than the toes [3]. The subungual region has a particular predilection for amelanotic melanoma, accounting for nearly 25% of cases [3].

The absence of pigmentation can be misleading, often resulting in a delayed diagnosis [3]. Differential diagnosis can include subungual nevus, keratoacanthoma, subungual squamous cell carcinoma, subungual hematoma, pyogenic granuloma, and other conditions [3,4].

The primary treatment option is surgical excision, while amputation is necessary in cases of suspected bone invasion [5]. The surgical margins are determined based on the National Comprehensive Cancer Network guidelines, according to Breslow lesion depth [6]. Sentinel lymph node biopsy is recommended for intermediate-thickness melanomas (1.0 to 4.0 mm) and for high-risk lesions (characterized by ulceration and/or high mitotic figures) with melanomas ranging from 0.75 to 1.0 mm [6]. For advanced stages, targeted therapy and immunotherapy may also be considered [5].

The challenging anatomical locations of these lesions often limit the effective application of the guidelines, as wide excisions may lead to functional complications for the patient. Newer strategies and personalized recommendations should be developed to ensure effective treatment while preserving as much viable tissue as possible.

Case report.

A 57-year-old woman presented with a rapidly growing tumor-like lesion on the right hallux (Figure 1a). Approximately 30 years ago, prior to the consultation in February 2025, following a sports injury, a dark discoloration appeared, covering the nail of the right hallux and remaining unchanged until November 2024. That month, after a domestic injury, a wound developed, which was treated locally from the patient with an epithelializing gel but showed no significant improvement. The patient reported progressive growth of the lesion, associated with pain, and in recent weeks, spontaneous bleeding had occurred.

The dermatological examination revealed a tumor-like formation with central ulceration and hemorrhagic crusts in the area of the right hallux (Figure 1a). Enlarged lymph nodes were not palpable. The lesion was suspected for acral located achromatic cutaneous melanoma.

A contrast-enhanced CT scan of the right foot, head, chest, abdomen, and pelvis performed immediately before hospitalization revealed a tumor formation with lysis of the distal and middle third of the proximal phalanx. However, no evidence of metastatic spread was detected.

Routine and urine tests revealed the following results: several deviations from the norm have been detected: erythrocyte sedimentation rate (ESR) - 31 mm/h (0-20 mm/h), CRP - 19.0 mg/l (0-5.0 mg/L), LDH - 238.0 U/l (125-220 U/L).

Surgical removal of the tumorous lesion located on the right hallux was planned. No pathological lymph node changes were detected in the right popliteal fossa or the femoral triangle along the course of the iliac arteries.

Amputation of the right distal and proximal phalanx of digitus I (hallux) was performed under local anesthesia with 2% lidocaine (Figure 1b,c). The skin edges were adapted with single sutures (Figure 2a,b), and a sterile dressing was applied.

The histological examination revealed an abundant parakeratotic crust over areas of superficial epidermal necrosis, with a compact proliferation of large melanocytes exhibiting marked pleomorphism, atypical mitoses, and discohesion (Figures 4a and 4b). The tumor infiltrated deeply into the underlying dermis and bone matrix, forming necrotic foci within a sparse lymphoplasmacytic stroma (Figure 3a,b and Figure 4a,b). No evidence of perineural or lymphovascular invasion was observed. The resection margins were clear. Ulceration was present. Clark level IIC, Breslow thickness > 4mm. A diagnosis of nodular subungual melanoma, staged IIC (T4bN0M0) was established based on whole-body contrast-enhanced CT findings and histological analysis.

For the newly diagnosed type 2 diabetes mellitus, therapy with gliclazide 90 mg per day was prescribed. Additionally, amoxicillin/clavulanic acid 1000 mg was prescribed twice daily – once every 12 hours for 7 days. Regarding the subungual melanoma: 1) BRAF testing from the primary/lesional tissue, 2) re-excision with a 1.7 cm margin and sentinel lymph node biopsy within 2-4 weeks, and 3) potential initiation of immunotherapy or targeted therapy, were recommended.

Discussion.

Acral lentiginous melanoma (ALM) is a rare subtype of cutaneous malignant melanoma that occurs on acral sites, including the palms, soles, and subungual regions of the upper and lower extremities [7]. It is characterized by poor survival rates, and unlike other forms of skin cancer, has not been associated with UV exposure [7]. On dermatological examination, the subungual melanoma presents as brown-black pigmentation of the nail bed, which, as it progresses, may lead to thickening or destruction of the nail, often accompanied by pain and inflammation [6].

Interestingly, in the Japanese population, malignant melanoma exhibits certain distinct characteristics, with approximately 40% of cutaneous melanoma occurring in the palmoplantar and subungual regions [8]. 80% presents as acral lentiginous type, while 15% manifest as nodular melanoma [8]. A study analyzing 69 cases of primary volar and subungual melanomas identified 31 (45%) as acral lentiginous, 18 (26%) as superficial spreading, and only two (3%) nodular melanoma cases [9]. The histopathological subtype in the remaining 18 biopsies could not be determined [9]. Notably, 92% of subungual melanoma cases were located on the thumb or great toe [9]. A third study documented a total of 65 primary melanomas, with 32 cases (74%) occurring in the volar or subungual regions [10]. Interestingly, thickness greater than 3 mm was observed in 81.5% of cases, and in 37% of cases, the thickness exceeded 9

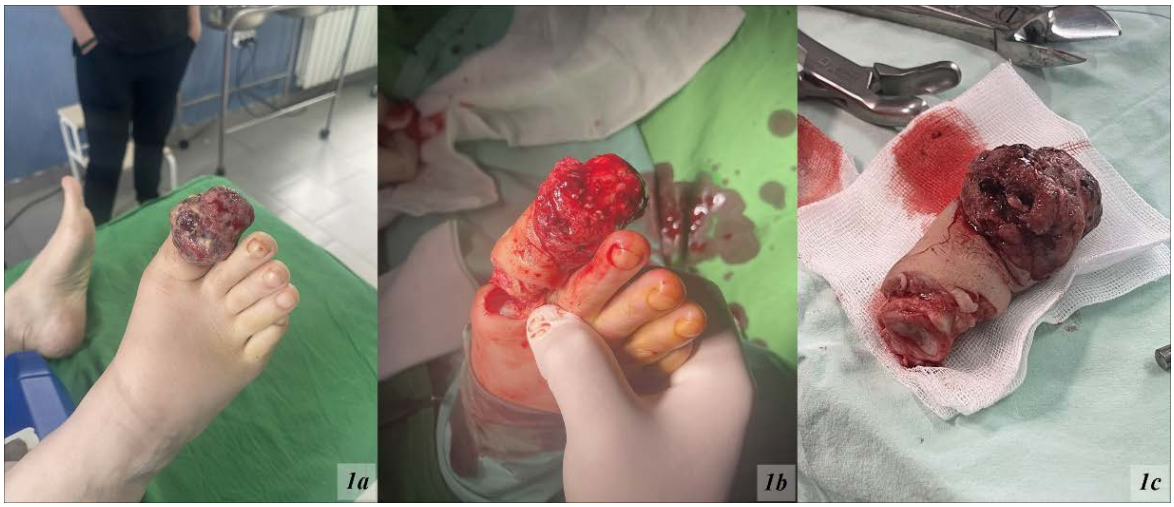

Figure 1a-c. *Intraoperative view.*
1a: *A tumor-like formation with central ulceration and hemorrhagic crusts in the area of the right hallux.*
1b,c: *Amputation of the right distal and proximal phalanx of digitus I (hallux).*

Figure 2. *Intraoperative view: The primary wound defect is closed with single interrupted sutures.*

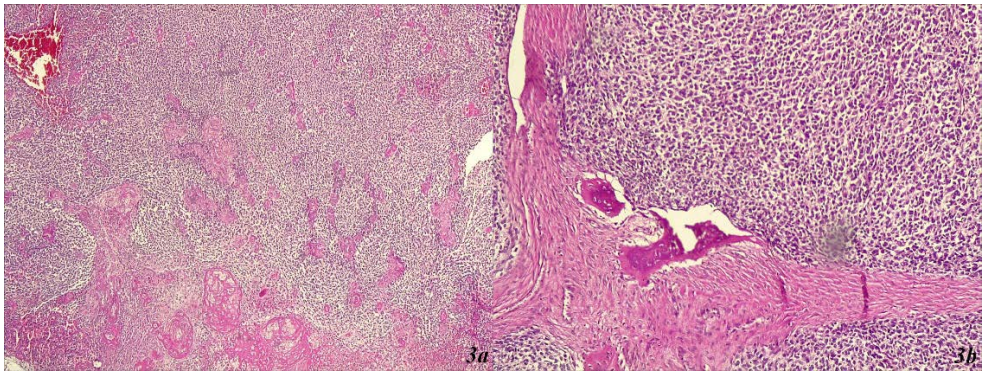

Figure 3. *An abundant parakeratotic crust over areas of superficial epidermal necrosis, with a compact proliferation of large melanocytes exhibiting marked pleomorphism, atypical mitoses, and discohesion. The tumor infiltrates deeply into the underlying dermis and bone matrix, forming necrotic foci within a sparse lymphoplasmocytic stroma.*
3a: *Osteolytic invasion HE x 40.*
3b: *Osseous islands invaded by atypical melanocytes HE x 40.*

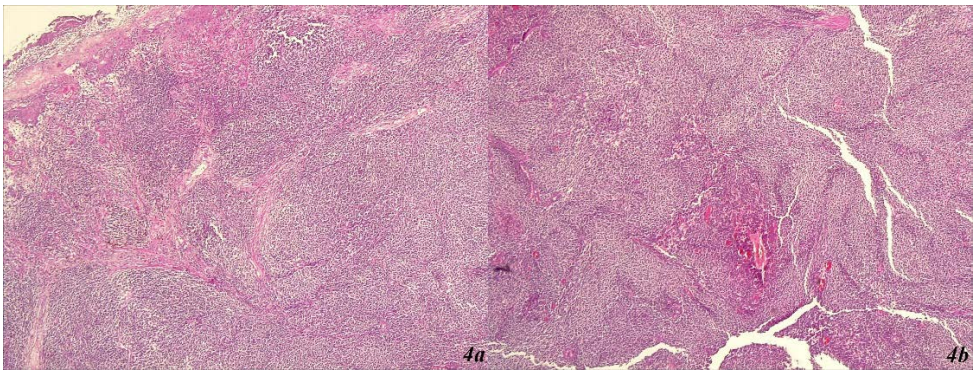

Figure 4. *An abundant parakeratotic crust over areas of superficial epidermal necrosis, with a compact proliferation of large melanocytes exhibiting marked pleomorphism, atypical mitoses, and discohesion. The tumor infiltrates deeply into the underlying dermis and bone matrix, forming necrotic foci within a sparse lymphoplasmocytic stroma.*
4a: *Subungual melanoma HE x 40.*
4b: *Subungual melanoma – necrotic zone HE x 40.*

mm [10]. Additionally, a prior pigmented lesion was noted in 15 of the volar or subungual cases [10].

According to colleagues, ALM may be associated with mechanical stress, suggesting that trauma could be a contributing factor, particularly on the sole [11].

A cross-sectional, retrospective study of 177 Korean patients with acral melanoma concluded that prolonged physical stress or pressure strength played a significant role in the incidence and spreading pattern of acral melanoma [12]. Additionally, the predominant histopathological subtype was identified as acral

lentiginous melanoma (85.9%), followed by nodular melanoma (12.8%) [12].

Another retrospective analysis of 685 cases of cutaneous melanoma by Zhang et al. [13] found that 437 cases (63.8%) involved melanoma on the extremities, with 104 patients (15.2%) exhibiting an association between trauma and melanoma.

The lower extremities were the most frequently affected anatomic sites, accounting for 74 patients (71.2%), followed by the upper extremities in 17 cases (16.3%) [13].

This suggested that the extremities are at higher risk for post-traumatic melanoma compared to other sites (OR 3.968; 95% CI 2.267-5.592) [13].

These observations further support our case regarding melanoma development following two past injuries – a sports-related injury 30 years ago and a more recent domestic trauma that occurred four months prior to the consultation. Two possible scenarios could explain the progression in our case: 1) the initial injury may have triggered carcinogenesis or contributed to the development of a benign lesion that, over time, transformed into an aggressive nodular melanoma, which subsequently ruptured following the second injury; or 2) the first injury may have led to the formation of a benign lesion, which remained noncancerous until the second trauma, after which it underwent rapid malignant transformation into an aggressive subungual acral nodular melanoma with subsequent bone infiltration.

In a prognostic study of 142 cases by Lv et al. [14], it was found that the toenail was more commonly involved than the fingernail, with the great toe accounting for 56.5% of the cases, followed by the thumb with 21.7% [14]. In the table provided, one of the clinical characteristics of patients with acral melanoma was the duration of the lesions before diagnosis, which ranged from 10 days to 70 years [14]. Notably, 21 patients (14.8%) had lesion that lasted more than 10 years [14].

Similarly prolonged intervals, as described in the abovementioned study, may also account for the nearly 30-year duration observed in our patient's case prior to diagnosis.

Post-traumatic amelanotic subungual melanoma was observed one month after an injury caused by nail clippers [15]. The prior trauma history, along with the misleading clinical appearance of the lesion, delayed the diagnosis, leading to the patient undergoing complete amputation of the fourth finger [15]. Before the amputation, the patient resulted negative for metastatic disease, and no regional lymph nodes were detected [15]. However, eight months later, metastases were discovered in the lung and liver, and the patient eventually passed away [15].

Another case of pathological nail growth following trauma was reported by Steen et al. [16]. Eleven years post-accident the nail was removed, and the defect was reconstructed using a split-thickness skin graft [16]. Six years after the surgery a nodular malignant melanoma developed beneath the skin graft [16].

Cases of malignant melanoma affecting interdigital spaces have already been published in the literature [17,18]. Although our case involves melanoma localized to the right hallux, it shares similarities regarding the prolonged period prior to diagnosis and possible further involvement if treatment is delayed or inadequate [17,18]. Proper management of such lesions is crucial, encompassing accurate staging and early surgical intervention [19].

The diagnosis and treatment of cutaneous melanoma are thoroughly outlined in the literature through established guidelines, specifically developed by multidisciplinary experts across Europe [20,21]. These guidelines aim to integrate the latest evidence-based recommendations and address areas of debate, providing unified protocols for clinicians to follow [20,21]. In the first part of the consensus, diagnostic criteria are clearly defined: evaluation begins with a thorough clinical examination, followed by dermoscopy, and if melanoma is suspected, histopathological evaluation is required [20]. Additionally, sequential digital dermoscopy and whole-body photography may aid in the detection of early-stage melanoma, while confocal reflectance microscopy can be utilized in certain cases [20]. Once the diagnosis is confirmed, the second part of the consensus offers standardized treatment strategies [21]. Alongside the European consensus recommendations, guidelines for the management of primary cutaneous melanoma have also been established by the American Joint Committee on Cancer (AJCC) [22]. Given the surgical focus of our case, only the surgical recommendations from the treatment consensus will be briefly discussed [21].

Both recommendation frameworks emphasize excisional biopsy as the initial step in the managing primary cutaneous melanoma [21,22]. Summarized tables detailing surgical margin guidelines are provided, modified from the European Joint Committee (EJC) consensus by Garbe et al. [21] and Swetter et al. [22] (Tables 1 and 2). Both guidelines recommend performing two surgical excisions [21,22] (Tables 1 and 2). According to the EJC guidelines, the primary excision/excisional biopsy should maintain margins between 0.1 and 0.3 cm regardless of the Breslow tumor thickness (Table 2) [21]. In contrast, the AJCC provides varying surgical margin recommendations, as summarized in the table below (Table 2) [22]. While specific margin recommendations may differ between the guidelines, a secondary excision/re-excision is always advised with or without sentinel lymph node biopsy (Tables 1 and 2) [21,22]. This second surgical intervention/re-excision involves an additional surgical field, determined by the Breslow thickness (Tables 1 and 2). For melanomas with a Breslow thickness greater than 2 mm, both guidelines aim to achieve a total surgical margin of 2 cm in all directions, performed in two surgical sessions (Tables 1 and 2) [21,22].

While these recommendations are effective, they may lack personalization. Limitations such as the necessity for additional surgical intervention, increased financial burden due to a second procedure, heightened patient stress, and the potential requirement for additional lymph node biopsies are not fully considered when following standardized guidelines. Over the years, our team has prioritized a more individual approach, opting for a single surgical intervention (Table 3) [23-28]. This strategy aims to reduce both financial and psychological burden on the patient while still achieving disease-free outcomes [23-28]. In addition to the recommended complete surgical margins achieved through a single-stage intervention, as outlined in

Table 1. *Surgical margin recommendations for primary cutaneous melanoma modificated from AJCC, Swetter et al., 2019 [1].*

Tumor thickness (Breslow)	**Surgical margin***
In situ	0.5-1 cm† always 2 surgical sessions
≤1.0 mm	1 cm/ always 2 surgical sessions
>1.0 to 2.0 mm	1-2 cm/ always 2 surgical sessions
>2.0 mm	2 cm/ always 2 surgical sessions (if necessary)

Table 2. *Modificated from EJC recommendations (C. Garbe et al., 2022) [2].*

Breslow thickness	Recommended surgical margins/ EJC
Melanoma in situ	0.1 - 0.3cm primary excision/ excisional biopsy, followed by secondary excision in order to achieve **total surgical margin of 0.5cm** in all directions
<2mm	0.1 - 0.3cm primary excision/ excisional biopsy, followed by secondary excision in order to achieve **total surgical margin of 1cm** in all directions
>2mm	0.1 - 0.3cm primary excision/ excisional biopsy, followed by secondary excision in order to achieve **total surgical margin of 2cm** in all directions

Table 3. *Personalized One step Melanoma surgery (OSMS) recommendations. Updated version 2025.*

Breslow thickness	**Recommended surgical margins**
Melanoma in situ	1.0 cm /**PREOPERATIVELY/**Mandatory: clinical/dermatoscopic evaluation obligate/ if possibility for echographical examination-from benefit/ when possible - confocal microscopy additionally)
<1mm	1.0 cm **/ PREOPERATIVELY/**Mandatory: clinical/dermatoscopic evaluation obligate/ if possibility for echographical examination-from benefit/ confocal microscopy additionally)
1.01- 2.0 mm /Class A	**2.0** cm **/PREOPERATIVELY/:** (with SLNB), (Mandatory: clinical/ dermatoscopic evaluation, echographic tumour thickness measurement preoperatively/ when possible - confocal microscopy additionally, CT contrast, PET SCAN, echography lymph nodes)
2mm- 4 mm /Class B	2.0 cm **/PREOPERATIVELY/:** (with SLNB), (Mandatory: clinical/ dermatoscopic evaluation, echographic tumour thickness measurement preoperatively/ when possible-confocal microscopy additionally, CT contrast/ PET SCAN, echography lymph nodes)
>4mm	2.0 cm complete surgical margin or less with / without SLNB to be discussed on tumour board. **/PREOPERATIVELY/:** Mandatory: clinical/ dermatoscopic evaluation, echographic tumour thickness measurement preoperatively/ when possible-confocal microscopy additionally, CT contrast, PET SCAN, echography lymph nodes)

the "guideline" proposed by our team [23-28], Table 3 also highlights specific mandatory preoperative evaluations essential for ensuring optimal disease outcomes alongside complete excision.

In lentiginous acral and mucosal melanoma, poorly defined margins can often pose a significant challenge due to the inconsistency between clinically visible and histopathological margins [21]. Local recurrences are frequent, which is why an increased surgical safety margin of at least 1 cm, or by narrower margins combined with micrographic control, is recommended [21].

Distal and proximal amputation is recommended when periosteal invasion is suspected [29-31]. In our case, amputation of the distal and middle phalanges was performed due to confirmed bone infiltration.

Conclusion.

Although standardized treatment guidelines have demonstrated efficacy, they may not represent the optimal approach for every patient. Certain limitations persist, highlighting the need for ongoing discussion within the medical community to further personalize management strategies. Amputation remains an option when bone infiltration is evident, regardless of Breslow thickness.

REFERENCES

1. Hall KH, Rapini RP. Acral Lentiginous Melanoma. In: StatPearls. Treasure Island (FL): StatPearls Publishing. 2025.
2. Tsiogka A, Rubin AI, Gregoriou S, et al. Prevalence of subungual melanoma in patients with cutaneous malignant melanoma: A systematic review and meta-analysis. J Eur Acad Dermatol Venereol. 2024;38:77-83.
3. Kim SJ, Park HJ, Lee JY, et al. A Case of Amelanotic Subungual Melanoma. Ann Dermatol. 2008;20:26-8.
4. Shukla VK, Hughes LE. Differential diagnosis of subungual melanoma from a surgical point of view. Br J Surg. 1989;76:1156-60.
5. Darmawan CC, Ohn J, Mun JH, et al. Diagnosis and treatment of nail melanoma: a review of the clinicopathologic, dermoscopic, and genetic characteristics. J Eur Acad Dermatol Venereol. 2022;36:651-660.
6. Mole RJ, MacKenzie DN. Subungual Melanoma. In: StatPearls. Treasure Island (FL): StatPearls Publishing. 2025.
7. Masison JA, Eldirany SA, Stewart CL, et al. Acral and nail melanoma. Clin Dermatol. 2025:S0738-081X(25)00025-2.
8. Jimbow K, Takahashi H, Miura S, et al. Biological behavior and natural course of acral malignant melanoma. Clinical and histologic features and prognosis of palmoplantar, subungual, and other acral malignant melanomas. Am J Dermatopathol. 1984;6:43-53.
9. Feibleman CE, Stoll H, Maize JC. Melanomas of the palm, sole, and nailbed: a clinicopathologic study. Cancer. 1980;46:2492-504.
10. Collins RJ. Melanoma in the Chinese of Hong Kong. Emphasis on volar and subungual sites. Cancer. 1984;54:1482-8.
11. Kudsi MA, Kudsi MS, Ghazy A, et al. Unusual location of subungual melanoma surgically managed successfully: A rare case report from Syria. Int J Surg Case Rep. 2023;113:109062.
12. Jung HJ, Kweon SS, Lee JB, et al. A clinicopathologic analysis of 177 acral melanomas in Koreans: relevance of

spreading pattern and physical stress. JAMA Dermatol. 2013;149:1281-8.
13. Zhang N, Wang L, Zhu GN, et al. The association between trauma and melanoma in the Chinese population: a retrospective study. J Eur Acad Dermatol Venereol. 2014;28:597-603.
14. Lv J, Dai B, Kong Y, et al. Acral Melanoma in Chinese: A Clinicopathological and Prognostic Study of 142 cases. Sci Rep. 2016;6:31432.
15. Ghariani N, Boussofara L, Kenani N, et al. Post traumatic amelanotic subungual melanoma. Dermatol Online J. 2008;14:13.
16. Steen M, Bugyi S, Zellner PR, et al. Malignes Melanom des Nagelbetts unter einem Hauttransplantat [Malignant melanoma of the nailbed under a skin graft]. Handchir Mikrochir Plast Chir. 1986;18:209-13.
17. Tchernev G, Lozev I, Pidakev I, et al. Interdigital melanoma simultaneously affecting two neighboring interdigital spaces: First description in the medical literature. Wien Med Wochenschr. 2018;168:423-426.
18. Tchernev G, Pidakev I, Chokoeva AA, et al. Another Case of Interdigital Located "Metastasing Hematoma"? Open Access Maced J Med Sci. 2018;6:115-117.
19. González M, Tchernev G, Atanasova-Chokoeva A, et al. Multiple Primary Acral Lentiginous Melanomas (MPALM). Open Access Maced J Med Sci. 2017;5:805-806.
20. Garbe C, Amaral T, Peris K, et al. European consensus-based interdisciplinary guideline for melanoma. Part 1: Diagnostics - Update 2024. Eur J Cancer. 2025;215:115152.
21. Garbe C, Amaral T, Peris K, et al. European consensus-based interdisciplinary guideline for melanoma. Part 2: Treatment - Update 2024. Eur J Cancer. 2025;215:115153.
22. Swetter SM, Tsao H, Bichakjian CK, et al. Guidelines of care for the management of primary cutaneous melanoma. J Am Acad Dermatol. 2019;80:208-250.
23. Kordeva S, Batashki I, Dhanarajan M, et al. APPLICABILITY OF ONE STEP MELANOMA SURGERY (OSMS)IN PATIENTS WITH FAMMM SYNDROME: GUIDELINES RELATED COMPARATIVE ANALYSIS TO THE CURRENT RECOMMENDATIONS OF AJCC AND THE EJC. Med review. 2023;59:5-16.
24. Kordeva S, Cardoso J, Tchernev G. CONGRESS REPORT OF THE 5TH NATIONAL CONGRESS OF THE BULGARIAN SOCIETY FOR DERMATOLOGIC SURGERY, SOFIA, 11TH MARCH 2023 WITH MAIN TOPICS: NITROSAMINES AS MOST POWERFUL TRIGGER FOR SKIN CANCER DEVELOPMENT AND PROGRESSION/PERSONALISED ONE STEP MELANOMA SURGERY AS POSSIBLE SKIN CANCER TREATMENT OPTION. Georgian Med News. 2023;337:89-95.
25. Tchernev G, Oliveira N, Kandathil LJ, et al. 4th National Congress of the Bulgarian Society for Dermatologic Surgery, Sofia, 12th March 2022 with main topics: one step melanoma surgery and drug induced melanoma. Dermatol Reports. 2022;14:9542.
26. Tchernev G, Temelkova I. The One Step Melanoma Surgery (OSMS): A New Chance for More Adequate Surgical Treatment of Melanoma Patients!? Open Access Maced J Med Sci. 2019;7:504-506.
27. Tchernev G. One Step Surgery for Cutaneous Melanoma: "We Cannot Solve Our Problems with the Same Thinking We Used When We Created Them?". Open Access Maced J Med Sci. 2017;5:774-776.
28. Tchernev G, Chernin S, Lozev I, et al. Innovative One Step Melanoma Surgical Approach (OSMS): Not a Myth-It's a Reality! Case Related Analysis of a Patient with a Perfect Clinical Outcome Reported from the Bulgarian Society for Dermatologic Surgery (BULSDS)! Open Access Maced J Med Sci. 2018;6:673-674.
29. Anthony T, Goodman A, Fan J, et al. A Rare Disease Presentation of Malignant Fungating Acral Melanoma of the Hand. J Hand Surg Glob Online. 2023;5:386-390.
30. Yun MJ, Park JU, Kwon ST. Surgical options for malignant skin tumors of the hand. Arch Plast Surg. 2013;40:238-43.
31. Chakera AH, Quinn MJ, Lo S, et al. Subungual Melanoma of the Hand. Ann Surg Oncol. 2019;26:1035-1043.