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REVIEW

LEIOMYOSARCOMA OF THE SCALP AND LOWER LEG SKIN. CLINICAL CASES AND LITERATURE REVIEW

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ABSTRACT

Malignant soft tissue tumors localized in the skin, particularly leiomyosarcoma, are rare. Cutaneous leiomyosarcomas could have superficial and deep forms, while subcutaneous leiomyosarcomas are usually nodular. The tumor can spread to the underlying muscle fascia. The immunophenotype of leiomyosarcoma is determined by the following antibodies: ASMA, desmin, and N-caldeston; expression of PanCK is also possible. Researchers do not have any common opinion on the clinical course and biological behavior of cutaneous leiomyosarcomas. This is probably due to the tumor heterogeneity and the carcinogenesis specificity associated with molecular genetic changes. We detected these tumors at the histological examination which resulted in an analysis of the literature and our own material. We analyzed cutaneous tumors diagnosed in 2522 patients during 5 years (2016–2020). Squamous cell and basal cell histotypes were the most common ones. We did not diagnosed cutaneous leiomyosarcoma in our material during this period. This article presents two cases of cutaneous leiomyosarcoma localized in the scalp and calf skin. Morphological and immunohistochemical profiles of the tumors are described. The immunohistochemical analysis confirmed the morphological diagnosis and established the tumor immunophenotypes. The morphological diagnosis in one case was complicated due to the rarity of this pathology and the ambiguity of the interpretation of histological changes. Analysis of histological preparations and immunohistochemical study allowed verification of the tumor as leiomyosarcoma with its characteristic immunophenotype. All of the above demonstrate the need to perform morphological and immunohistochemical tests in specialized research cancer centers.

Keywords:
sarcoma, scalp skin, soft tissues, immunohistochemical study, clinical data, literature review

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ОБЗОР

ЛЕЙОМИОСАРКОМА КОЖИ ВОЛОСИСТОЙ ЧАСТИ КОЖИ ГОЛОВЫ И КОЖИ ГОЛЕНИ. ОПИСАНИЕ НАБЛЮДЕНИЙ И ОБЗОР ЛИТЕРАТУРЫ

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РЕЗЮМЕ

Мягкотканые злокачественные опухоли и, в частности, лейомиосаркомы, локализующиеся в коже, встречаются редко. В кожных лейомиосаркомах выделяют поверхностные и глубокие формы. Для первичных подкожных лейомиосарком характерна узловая форма. Опухоль может распространяться на подлежащую мышечную фасцию. Иммунофенотип лейомиосарком определяется следующими антителами: ASMA, desmin, N-caldeston. Возможна экспрессия PanCK. В литературе существуют противоречивые суждения о клиническом течении и биологическом поведении кожных лейомиосарком. Вероятно, это обусловлено гетерогенностью опухоли и особенностями канцерогенеза, связанного с молекулярно-генетическими изменениями. Обнаружение этих опухолей при гистологическом исследовании операционного материала побудило к анализу литературы и собственного материала. Проведен анализ опухолей кожи за 5 лет (2016–2020 гг.). За этот период опухоли были диагностированы у 2522 пациентов. Основным гистотипом были плоскоклеточные и базальноклеточные раки. Лейомиосарком кожи за этот период на нашем материале диагностировано не было. Приведены два наблюдения лейомиосаркомы кожи: волосистой части кожи головы и кожи голени. Описана морфологическая и иммуногистохимическая картина опухолей. Выполненное иммуногистохимическое исследование позволило подтвердить морфологический диагноз и установить иммунофенотип опухолей. При установлении морфологического диагноза в одном наблюдении возникли трудности, обусловленные редкостью данной патологии и неоднозначностью трактовки гистологических изменений. Анализ гистологических препаратов, проведение иммуногистохимического исследования позволили верифицировать опухоль как лейомиосаркому с характерным для нее иммунофенотипом. Все вышеизложенное свидетельствует о необходимости проведения морфологического и иммуногистохимического исследования в специализированных научных онкологических центрах.

Ключевые слова:
саркома, кожа головы, мягкие ткани, иммуногистохимическое исследование, клинические данные, обзор литературы

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RELEVANCE

Cutaneous malignant tumors are divided into epithelial and mesenchymal. Skin cancer is one of the most common types of cancer, which in most cases appears on areas of the skin exposed to the sun. Skin cancer develops from cells that, as a result of mutations, have acquired the ability to multiply uncontrollably and have ceased to obey the general mechanisms of regulation. Malignant skin tumors can develop from different tissues [1].

One of the variants of stromal malignant tumors is tumors of muscular origin. Primary subcutaneous leiomyosarcomas are manifested by a node or a focus of diffuse compaction. The tumor can spread to the underlying muscle fascia, as well as along the subcutaneous veins [2–4]. The frequency of cutaneous sarcomas is 2–3 % of the number of all cutaneous soft tissue sarcomas.

Leiomyosarcomas of the skin, like all soft-tissue leiomyosarcomas, have characteristic cytological and histological signs. Smooth muscle cells in highly differentiated tumors look oblong, with cigar-shaped, centrally located nuclei and eosinophilic cytoplasm. Sometimes the cells are arranged in the form of a palisade. In low-grade tumors, there are anaplastic bizarre multinucleated giant cells. The number of mitoses varies, including atypical forms [5–8].

There is evidence that subcutaneous leiomyosarcomas metastasize with a frequency of 30 to 60 %, and the recurrence rate is 80 % of cases and recur within 5 years [7].

There are conflicting opinions about the clinical course and biological behavior of cutaneous leiomyosarcomas. There is evidence that dermal leiomyosarcomas are associated with Li-Fraumeni syndrome [9]. It is suggested that EBV-associated leiomyosarcomas may be observed in immunosuppressive patients [5].

The issues of carcinogenesis, including soft tissue sarcomas, have been considered at the molecular genetic level in recent years, which makes it possible to approach their interpretation and therapy in a new way [10]. A germinal FH mutation has been described in a number of observations [11].

The immunophenotype of soft tissue leiomyosarcoma is characterized by overexpression of ASMA, desmin, N-caldeston, MSA In 45 % of cases, keratin expression occurs [9; 12].

Clinical manifestations and severity of symptoms depend on the primary localization and size of the tumor. Most often, soft tissue sarcomas of the head and neck have an asymptomatic course.

Preoperative verification of the pathological process is established on the basis of histological examination of the tissue of the formation. There are two methods of obtaining the material for the study:

- thick-needle biopsy;
- open biopsy.

The biopsy should be performed in the localization that will enter the excision zone of the tumor formation during the operation.

The treatment of a patient with soft tissue sarcomas of the head and neck requires a comprehensive approach involving a number of specialists: a surgeon, a radiation diagnostician, a pathologist, a chemotherapist, a radiologist. Surgical intervention is the main method of treating patients with this pathology. The growth of soft tissue sarcomas occurs in a capsule, which subsequently pushes away nearby tissues. This shell is called a pseudocapsule. Surgical intervention involves removing the pseudocapsule in a single block with negative resection edges without damaging it, since violation of the integrity of this formation increases the risk of tumor recurrence. In the postoperative period, radiation therapy can be performed to ensure local control. Additional methods of treatment include chemotherapy and radiation therapy.

The prognosis for soft tissue sarcomas of the head and neck largely depends on the size of the tumor, the primary localization. With early diagnostic measures and adequate timely therapy, the prognosis is favorable.

Isolated observations of cutaneous leiomyosarcomas are given in the literature. They concern tumors with a predominant localization on the proximal parts of the extremities.

The treatment of dermal sarcoma consists in the correct surgical removal of the primary tumor with a wide capture of the surrounding tissues. Relapses of leiomyosarcoma are characterized by an aggressive course [1; 6].

Clinical data

Clinical data, results of morphological and immunohistochemical studies are presented. The analysis of skin tumors for 5 years (2016–2020) was carried out.

For 5 years (2016–2020), 2522 patients with epithelial skin tumors were operated on at National Medical Research Centre for Oncology. The average age is 50–59 years. The distribution by age and gender was approximately the same.

The main malignant epithelial tumors were basal cell (2200, 88 %) and squamous cell (284, 11 %) skin cancer. All other malignant tumors – metatypical cancer, cancer of the sweat and sebaceous glands, cancer from Merkel cells) were represented by single observations (< 1 %).

Non-epithelial malignant skin tumors were found in 648 patients. The main age group is 60–69 years old. Basically, tumors occurred in patients after 50 years. The distribution by gender and age was also approximately the same.

The distribution by nosological forms was as follows. Malignant melanoma – 593 (91.5 %), fibrosarcoma – 32 (5 %), non-Hodgkin's lymphoma, skin lymphomas – 23 cases (3.5 %).

Clinical observations

Leiomyosarcoma was not diagnosed on our material for the period 2016–2020. Due to the rarity of this malignant tumor of soft tissue sarcoma of the skin, we present our observations.

Observation 1. Patient Zh., 71 years old, was admitted to the department of head and neck tumors of National Medical Research Centre for Oncology on 11.05.2021 with the diagnosis: malignant neoplasm of the scalp, cl. gr. 2.

After a bruise, a pinkish spot appeared on the scalp, which gradually increased in size and a tumor formed in its place.

In the skin under the epidermis of the scalp, the formation of 2.0 × 1.5 cm of a soft consistency. The skin above the formation is not changed.

Puncture of the formation of the scalp skin was performed – during cytological examination, the cellular composition is represented by sharply polymorphic spindle-shaped tumor cells, with large oval

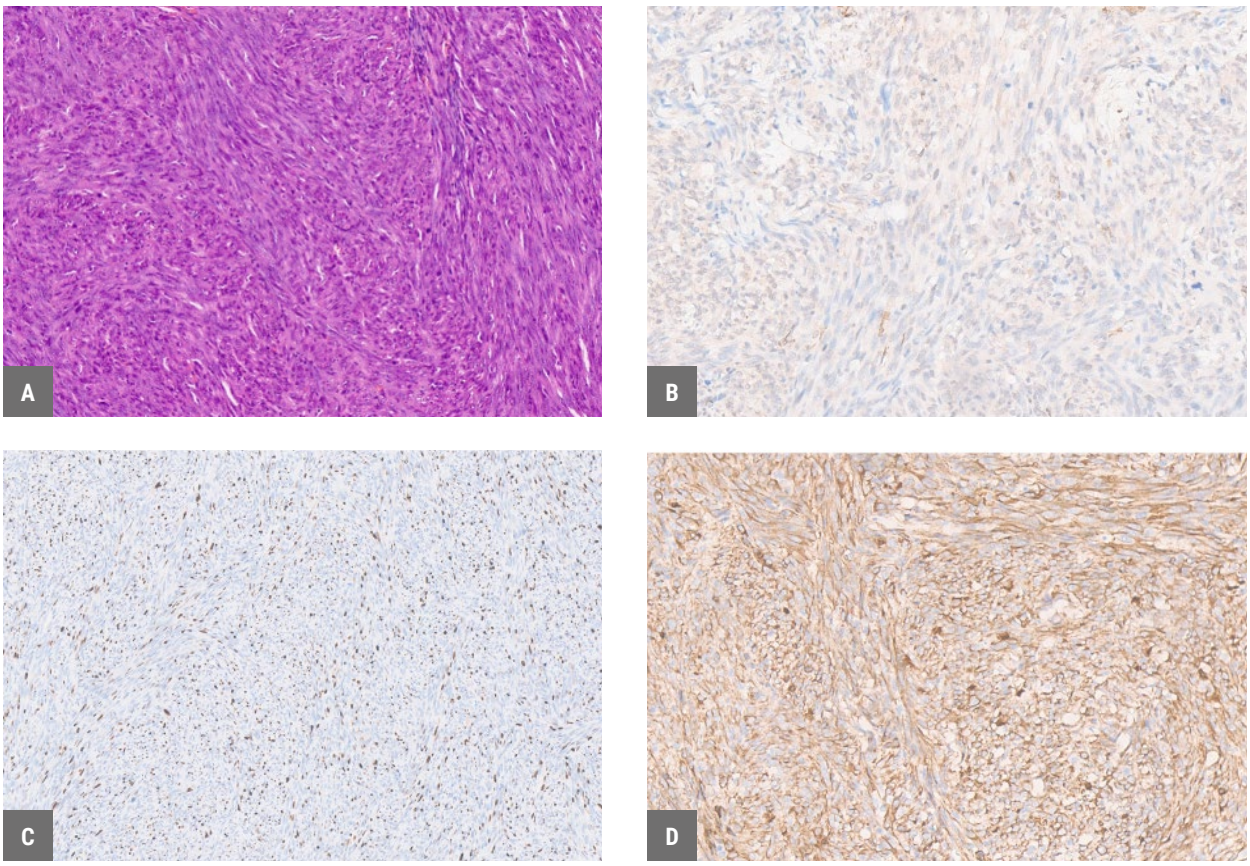

Fig. 1. Microarchitectonics of leiomyosarcoma of the skin, A-D – leiomyosarcoma of the skin, A – leiomyosarcoma G3, B – positive reaction with SMA, G – positive reaction with caldeston, C – proliferative activity of Ki-67, A – staining with hematoxin and eosin, B, C, D – immunohistochemical reaction, A, B, C, D – × 200.

nuclei with nucleoli, with abundant, partially vacuolized light cytoplasm, single multinucleated cells, elements of pronounced inflammation (neutrophilic leukocytes in abundance), single vascular elements. Cytogram of malignant neoplasm of sarcomatous nature. SRCT of the head: no pathological changes in the substance of the brain were detected, the tumor of the parietal region is 2 × 2.1 cm without invasion into bone structures. Ultrasound of the l/nodes of the neck – Cervical / above /subclavian l/y from 2 sides are not enlarged.

Pathology of the thoracic and abdominal organs was not revealed. The formation was removed.

A skin flap with a tumor node measuring 1.8 × 1.4 cm was delivered for morphological examination. The node protrudes above the surface of the epidermis by 0.5 cm, gray, dense, coarse-grained.

Histological examination revealed the following changes. In the flap of skin under the epidermis – G3 fusiform cell sarcoma with infiltrative growth, invasion of level IV, in some drugs – the invasion spreads to adipose tissue. High mitotic activity is detected in the tumor. Extensive hemorrhages are noted. The epidermis is ulcerated. Outside the tumor, there is a slight leukocyte infiltration. The tumor was removed within healthy tissues. The edges of the resection have the usual structure. The histological picture most closely corresponds to leiomyosarcoma; pT1. An immunohistochemical study was conducted. A positive reaction was detected in tumor cells with Caldesmon, SMA antibodies. Proliferative activity (Ki-67) positive reaction in 30 % of tumor cell nuclei. There is no expression in tumor cells with the myogenin antibody. Thus, the conducted immunohistochemical study made it possible to establish the immunophenotype of the tumor – leiomyosarcoma (Fig. 1).

In the future, the patient is under observation.

Observation 2. An 87-year-old patient was admitted with complaints of the presence of a skin tumor of the right shin. In a non-core medical institution, the formation was removed. Dermatofibroma was

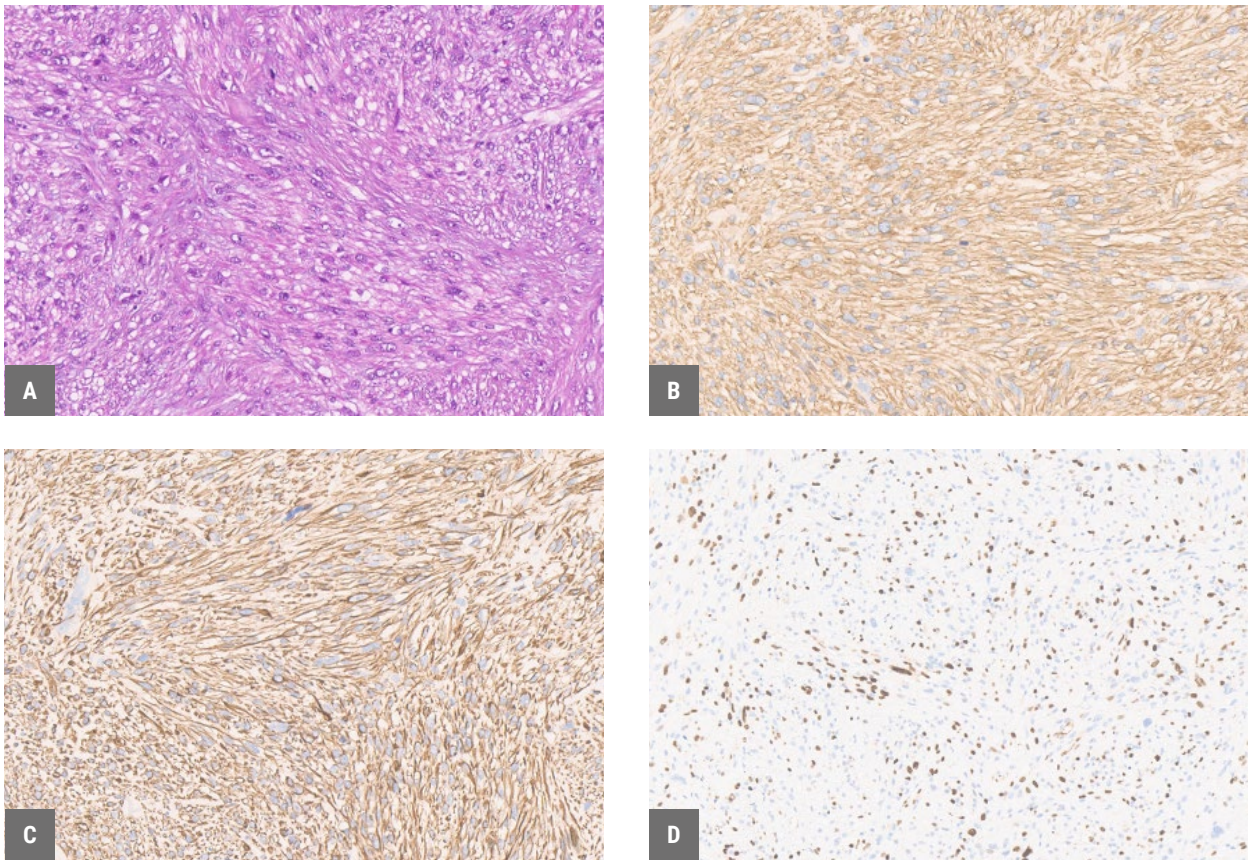

Fig. 2. Microstructure of deep leiomyosarcoma of the shin skin, A-D – leiomyosarcoma of the shin skin, A – leiomyosarcoma G1, B – positive reaction with SMA, C – positive reaction with caldesmon, D – proliferative activity of Ki-67, A – staining with hematoxylin and eosin, B, C, D – immunohistochemical reaction, A, B, C, D – × 200.

diagnosed. In the future, the patient turned to the National Medical Research Centre for Oncology for consultation.

When reviewing histopreparations, the following changes were found. In the skin flap, in the dermis, there is a tumor node that spreads into adipose tissue. The tumor is represented by elongated cells with signs of smooth muscle differentiation. There are large cells with hyperchromic, polymorphic nuclei. Few mitoses are determined. The opinion is expressed about cutaneous leiomyosarcoma (atypical smooth muscle tumor).

To determine the immunophetotype, an IHC study was performed. The IHC study revealed the following changes: a positive reaction with antibodies SMA, caldesmon. The marker of proliferative activity was 30 % of the nuclei of tumor cells. Expression with the CD34 marker was absent.

Thus, the morphological picture and immunophenotype of tumor cells were characteristic of cutaneous leiomyosarcoma (atypical smooth muscle tumor) (Fig. 2).

CONCLUSION

The article analyzes skin tumors according to National Medical Research Centre for Oncology, which amounted to 2,522 patients over 5 years (2016–2021). It was found that soft tissue skin tumors are rare. Leiomyosarcoma of the skin during this period was not detected on our material, which prompted the description of our observations.

Two observations of leiomyosarcoma of the skin are given: the scalp and the shin skin. The morphological and immunohistochemical picture of these tumors is described. It is noted that there are difficulties of morphological diagnostics in verification. All of the above indicates the need for morphological research in specialized oncological research centers.

Reference

1. NCCN Guidelines for Patients: Soft Tissue Sarcoma, 2020. Available at: https://www.nccn.org/patients/guidelines/content/PDF/sarcoma-patient.pdf. Accessed: 03.06.2020.

2. Shah J, Patel S, Singh B, Wong R. Head and Neck Surgery and Oncology. 5th ed. New York: Elsevier, 2020, 896 p.

3. Soft tissue sarcomas: a guide for patients. Information based on ESMO Clinical Practice Guidelines, 2016. Available at: https://www.esmo.org/content/download/75509/1380040/file/esmo-acf-soft-tissue-sarcomas-guide-for-patients.pdf. Accessed: 03.06.2020.

4. Crowson AN, Margot S, Mim MS. Interpretation of skin biopsies. Primary lymphoid tumors of the skin. Trans. from English. edited by O.R. Katunin. Moscow: Practical Medicine, 2019, 520 p. (In Russ.).

5. Cutaneous leiomyosarcoma (atypical smooth muscle tumors). In: Elder DE, Massi D, Scolyer RA, Willemze R, eds. WHO Classification of Skin Tumours. 4th ed. Lyon, France: IARC; 2018;11:330–331.

6. Satbaeva EB, Mukhametgaliev NA, Iskakova EE. Cutaneous leiomyosarcoma / atypical smooth muscle sarcoma. Oncology and Radiology of Kazakhstan. 2020;(2(56)):22–25. (In Russ.).

7. Leiomyosarcoma. The WHO classification of Tumors. Soft Tissue and Bone Tumors. 5th Edition. 2020;3:195–197.

8. Wang W-L, Bones-Valentin RA, Prieto VG, Pollock RE, Lev DC, Lazar AJ. Sarcoma metastases to the skin: a clinicopathologic study of 65 patients. Cancer. 2012 Jun 1;118(11):2900–2904. https://doi.org/10.1002/cncr.26590

9. Kraft S, Fletcher CDM. Atypical intradermal smooth muscle neoplasms: clinicopathologic analysis of 84 cases and a reappraisal of cutaneous "leiomyosarcoma". Am J Surg Pathol. 2011 Apr;35(4):599–607. https://doi.org/10.1097/PAS.0b013e31820e6093

10. Kit OI, Shaposhnikov AV. General carcinogenesis of theory-model (manual for doctors) monograph. Rostov-on-Don: LLC "ID Mercury", 2021, 128 p. (In Russ.).

11. Smit DL, Mensenkamp AR, Badeloe S, Breuning MH, Simon MEH, van Spaendonck KY, et al. Hereditary leiomyomatosis and renal cell cancer in families referred for fumarate hydratase germline mutation analysis. Clin Genet. 2011 Jan;79(1):49–59. https://doi.org/10.1111/j.1399-0004.2010.01486.x

12. Massi D, Franchi A, Alos L, Cook M, Di Palma S, Enguita AB, et al. Primary cutaneous leiomyosarcoma: clinicopathological analysis of 36 cases. Histopathology. 2010 Jan;56(2):251–262. https://doi.org/10.1111/j.1365-2559.2009.03471.x

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