

## Research Article

# Peculiarities of morphopathological diagnosis of skin mucinosis in children

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## Abstract

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### Particularitățile diagnosticului morfopatologic în mucinoza cutanată la copii

**Background:** Afecțiunile cutanate sunt frecvente manifestări ale exteriorizării pielii, inclusiv primare în cadrul unor dereglări funcționale sau preexistente metabolice. Diagnosticul metabolismului glucidic prin afectarea pielii poate fi primul semn a evoluției tulburărilor metabolice. Printre grupurile diverse ale afecțiunilor cutanate metabolice se înscriu și mucinozele cutanate, caracterizate prin depozite de mucină focal sau generalizat printre fibrele de collagen în dermul pielii, variind de la focare mici lezionale cosmetice, până la afecțiuni grave sistemice de organe. Ca regulă, acestea sunt mai frecvent diagnosticate la vârsta adultă, datorită precauției personale estetice ale pacientului și mult mai rarism atestate la copii, dat fiind faptul că este mai dificilă utilizarea diagnosticului prin *panci* biopsie a manifestărilor reactive sau patologice cutanate, precum și complexitatea acestora prin diversitatea frecventă a dermatitelor nemetabolice polietiologice la această perioadă de vârstă. Diagnosticul și gestionarea mucinozelor cutanate la copii este, de asemenea, o provocare dificilă și confuză din cauza lipsei de cunoștințe științifice adecvate sau a recomandărilor bazate pe dovezi.

**Material and methods:** Materialul de studiu a servit probele tisulare cutanate prelevate de la o pacientă la vârsta de 17 ani cu apariția erupțiilor cutanate papulomatoase în regiunea lombară în diagnostic clinic prezumtiv de mucinoză papuloasă. Probele tisulare au fost examinate morfologic conform planului de examinare cu aplicarea metodei histologice prin colorație uzuală cu hematoxină-eozină și histochimice: van Gieson cu picrofuxină, albastru alcian în scopul cercetării particularităților componente conjunctive fibrilare și atestării depozitărilor de mucină intradermală.

**Results:** La revizia externă, erupții cutanate multiple în regiunea lombară, unilaterale pe dreapta, dimensiuni 3-4 mm, în formă de papule, culoare roșie-cianotice, durata de expunere 2 luni. La revizia macroscopică a biopatului cutanat cu dimensiunile de 0,5x0,2x0,2 cm sau atestat papule de culoare cafenie/surie. La examenul microscopic depozite mucinoase printre fibrele de collagen la nivelul stratului papilar, procese fibrosclerotice în stratul reticular al dermului cu reactivitate ușoară proliferativă din partea fibroblastelor, infiltrate limfo-histiocitare perivascularare ale vaselor patului microcirculator cu vasculopatie și reacție pozitivă la mucină la nivelul peretelui vascular.

**Conclusions:** Biopsia cutanată reprezintă o metodă invazivă cu impact deosebit în diagnosticul diferențiat ale exteriorizărilor cutanate și suspectate în dereglările metabolice, în particular la copii, cu aplicarea metodelor complexe de examinare conform unui procedeu standard. Aplicarea investigației histochimice cu albastru alcian reprezintă o metodă de elecție în determinarea mucinei intradermale ca indice principal histopatologic în dereglările metabolismului glucidic. Importanța cazuisticii raportate a constituit-o atestarea vasculopatiei pozitive la mucină (albastru alcian: ++/+++) concomitent cu testul pozitiv (+++) intradermal.

**Cuvinte cheie:** mucinoză cutanată, mucină, papule cutanate.

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## Abstract

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**Background:** Skin conditions are a common exteriorization of diseases, and can be primary in functional or pre-existing metabolic disorders. Skin lesions can induce the suspicion of carbohydrate metabolism disorders and they may be their first sign. Among the various metabolic skin diseases are cutaneous mucinoses, characterized by focal or generalized mucin deposits among collagen fibers in the dermis of the skin; manifestations ranging from small foci of cosmetic lesions to severe systemic organ disease. As a rule, they are more frequently diagnosed in adults, due to the esthetic inconveniences and much rarer in children, given that it is more difficult to use the diagnosis by punch biopsy of reactive or pathological skin lesions and the frequent incidence of non-metabolical polyethiological dermatitis at this age. The diagnosis and management of cutaneous mucinoses in children is also a difficult and confusing challenge due to a lack of adequate scientific knowledge or evidence-based recommendations.

**Material and methods:** We examined several skin tissue samples taken from a 17-year-old patient with papulomatous rashes in the lumbar region and a presumptive clinical diagnosis of papular mucinosis. Tissue samples were examined morphologically using the histological method which included routine staining (hematoxylin-eosin) and histochemical staining (van Gieson with picrofuchsin, Alcian blue) which allowed to investigate the peculiarities of the fibrillar connective component and detection of intradermal mucin deposits.

**Results:** Visual inspection revealed multiple rashes in the lumbar region, unilateral, on the right side, 3-4 mm in size, papule-shaped, of a red cyanotic color, which appeared 2 months ago. The skin biopsy was the size of 0.5x0.2x0.2 cm. Its macroscopic examination attested grayish brown papules. During microscopic examination, we found mucin deposits among collagen fibers in the papillary layer, fibrosclerotic processes in the reticular layer of the dermis with mild proliferative reactivity of fibroblasts, perivascular lymphohistiocytic infiltrates of microcirculatory bed vessels with vasculopathy and positive reaction to mucin in the blood vessels' walls.

**Conclusions:** Skin biopsy is an invasive method with a significant impact on the differential diagnosis of primary skin lesions and secondary lesions in case of metabolic disorders, especially in children, with the application of complex examination methods according to a standard procedure. The application of histochemical investigation with Alcian blue is a method of choice in determining intradermal mucin as the main histopathological index of carbohydrate metabolism disorders. The importance of the presented case was the confirmation of mucin-positive vasculopathy (Alcian blue: ++ / +++) simultaneously with the positive (+++) intradermal test.

**Keywords:** cutaneous mucinosis, mucin, skin papules.

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## Introduction

Skin conditions are a common exteriorization of diseases, and can be primary in functional or pre-existing metabolic disorders. Skin lesions can induce the suspicion of carbohydrate metabolism disorders and they may be their first sign [3]. Among the various metabolic skin diseases are cutaneous mucinoses, characterized by focal or generalized mucin deposits among collagen fibers in the dermis of the skin; manifestations ranging from small foci of cosmetic lesions to severe systemic organ disease [5]. Cutaneous mucinoses are a heterogeneous group of disorders in which there is an abnormal amount of mucin accumulated in the skin with uncertain etiopathogenesis [6]. As a rule, they are more frequently diagnosed in adults, due to the esthetic inconveniences and much rarer in children, given that it is more difficult to use the diagnosis by punch biopsy of reactive or pathological skin lesions and the frequent incidence of non-metabolical polyethiological dermatitis at this age. The diagnosis and management of cutaneous mucinoses in

children is also a difficult and confusing challenge due to a lack of adequate scientific knowledge or evidence-based recommendations.

The given work is a report of a rare case of cutaneous manifestations, the only one registered in the last 10-15 years and confirmed by the morphopathological diagnosis. These manifestations can be related to the syndrome of functional disorders and unclear clinical conditions linked to the disrupted carbohydrate metabolism in children.

**Aim of the study:** To reveal the importance of skin biopsy in case of visible/ suspected skin lesions linked to metabolic disorders in children.

## Material and methods

We examined several skin tissue samples taken from a 17-year-old patient with papulomatous rashes in the lumbar region and a presumptive clinical diagnosis of papular mucinosis. Tissue samples were examined morphologically using the histological method which included routine staining (hematoxylin-eosin) and

histochemical staining (van Gieson with picrofuchsin, Alcian blue) which allowed to investigate the peculiarities of the fibrillar connective component and detection of intradermal mucin deposits.

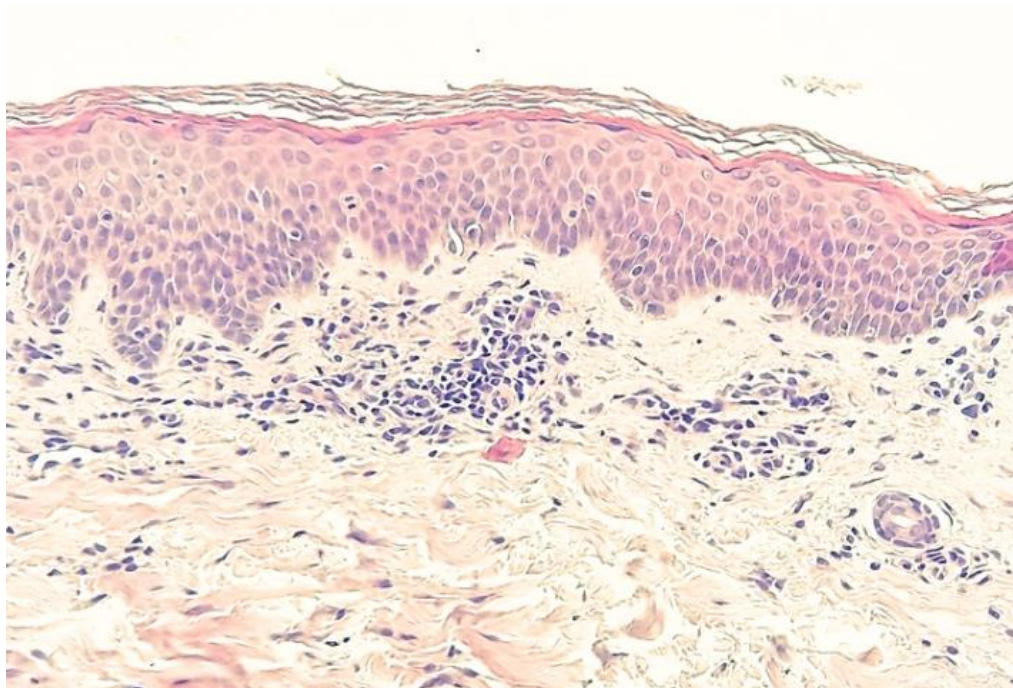
### **Results**

According to the medical records, the very first papulomatous rashes appeared on the body of the child almost 2 months ago. They popped up in the inferior lumbar region on the right side, had a red-cyanotic color, with sizes ranging from 3 to 4 mm. There was no itching. The macroscopic examination of the tissue sample (0.5x0.2x0.2 cm) attested grayish brown papules on the epidermis. We then performed a hematoxylin-eosin staining which revealed prominent bundles of collagen fibers, nodular microfoci of collagen fibers in the reticular layer of the dermis with a wavy irregular

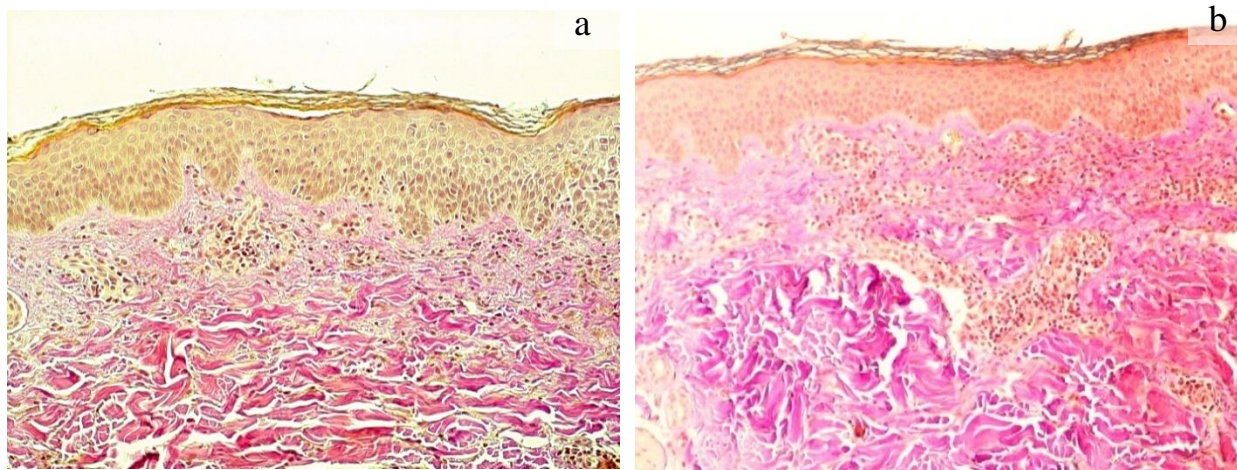
appearance, accompanied by a slightly accentuated interfascicular edema (fig. 1).

The papillary layer was moderately thickened, with wavy collagen fibers and a transparent organic mass. The lymphohistiocytic infiltrates were located in the perivascular regions of the microcirculatory bed and were more prominent in the upper layer of dermis. The blood vessels walls were moderately thickened and endothelium was swelled. The staining with van Gieson and picrofuchsin confirmed fibrosclerotic changes of dermis (fig. 2).

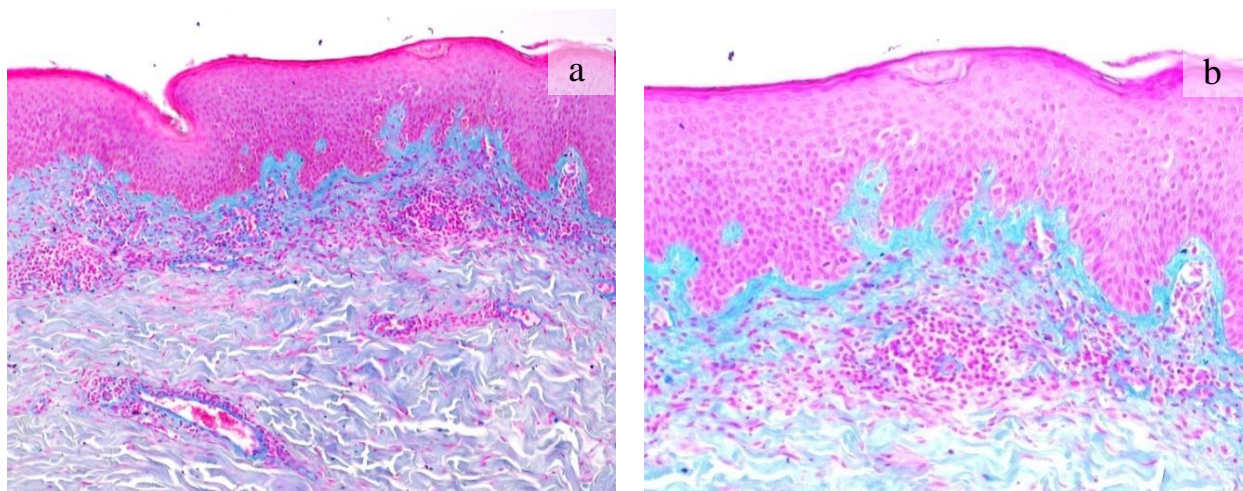
We also did a staining with Alcian blue in order to confirm or exclude the presence of any deposits among the collagen fibers. In given case, the detected organic mass had an obvious basophilic staining, more prominent in the papillary layer of dermis. We also detected a positive basophilic reaction in the blood vessels' walls (fig. 3).



**Fig. 1.** Skin biopsy. Increased collagenization of dermis layers with a multifocal lymphohistiocytic infiltrate. Staining: hematoxylin-eosin. x100.



**Fig. 2.** Skin biopsy: a) Fascicular pattern of collagenization in the reticular layer of dermis. b) Nodular pattern of collagenization in dermis; a, b) Enlarged interfascicular spaces. Staining: van Gieson with picrofuchsin, x 100.



**Fig. 3.** Skin biopsy. Increased basophilic staining of the papillary layer of dermis. Basophilic staining of blood vessels' walls. Multifocal and perivascular lymphohistiocytic infiltrates. Staining: alcian blue, a) x100, b) x200

### Discussion

Skin conditions are a common exteriorization of diseases, and can be primary in functional or pre-existing metabolic disorders. Skin lesions can induce the suspicion of carbohydrate metabolism disorders and they may be their first sign [3]. Among the various groups of metabolic skin diseases are cutaneous mucinoses, characterized by focal or generalized mucin deposition among collagen fibers in the dermis of the skin [6]. Cutaneous mucinoses are a heterogeneous group of disorders in which there is an abnormal amount of mucin accumulated in the skin and their etiopathogenesis is still

unknown [3]. Conditionally, cutaneous mucinoses are divided into the following types: primary mucinosis – the storage of intradermal mucin with cutaneous characteristics and secondary mucinosis - attestation of mucin storage as a result of other diseases. The last group includes: endocrinopathies, toxic diseases (toxic oil syndrome), eosinophilic myalgia syndrome, nephrogenic fibrosing dermatopathy, diffuse connective tissue diseases (lupus erythematosus, etc.) [1, 2, 5]. The most recent classification of dermal mucinosis was developed by Rongioletti F., Rebori A. in 2001, who differentiated two main groups of dermal mucinosis: scleromixedema

(generalized form) and myxedematous lichen (localized form) [5]. A great importance is attributed to diabetes, which is a common disease involving the skin by disrupting carbohydrate metabolism. Between thirty and seventy percent of patients with diabetes, both type 1 and type 2, will have a skin complication of diabetes at some point in their lives [4]. Thus, early findings of skin changes may provide insight into glycemic control in patients and may be the first sign of metabolic disorders in patients with diabetes. In our case, according to the findings, we tend to mention that diabetic vasculopathy with papular cutaneous expression in children has both generalized and focal character.

### **Conclusions.**

Skin biopsy is an invasive method with a significant impact on the differential diagnosis of primary skin lesions and secondary lesions in case of metabolic disorders, especially in children, with the application of complex examination methods according to a standard procedure. The application of histochemical investigation with Alcian blue is a method of choice in determining intradermal mucin as the main histopathological index of carbohydrate metabolism disorders. The importance of the presented case was the confirmation of mucin-positive vasculopathy (Alcian blue: ++/+++) simultaneously with the positive (+++) intradermal test.

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*Conflicts of interest: authors have no conflict of interest to declare*