Lichen sclerosus et atrophicus in pediatric and adult male patients with congenital and acquired phimosis

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Key words: *lichen sclerosus et atrophicus; rate; boys; males; congenital and acquired phimosis.*

Summary. *Lichen sclerosus et atrophicus is a chronic inflammatory sclerotic and atrophic disease of unknown cause that predominantly affects male and female genital skin. This study was designed to evaluate histological characteristics of congenital and acquired phimoses among pediatric (n=60) and adult (n=60) male patients who were admitted for circumcision to the Clinics of Urology and Pediatric Surgery of Kaunas University of Medicine Hospital between 2000 and 2003 and to determine the rate of lichen sclerosus et atrophicus and other histological diagnoses among them. This study demonstrates that 45.1% of congenital and 62.3% of acquired phimoses show histological signs of lichen sclerosus et atrophicus. The rate of lichen sclerosus et atrophicus was statistically significantly higher among patients with acquired than congenital phimosis. Boys with acquired narrowing of prepuce were statistically significantly 3.9 times more likely to develop lichen sclerosus et atrophicus than those with congenital phimosis. There were no statistically significant differences between rates of lichen sclerosus et atrophicus and other dermatological diagnoses among pediatric and adult male patients if the type of phimosis (acquired or congenital) was considered. Histological features of lichen sclerosus et atrophicus and other histological diagnoses in boys and men with phimosis were detected with equal frequency irrespective the age of the subjects. The rate of lichen sclerosus et atrophicus was similar among all boys (56.7%) and men (53.3%) treated for phimosis. Only the type of phimosis had a statistically significant influence on the rate of lichen sclerosus et atrophicus and other histological diagnoses.*

Introduction

Phimosis is a clinical condition when the foreskin cannot be drawn back to uncover the glans penis. This condition may be either congenital (continues from birth) or acquired (previously being retractable foreskin contracts). The causes of phimosis frequently remain unclear, and the treatment is aimed at managing the pathological condition and associated urination and sexual disorders or inflammatory conditions. Frequently no coherent examination of patients is applied following circumcision, and no cause-oriented treatment is administered.

Lichen sclerosus et atrophicus (LSA) is one of potential courses of phimosis that often attracts the highest interest of researchers working in this field. The male genital variant of LSA is also called balanitis xerotica obliterans (A. Stühmer, 1928) (1). This is a relatively rare inflammatory disease of skin and mucosa that is characterized by a chronic course, unknown etiology, and insufficiently clear pathogenesis. The disease may start at any site of the body in subjects of any age and sex. However, it mostly targets the site of external genitals in men as well as in women. Observed skin changes include areas of pallor, which may be small polygonal papules or large patches and plaques with thinned, atrophic, wrinkled, fragile skin sometimes demonstrating telangiectasia, purpura, erosions, and tender fissures. Hyperkeratosis and areas of sclerosis may occur. The frenulum often becomes contracted, and circumferential involvement of the preputial aperture into the scarring process leads to a progressive fibrous phimosis, characterized by the typical whitish discoloration. Histologically, typical cases of LSA show discrete lichenoid dermatitis with vacuolization of the basal layer of the epidermis and homogenization and sclerosis of the superficial dermis

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(2–4). However, sometimes even cases with characteristic clinical presentation simulate histological features of mycosis fungoides and have only picture of lichenoid interface dermatitis without development of homogenous zone in the upper dermis (5–9).

It is estimated that the incidence of LSA in males may reach 0.07% (10). According to literature data, the incidence of LSA among male patients with phimosis ranges between 4.3% and 57% or even 95% in cases when only scarring preputial samples were examined (11–15). Contradictory literature findings on the associations of LSA with phimosis stimulated us to perform histological examinations of prepuces removed during circumcision. This study was designed to evaluate histological characteristics of congenital and acquired phimoses among pediatric and adult male patients who were admitted for circumcision to the Clinics of Urology and Pediatric Surgery of Kaunas University of Medicine Hospital between 2000 and 2003 and to determine the rate of LSA and other histological diagnoses among them.

Material and methods

The population of prospective study was composed of all male patients admitted to inpatient Departments of Urology and Pediatric Surgery for the evaluation and surgical treatment of the narrowing of preputium (phimosis) from 2000 to 2003. Among 120 male patients, 60 were boys (less than 18 years old) and 60 were adult male patients (older than 18 years). Only 2 out of the 120 patients were treated with topical corticosteroids before circumcision. All male patients (n=120) suffering from narrowing of preputium underwent circumcision. Excision materials were fixed in buffered 10% solution of formalin, embedded in paraffin, and routinely stained with hematoxylin-eosin (HE), elastica-van Gieson's (EVG) reagents for elastic fibers and periodic acid Schiff's reagents for evaluation of basal membrane (PAS). All specimens were examined by three dermatopathologists (J.D., F.I., and G.H.). The histopathologic findings were the result of their diagnostic agreement. All histological diagnoses were divided into two groups. The first group included dermatological diseases with specific histopathologic findings and fully established clinical diagnoses, the second group – with nonspecific histopathological findings where only descriptive histological diagnosis was established (Table 1). LSA was diagnosed as acute, subacute, chronic, or chronic active depending on a different combination of histological features of this disease in each stage (Table 2, Fig.). The interviewing about the course of the disease and a full-body skin examination were done by one dermatologist (J.D.) after informed consent of the patient had been obtained. The study was approved by the Regional Ethics Committee for Biomedical Research (protocol No. 73/2002, Kaunas).

Statistical analysis was performed using standard statistical packages SPSS/w10 and STATISTIKA/w5. Data are presented using standard characteristics of descriptive statistics. The frequencies of qualitative characteristics between two groups with normal distribution were compared using asymptomatic arcsinus criterion, when $n \geq 30$, and exact criterion of comparison of probabilities, when $n < 30$ (16). The same variables among more than two groups with normal distribution were compared using χ^2 criterion (17). Analyzing data without normal distribution, nonparametric analyses of variables were used: Mann-Whitney (U) test comparing two groups and Kruskal-Wallis (H) test comparing more than two groups (17). Statistical analysis of means of variables was carried out using the Student's unpaired t test or ANOVA (analysis of variance between groups) (17). Logistic regression analysis was used to measure the impact of different independent variables on the chance of developing LSA and other histological diagnoses. Value of $P<0.05$ was considered as statistically significant.

Results

The mean age of boys was 9.9 years (range, 2–17 years; 95% CI, 8.8–11.0), and that of the adult males was 55.8 years (range, 18–83 years; 95% CI, 48.5–63.1). Among pediatric and adult male patients studied, congenital phimosis was diagnosed in 70% (n=42) and 15% (n=9), and acquired – in 30% (n=18) and 85% (n=51) of patients, respectively. Boys were more likely to develop congenital phimosis than acquired one ($\chi^2=9.6$; P=0.002), whereas adult male patients – rather acquired phimosis than congenital one ($\chi^2=29.4$; P=0.0001).

The rates of histological diagnoses evaluating specimens of preputium after circumcision among pediatric and adult male patients are summarized in Table 3. There was a statistically significant difference in the rate of LSA between boys with congenital and acquired phimosis observed. A logistic regression analysis indicated that boys with acquired phimosis were 3.9 times (95% CI, 1.1–13.7; P=0.04) more likely to develop LSA compared to boys with congenital phimosis. Histological features of nonspecific mild dermatitis were more often observed among adult male patients with congenital phimosis than with acquired

Table 1. **Diagnostic criteria of histological diagnoses (2)**

Diagnoses	Diagnostic criteria
1. Fully established clinical diagnoses	
1.1. Lichen sclerosus et atrophicus	Vacuolar degeneration and lymphocytic invasion of basal layer of epidermis; hyalinization of collagen in the upper dermis; lymphocytic and histiocytic band-like inflammatory infiltrate; reduction or loss of elastic fibers in the upper dermis.
1.2. Psoriasis	Regular elongation of rete ridges; suprapapillary thinning; parakeratosis; hypogranulosis; neutrophils in the stratum corneum; no evidence of fungal elements on PAS stain.
1.3. Lichen planus	Jagged epidermal hyperplasia; wedge-shaped hypergranulosis; band-like infiltrate of lymphocytes with tendency to obscure the dermoepidermal junction; at least few necrotic keratinocytes within the epidermis; thinning of epidermis and absence of jagged epidermal hyperplasia did not exclude diagnosis.
2. Descriptive histological diagnoses	
2.1. Nonspecific mild dermatitis	No characteristic patterns.
2.2. Psoriasiform dermatitis with parakeratosis or orthohyperkeratosis	Regular and irregular elongation of rete ridges; suprapapillary thinning and neutrophils in the stratum corneum were absent; parakeratosis or orthohyperkeratosis; more or less pronounced superficial perivascular inflammatory infiltrate and spongiosis did not exclude diagnosis.
2.3. Infectious dermatitis	Bacterial or fungal (PAS positive) elements in the epidermis; neutrophils within the stratum corneum; more or less pronounced regular and irregular psoriasiform hyperplasia, spongiosis and mixed cell superficial perivascular inflammatory infiltrate were as additional findings in this category.
2.4. Fibrosing dermatitis	Increased number of fibrocytes and more or less thickened collagen bundles in the dermis; absence of any other specific histopathological features; more or less pronounced superficial perivascular inflammatory infiltrate and irregular thickening of epidermis did not exclude diagnosis.

Table 2. **Histological criteria of stages of lichen sclerosus et atrophicus**

Stage	Histopathological feature	Requirement
Acute	lymphocytic invasion of basal layer of epidermis	absolute
	subepidermal edema	–/+
	disruption between dermis and epidermis	–/+
	more or less pronounced band-like inflammatory infiltrate	absolute
Subacute	lymphocytic invasion of basal layer of epidermis	–/+
	subepidermal edema	–/+
	disruption between dermis and epidermis	–/+ (but at least one)
	initial hyalinization of the superficial dermis	absolute
	more or less pronounced band-like inflammatory infiltrate	absolute
Chronic	well-expressed hyalinization of the superficial dermis	absolute
	more or less pronounced band-like inflammatory infiltrate	–/+
Chronic active	lymphocytic invasion of basal layer of epidermis	absolute
	subepidermal edema	–/+
	disruption between dermis and epidermis	–/+
	well-expressed hyalinization of the superficial dermis	absolute
	more or less pronounced band-like inflammatory infiltrate	absolute

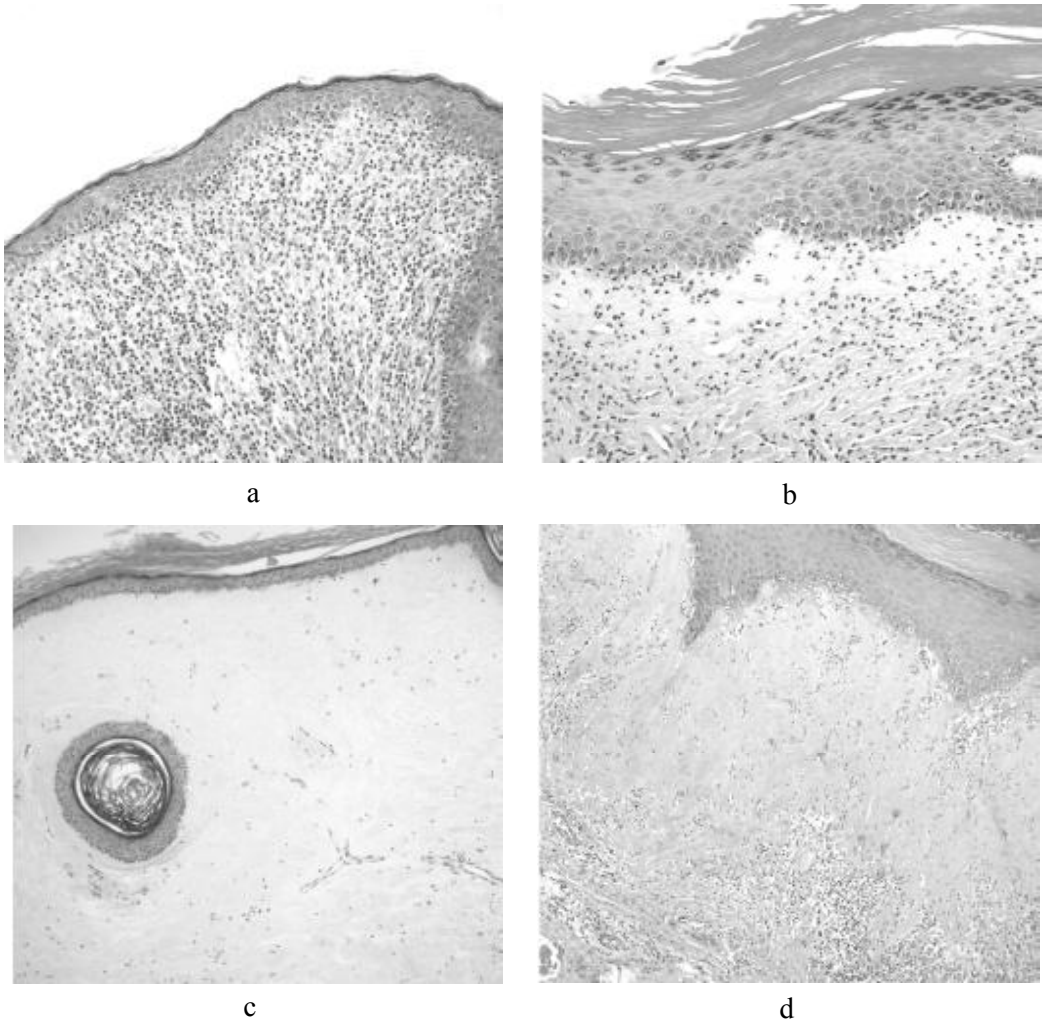

Fig. **Histological stages of lichen sclerosus et atrophicus**

a – acute (hematoxylin-eosin, original magnification 20×10), b – subacute (hematoxylin-eosin, original magnification 40×10), c – chronic (hematoxylin-eosin, original magnification 10×10), d – chronic active (hematoxylin-eosin, original magnification 10×10)

phimosis. A logistic regression analysis revealed that adult male patients with congenital phimosis were 12.8 times (95% CI, 2.2–74.2; P=0.004) more likely to develop nonspecific mild dermatitis than those with acquired phimosis. There were no statistically significant differences regarding rates of LSA and other histological diagnoses between pediatric and adult male patients, if the type of phimosis was considered (Table 3; for congenital phimosis, columns a and d; for acquired, c and d). Statistically significant differences regarding rates of histological diagnoses, however, were observed between pediatric and adult male patients, if the type of phimosis had been ignored (Table 3; columns c and f). Nonspecific mild dermatitis was more often diagnosed among all pediatric than adult male patients (χ^2=8.1; P=0.004), and psoriasis – among all adult than pediatric male patients (χ^2=5.2; P=0.02).

All male patients with acquired phimosis were more likely to develop LSA than those with congenital phimosis, and nonspecific mild dermatitis – conversely (Table 4).

Among all LSA male patients, lesions on the glans penis, perianal region, and other extragenital areas were observed in 18 (27.3%), 5 (7.6%), and 2 (3.0%) cases, respectively. LSA lesions in other than perianal extragenital areas were diagnosed only among adult male patients. LSA lesions on the glans penis in boys were registered in 8 (23.5%) cases. Among all male patients, acute, subacute, chronic, and chronic active stages of LSA were diagnosed in 12 (18.2%), 15 (22.7%), 8 (12.1%), and 31 (47.0%) cases, respectively.

Discussion

Literature data on the incidence of LSA among phimosis patients are contradictory. The results of our

Table 3. **Histological characteristics of circumcision specimens among pediatric and adult male patients with phimosis**

Diagnosis	Boys		
	Congenital (a) n=42 (%)	Acquired (b) n=18 (%)	Total (c) n=60 (%)
Lichen sclerosus et atrophicus	20 (47.6)*	14 (77.8)*	34 (56.7)
Nonspecific mild dermatitis	17 (40.4)	3 (16.7)	20 (33.3)
Psoriasiform dermatitis	1 (2.4)	0 (0.0)	1 (1.7)
Infectious dermatitis	2 (4.8)	0 (0.0)	2 (3.3)
Lichen planus	2 (4.8)	0 (0.0)	2 (3.3)
Fibrosing dermatitis	0 (0.0)	1 (5.6)	1 (1.7)
Diagnosis	Men		
	Congenital (d) n=9 (%)	Acquired (e) n=51 (%)	Total (f) n=60 (%)
Lichen sclerosus et atrophicus	3 (33.3)	29 (56.9)	32 (53.3)
Nonspecific mild dermatitis	4 (44.4)**	3 (5.9)**	7 (11.7)
Psoriasiform dermatitis	1 (11.1)	3 (5.9)	4 (6.7)
Psoriasis	0 (0.0)	5 (9.8)	5 (8.3)
Infectious dermatitis	0 (0.0)	1 (2.0)	1 (1.7)
Lichen planus	0 (0.0)	7 (13.7)	7 (11.7)
Fibrosing dermatitis	1 (11.1)	3 (5.9)	4 (6.7)
	between a and d χ^2=7.3; P=0.20	between b and e χ^2=8.4; P=0.21	between c and f χ^2=18.0; P=0.01

* χ^2=4.7; P=0.03.
** χ^2=11.0; P=0.007.

Table 4. **Histological characteristics of circumcision specimens among male patients with congenital and acquired phimosis**

Diagnosis	Congenital n=51 (%)	Acquired n=69 (%)	Total n=120 (%)
Lichen sclerosus et atrophicus	23 (45.1)*	43 (62.3)*	66 (55.0)
Nonspecific mild dermatitis	21 (41.2)**	6 (8.7)**	27 (22.5)
Psoriasiform dermatitis	3 (5.9)	3 (4.3)	6 (5.0)
Psoriasis	0 (0.0)	5 (7.2)	5 (4.2)
Infectious dermatitis	1 (2.0)	1 (1.4)	2 (1.7)
Lichen planus	2 (3.9)	7 (10.1)	9 (7.5)
Fibrosing dermatitis	1 (2.0)	4 (5.8)	5 (4.2)

* χ^2=7.8; P=0.04.
** χ^2=17.7; P=0.00001.

study are most consistent with the findings published by G. Mattioli *et al.*, stating that LSA in boys may be diagnosed in 30% of cases of congenital and in 60% of cases of acquired phimosis (18). The difference in the studies performed might be conditioned by a variety of factors including different traditions and indications for circumcision in a particular country or region, preoperative treatment with topical glucocorticoids and antibiotics, as well as by different interpretations of histological alterations. In Great Britain, circumcision is performed on the average in 7% of all boys aged up to 15 years, whereas in the United States, 60% of male newborns undergo this operation (19, 20). It is noteworthy that in Lithuania, preoperative local treatment is not usually indicated in cases of phimosis. Only 2 of the 120 patients examined had received preoperative topical glucocorticoid therapy. Thus, it can be stated that inflammatory skin alterations had not been suppressed and reflected a sufficiently precise incidence of histological changes re-

lated to LSA and other skin diseases in phimosis cases. Significant difficulties arise in the histological diagnosis of LSA in cases of early LSA lesions where the main diagnostic marker of LSA – the homogenization of the connective tissue fibers in the upper layers of the dermis – is not visible (5–9). According to the findings of our study, lesions related to acute and subacute LSA were detected in 18.2% and 22.7% of cases, respectively. The rate of early (acute) stage of LSA observed by us among all LSA samples investigated (18.2%) is comparable to the 19% reported in the large-scale prospective 10-year study of boys with phimosis by Kiss *et al.* (15). Contradictory literature findings regarding the associations of LSA with phimosis can be due to erroneous interpretation of histological findings in early stage of LSA. An inexperienced investigator could have easily marked these histological changes as nonspecific, and thus the resulting LSA incidence would have been lower. During our study, the histological alterations were evaluated by three experienced specialists.

Nonspecific mild dermatitis with slight signs of inflammation essentially reflects the causes of phimosis of a noninflammatory origin and thus is typically diagnosed in cases of congenital phimosis. The rate of nonspecific mild dermatitis determined during our study does not contradict the findings presented by other authors where histological alterations, approximate to the norm, were observed in 41–56.2% of cases (18, 21).

We failed to find studies that analyzing the relationship between LSA and phimosis had taken into account the age of the subjects (boys up to 18 years of age and adult men) as well as the type of phimosis (congenital or acquired). The rate of histological changes related to LSA and other skin diseases among boys and men differs due to a different rate of congenital and acquired phimosis – boys more frequently have congenital phimosis compared to men and vice versa. We did not find, however, any essential differences between boys and men concerning the rate of histological changes induced by either LSA or other skin diseases, when during the analysis the type of phimosis was taken into account.

LSA most frequently damages frenulum and the inner part of the foreskin, and these sclerotic changes result in phimosis. Frequently LSA spreads to the glans penis or even the urethra, causing its stricture. In our study, we observed lower rate of LSA lesions in other areas than preputium comparing with the findings from other studies. As evident from literature on the subject, lesions on the glans penis among LSA patients with phimosis were detected in 34–50% of cases, and the narrowing of the urethra – in 4–5.5% of cases, respectively (22–24). According to Meuli *et al.*, 10 of the 100 boys who had undergone circumcision for phimosis had LSA, and all of them were diagnosed as having lesions on the glans penis (25). Such uniform manifestation of LSA (all patients had LSA of glans penis) in the patients observed might have been associated with the overall low rate of diagnosed LSA, where histological changes of incompletely formed histological alterations during the early stages of LSA might have been evaluated as nonspecific ones.

Conclusions

Pathological changes commonly observed among circumcision specimens were due to lichen sclerosus et atrophicus and nonspecific mild dermatitis. At least half of preputium samples after circumcision showed pathological changes corresponding to lichen sclerosus et atrophicus. All histological diagnoses in boys and men with phimosis were detected with equal frequency irrespective the age of the subjects. Only the type of phimosis had a statistically significant influence on the rate of lichen sclerosus et atrophicus and other histological diagnoses.

Vaikų ir suaugusiųjų įgimtos ir įgytos fimozės sąsaja su sklerozine ir atrofine kerplige

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Raktažodžiai: sklerozinė ir atrofinė kerpligė, dažnumas, berniukai, vyrai, įgimta ir įgyta fimozė.

Santrauka. Sklerozinė ir atrofinė kerpligė (lot. *lichen sclerosus et atrophicus*) yra nežinomos etiologijos

odos sklerozę ir atrofiją sukelianti lėtinė uždegiminė odos liga, kuri dažniausiai pažeidžia moterų ir vyrų išorinių lyties organų sritį.

Tyrimo tikslas. Įvertinti cirkumcizijos metu pašalintų apyvarpių histologinius pokyčius ir nustatyti sklerozinės ir atrofinės kerpligės bei kitų histologinių diagnozių dažnumą tarp 2000–2003 m. KMU Vaikų chirurgijos ir Urologijos klinikose dėl įgimtos ar įgytos fimozės operuotų berniukų (n=60) ir vyrų (n=60). Sklerozinės ir atrofinės kerpligės histologiniai požymiai nustatyti 45,1 proc. įgimtų ir 62,3 proc. įgytų fimozių atvejų. Sklerozinė ir atrofinė kerpligė statistiškai reikšmingai dažniau diagnozuota, kai fimozė buvo įgyta nei įgimta. Esant įgytai fimozei, berniukai 3,9 karto dažniau serga sklerozine ir atrofine kerplige nei esant įgimtai fimozei. Esminių skirtumų tarp sklerozinės ir atrofinės kerpligės bei kitų histologinių diagnozių dažnumų berniukų ir vyrų grupėse nepastebėta, jei, analizuojant duomenis, kartu atsižvelgiama ir į fimozės tipą (įgimta ar įgyta). Berniukams ir vyrams susiaurėjusiose apyvarpėse sklerozinės ir atrofinės kerpligės bei kitų odos ligų histologiniai požymiai aptinkami vienodai dažnai nepriklausomai nuo jų amžiaus. Ši liga panašiu dažnumu diagnozuota berniukams (56,7 proc.) ir vyrams (53,3 proc.), kuriems gydyta fimozė. Tik fimozės tipas turėjo statistiškai reikšmingą įtaką sklerozinės ir atrofinės kerpligės bei kitų odos ligų dažnumui.

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