Lichen sclerosus amongst Prepubertal Nepalese Boys with Phimosis: A Prospective Observational Study

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ABSTRACT

Background

Lichen sclerosus (Ls), a chronic lymphocyte-mediated scarring dermatosis of possibly autoimmune origin typically affects the foreskin and glans penis in boys. With an elusive etiology and multifactorial causation, it has an incidence that is globally variable. Nevertheless, a resultant genital discoloration and recurrent balanoposthitis can seriously impact urinary functions in boys in addition to the risks of malignancy. Early identification is imperative for successful control and prevention of complications.

Objective

To study the profile of Nepalese boys with phimosis, determine the prevalence of Lichen sclerosus and assess the outcomes of treatment modalities.

Method

A prospective observational study was performed in boys who underwent treatment for phimosis between 1st September 2024 to 28th February 2026. Demographical profile, clinical findings, surgical details and outcomes were studied.

Result

A total of 200 boys were evaluated for symptomatic non-retractable foreskins at a mean age of 8 years (range: 4-16 years) and a mean symptom duration of 17 months. Of them, 139 were clinically diagnosed to have Physiological Phimosis (PhP) with most of them categorized as Kikiro's Grade I-II. They underwent Foreskin Adhesiolysis (FA) as a conservative treatment along with local application of ultra potent steroid cream for 2 months and foreskin hygiene maintenance thereafter. At the end of 3 months, they all had complete resolution of symptoms and no recurrence. The remaining 61 were diagnosed to have Pathological Phimosis (PaP) with most of them categorized as Kikiro's Grade III-IV and underwent Sleeve circumcision. Of them, 33 had histological evidence of lichen sclerosus while the rest 28 had non-specific chronic inflammation (non-Ls). The overall prevalence of lichen sclerosus was found to be 16.5% (33/200). Boys with lichen sclerosus were also treated with steroid cream as an adjuvant therapy for 2 months and followed up for a median period of 10 months while the rest (non-Ls) were followed up without adjuvant treatment. No serious complications were noted.

Conclusion

A vast majority of Nepalese boys (69.5%) with symptomatic phimosis were responsive to conservative measures with only a third needing operative management. Of these, lichen sclerosus was the underlying pathological cause in 16.5%.

KEY WORDS

Balanitis xerotica obliterans, Circumcision, Lichen sclerosus, Phimosis

INTRODUCTION

Lichen sclerosus (Ls) formerly known as Balanitis Xerotica Obliterans (BXO) is a chronic, inflammatory, lymphocyte-mediated dermatosis that causes scarring and primarily affects the foreskin and glans penis.[1] The condition is complex involving a variety of environmental, physiological and genetic factors and the etiology is largely known to be obscure although an autoimmune phenomenon is frequently suggested. When left untreated, Ls can progress to PaP and urethral strictures.[1] Pathological phimosis, again, is characterized by spontaneous adhesions between the inner foreskin and the glans often mistaken with PhP that typically resolves within the first few years of life.

Systematic studies suggest Ls to be responsible for 10% to 40% of all surgically treated phimoses of pathological variety, with the incidence varying widely between 10% to 95%.[2] The incidence of Ls, however is lower in males than females. In males, the condition exhibits a bimodal occurrence, peaking in young boys and later again in adulthood.[1] It leads to discoloration of the penile skin and recurrent balanoposthitis, which can severely impact sexual and urinary functions. Additionally, men with Ls are at increased risk for malignant transformation, particularly penile squamous cell carcinoma. The following clinical characters may help in the diagnosis of Ls: Symptoms: 1. Itching 2. Pain and sensation of soreness 3. Skin fragility 4. Impeded urinary flow. Signs:1. Pale ivory-colored lesions with skin atrophy 2. Purpura/ecchymosis 3. Hyperkeratosis 4. Sclerosis 5. Fissures 6. Ulcers and erosions 7. Scarring of varying degrees. Histopathological confirmation is necessary to confirm the diagnosis.[3]

Despite its clinical significance, the prevalence of Ls among boys with phimosis is not well-studied, especially in Nepal. This gap in the region-specific epidemiological data can lead to underdiagnosis and mistreatment highlighting the need for focused diagnostic and therapeutic approaches for Ls induced phimosis. Understanding the prevalence of Ls in boys presenting with phimosis is crucial for several reasons. Firstly, an accurate diagnosis can lead to more individualized and effective treatment plan, preventing unnecessary surgeries and reducing patient morbidity. Secondly, improved diagnostic precision and awareness can facilitate early intervention, potentially preventing severe complications such as extensive scarring and long-term urological problems.

This study aims to provide valuable epidemiological data to update health policies and clinical guidelines in Nepal, thereby improving resource allocation and training for healthcare providers. The ultimate goal is to enhance clinical outcomes for boys with phimosis and to lay the groundwork for further research and advancements in the treatment of Ls.

METHODS

A prospective observational study was performed in the Department of Pediatric Surgery, Kathmandu Medical College and Teaching Hospital, Sinamangal, Kathmandu, Nepal between 2024 and 2026. Convenience sampling was done and the sample size was calculated using the following formula:

$n=[Z^2_{1-\alpha/2} P(1-p)] /d^2$

p=Expected proportion

d=Absolute precision

1-α/2=Desired Confidence level

Based on the study provided in the reference, the incidence of Ls was 22/69 = 32% (95% CI: 21.5% - 44.3%).[4] The sample size calculation was based on the LS incidence at 30% with the precision level of 8.5% and 95% confidence limit; The calculated sample size was 115 but in view of overwhelming numbers of patient attendance, a total of 200 boys were included.

The relevant medical records of boys between 4-16 years age undergoing evaluation and treatment of phimosis were reviewed. Parents were interviewed to gather demographic data, clinical history, etiological factors, treatment outcome and follow up details which were recorded in a pre-designed proforma.

Ethical approval was obtained from the Institutional Review Committee: IRC Min No. 16102024/09 and informed consent was taken from parents before recruiting the patients.

The study included the following criteria

Inclusion criteria

1. Boys presenting with phimosis between 4-16 years age.

Exclusion criteria:

1. Boys under 4 years age since most of the foreskin adhesions are expected to spontaneously resolve by the age of 4 years (Mostly PhP).

2. Boys with a known dermatological condition that also involves foreskin or penis for example Lichen planus, Vitiligo etc.

3. Boys undergoing ritual circumcision for religious indications.

4. Boys undergoing circumcision as a part of penile reconstructive surgery example hypospadias repair or prophylaxis for Urinary Tract Infections.

Detailed history was taken along with physical examinations to diagnose and clinically categorize phimosis. At clinical examination, the severity of phimosis was graded using the Kikiro's Classification as shown in figure 1.

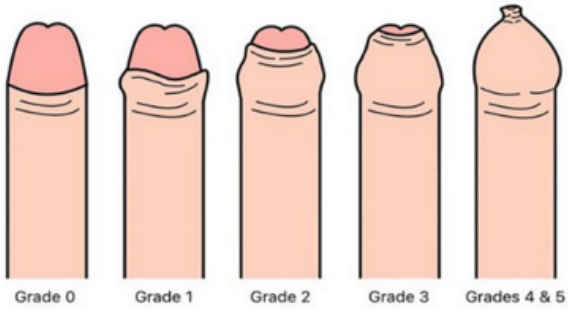

Figure 1. Kikiro's Severity Grading for Phimosis.[5]

All the circumcised specimens were subjected to histopathological examinations to confirm Ls. Information pertaining to demographic data, clinical findings and possible etiological factors were recorded.

Data was entered using EPIDATA software and screened for outliers and extreme values using Box-Cox plot and histogram (for shape of the distribution). Summary statistics was used for reporting demographic and clinical characteristics. T-test was used for the analysis of continuous data with Normal distribution and Mann-Whitney U test for data with non-Normal distribution with groups. Chi-square test was performed for categorical variables with groups. Differences were considered significant at $p < 0.05$. All the statistical analyses were performed using "SAS 9.4" or "R" software. The outcomes were evaluated in terms of patient demography, clinical profile and symptomatic improvement.

RESULTS

A total of 200 boys were studied for symptomatic non-retractable foreskins at a mean age of 8 years (range: 4-15 years) and a mean symptom duration of 17 months.

Clinical Profile

A. Symptom Analysis

1. Local symptoms (Pain, Itchiness, Erythema, Oedema, Irritation, Pus discharge):

Local symptoms as a cause for presentation was seen in 67/200 boys with phimosis of whom 32 (47.8%) were

eventually diagnosed to have Ls as shown in figure 2. Local symptoms, therefore as a presenting feature of Ls was found to be statistically insignificant. ($p = 0.81$).

2. Lower Urinary Tract Symptoms (Urgency, frequency, dysuria, hesitancy or intermittency):

LUTS were found in 184 (92%) boys with phimosis of which 28 (15.2%) were found to have Ls on histopathology. LUTS as a symptom to identify Ls was found to be statistically significant ($p < 0.001$).

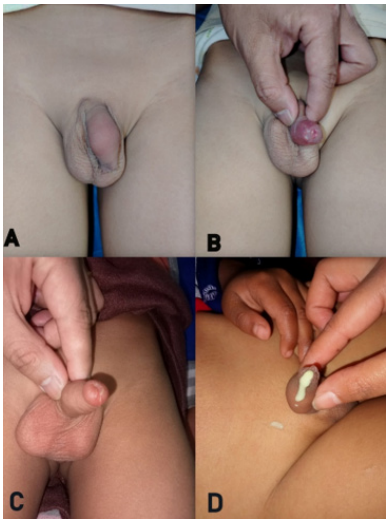

Figure 2. Clinical presentations of Phimosis and its local complications. (A, B) Acute Balanoposthitis (C) Foreskin Oedema. (D) Purulent Discharge.

3. Foreskin ballooning during micturition:

Foreskin ballooning during urination was found in 27 boys with phimosis of which 2 had PhP and 25 boys had PaP. Of 25 (92.6%) with PaP, only 14 (56%) were histologically proven to have Ls. Therefore, foreskin ballooning as a symptom to identify Ls was not statistically significant. ($p=0.69$).

4. Poor Urinary Stream:

Poor urinary stream was a feature complained by 38 (19%) boys with phimosis, of which only 16 (42.1%) had histopathological evidence of Ls. Poor urinary stream as a symptom to identify Ls did not reach values of statistical significance ($p=0.42$).

5. Past history of Urinary Tract Infections:

Past UTI was found in only 1 boy with PaP. Histopathology of his foreskin showed chronic inflammation and no Ls. Therefore, UTI as a finding in the past history was not an association with Ls.

6. Past history of recurrent balanoposthitis (RBP):

Recurrent Balanoposthitis was found in 54 (27%) boys of whom 22 (41%) had PhP and 32 (59%) had PaP.

Although RBP occurred more frequently in boys with PaP, the absolute difference in proportions was 18% (95% CI: - 0.6% to 36.6%, $p = 0.06$). This difference did not reach conventional statistical significance; however, the magnitude and direction of the effect could suggest a potential clinical relevance.

Of 32 boys with PaP and RBP, 18 (56%) had histologically confirmed Ls, while 14 (44%) did not. Conversely, among the 33 boys with Ls overall, 15 did not present with RBP. The absolute difference in proportions of Ls between boys with and without RBP was 13% (95% CI: −11.2% to 37.3%, $p = 0.30$), indicating no statistically significant association between RBP and Ls.

B. Analysis of physical findings

Categorization and severity of Phimosis

Those with pliable and supple foreskin edges that pout out easily with gentle retraction exposing the urethral meatus were categorized as PhP. Of 200, 139 boys had PhP. Most of these boys had Kikiro's grade I-II. The remaining 61/200 boys with findings of scarred unyielding foreskin openings with or without depigmentation were categorized as PaP. These boys had mostly Kikiro's grade III-IV as shown in in table 1 an attempted, even gentle retraction in these, would be anticipated to cause fissuring and tearing of the foreskin edge.

Table 1. Distribution of phimosis cases according to Kikiro's grade and etiological category.

Kikiro's	PhP	LS	Non-LS
Grade 1	37	0	0
Grade 2	93	0	1
Grade 3	9	15	18
Grade 4	0	18	9
	139	33	28

In a few boys, attempted retraction would demonstrate a pointed proboscis like appearance of foreskin edge as shown in figure 3 F.

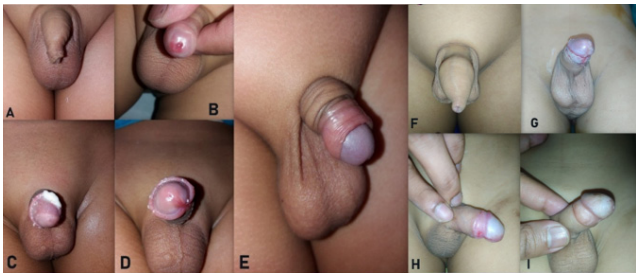

Figure 3. Physiological Phimosis (A) At initial assessment (B) Gentle retraction showing pouting and supple foreskin edges with exposure of urethral meatus (Kikiro's Grade II) (C) Exposure of smegma pearls at FA. (D) Complete retraction (E) Maintenance of foreskin hygiene with symptom resolution at 3 months follow up. And pathological Phimosis (F) Pointing proboscis like tip of foreskin (Kikiro's Grade IV) (G) At circumcision (H) At 1 week (I) At 3 months follow up.

Foreskin changes

The foreskin changes noted on physical examination were broadly classified into 3 major types:

1. Scarring 2. Depigmentation and 3. Scarring and depigmentation both as shown in figure 4 and table 2.

Foreskin changes were found in 44 boys with PaP and none with PhP. Of 44 boys with PaP, 29 (66%) were histologically proven to have Ls.

Management

By and large, in the index study, the course of management seems to have depended considerably upon the examination findings rather than the clinical history or symptoms alone.

Table 2. Foreskin Changes on examination

Foreskin Changes	numbers
Physiological Phimosis-Absent	**139**
Pathological Phimosis-Absent	**17**
Pathological Phimosis-Present	**44**
Scarring	**24**
Non-Ls	10
Ls	14 (58.3%)
Depigmentation	**15**
Non-Ls	5
Ls	10 (66.6%)
Scarring and Depigmentation	**5**
Non-Ls	0
Ls	5 (100%)

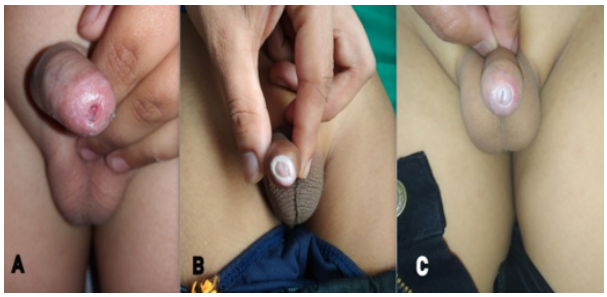

Figure 4. Physical findings with PaP (A) Scarring, (B) Depigmentation and (C) Scarring and depigmentation

The boys with PhP, after a watchful period of 4 years age, (by when most of the preputial non-separation is expected to resolve) underwent FA as a day case. This was followed by local application of 0.05% Clobetasol Propionate cream that was continued for a total of 2 months as per the BAD (The British Association of Dermatologists) guidelines.[6] During this period, no adverse events were recorded except in 2/139 boys of whom 1 presented for paraphimosis following overzealous foreskin retraction at home. This was amenable to repositioning in the emergency department without further problems as shown in figure 5 and 1 had presented for acute urinary retention that resolved with supportive measures.

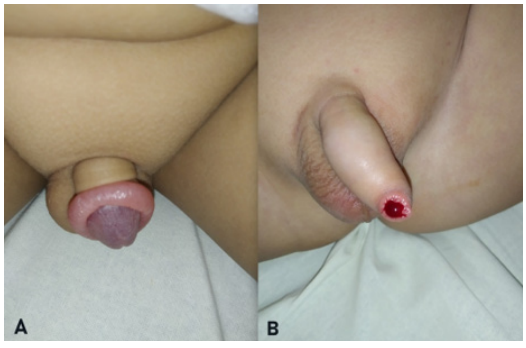

Figure 5. (A) Paraphimosis following overzealous retraction as an emergency complication of Foreskin Adhesiolysis (B). Immediate repositioning in the emergency room.

Sixty-one boys with PaP underwent Sleeve circumcision. Of them, 33 had histological evidence of Ls adding up to an overall prevalence of 33/200 (16.5%). The rest 28 were found to have non-specific chronic inflammation (non-LS). Those who were diagnosed to have Ls with glandular involvement at circumcision were advised topical application of 0.05% Clobetasol Propionate cream and those with meatal involvement were advised intra urethral instillation of the same using an infant feeding tube 8Fr for a period of 2 months. This was in order to keep the local disease under control and urethral calibration to prevent meatal stenosis and urethral strictures. Those without evidence of Ls on histopathology were advised regular maintenance of foreskin hygiene. There were no reported complications following Sleeve circumcision.

Follow up

The boys were followed up for a median duration of 10 months. At the end of 3 months, all the boys with PhP undergoing FA had supple and fully retractable foreskins with complete resolution of symptoms. There was no event of recurrence. Therefore, based on current experience and in coherence with published literature we concluded that FA is a safe and conservative method in management of PhP.[7] Also all the boys with PaP undergoing circumcision remained symptom free including those with histological evidence of Ls. No meatal stenosis or urethral stricture was observed during the available follow-up period.

DISCUSSIONS

Phimosis is a common reason for boys to visit paediatric surgical facility with or without associated complications. With increasing awareness among the parents and paediatricians, the referral rates have increased, although the number of those presenting with associated complications are also high. Phimosis primarily denotes a condition wherein the foreskin becomes unretractable beyond the coronal sulcus, a condition estimated to be in almost 96% of all the newborns, a congenital or physiological finding.

This, however, falls spontaneously to 50% by infancy, 10% by toddlerhood and 1% by 16 years age.[8] Therefore, self-limiting as it is understood, this condition commonly affects the pre-pubescent boys and is synonymously called foreskin non-separation or PhP.[9]

Similarly, a closely related entity exists called PaP that distinctly follows a unique course causing profound health effects and is often linked to a dermatological lesion called Ls or formerly BXO.[10,11]

Lichen sclerosus could be one of the pathologies in prepubertal boys with phimosis who do not respond to the usual time frame (from birth till 4 years age) of close observations apart from other conditions like chronic recurrent balanoposthitis or scarring secondary to trauma that usually follows premature manipulations.

The term Ls was first described by Hallopeau in 1887 under the name “lichen plan atrophique” that included a series of extragenital cases.[2] In 1928, Stühmer used the term BXO describing the male genital form of the disease. The term BXO was eventually replaced with Ls in 1976 based on the recommendations of International Society for the study of Vulvovaginal Diseases (ISSVD) along with elimination of the suffix “et atrophicus” in the absence of histological evidence of atrophy.[12]

The global data suggests that Ls requires a detailed evaluation and a protracted course in management owing to its chronicity and recurrent inflammation that renders the foreskin cicatrized with consequent meatal stenosis, urethral strictures or even malignancy in older subjects.[13,14]

With a varied incidence worldwide and across the populations or ethnic groups, the prevalence of Ls among Nepalese boys with phimosis remains poorly studied or understood, raising the concerns about potential underdiagnosis or mistreatment. A high index of suspicion in the background of clinical symptoms, associated typical findings on physical examination and supporting evidence on histopathology of circumcised specimens is diagnostic in most boys. The diagnosis, in the current series seems to have relied greatly upon the examination findings rather than the clinical history alone because LUTS was the sole symptom of significance that was identified to arouse the suspicion of Ls. Additionally, skin changes on examination were also found to be statistically significant and diagnostically attributable (p=0.05).

A very small number of boys 12% (4/33) had no macroscopic skin changes to suspect Ls although the eventual histopathology of the circumcised specimen confirmed it. On the other hand, those with scarring as well as depigmentation of the foreskin had a very high likelihood of getting Ls diagnosed on histopathology. The largest number of boys with LS belonged to the Tamang ethnic group as shown in table 3.

Table 3. Distribution of Ls according to the ethnicity of Nepalese boys.

Ethnic Community	Numbers
Brahmin	3
Thakuri	3
Chhetri	3
Newar	3
Magar	3
Gurung	4
Tamang	9
Others	5
Total	33

The current recommendation for managing boys with genital lichen sclerosus is topical application of ultra-potent corticosteroids like Clobetasol Propionate 0.05% combined with or followed by circumcision if the phimosis is cicatrized and doesn't allow the local application of the same.[15,16] A few studies have recommended circumcision as the first line treatment with topical corticosteroids and immunosuppressants as adjuvant therapy for long term remission with success rates of up to 60-70% with betamethasone and 81% with intralesional triamcinolone or tacrolimus over a follow up period of 1 month. We preferred using clobetasol since it was easily available, affordable, had negligible adverse effects and showed consistently good results in terms of symptom resolution.

Whatever, the choice of adjuvant therapy, long term follow up is paramount to diagnose relapses and institute appropriate treatment. In the median follow up period of 10 months no identifiable complications of Ls were noted in the current series. Likewise, sending the circumcised foreskin samples for histopathological review is as important as maintaining the clinical index of suspicion in order to pick up the occult cases.[17]

This study attempts to bring out the information on pediatric phimosis in Nepalese boys and the prevalence of LS on which no previous data exists. However, it suffers the following limitations namely: 1. Selection bias, 2. Limited sample size 3. Lack of blinding and 4. Single center data. Also, that the true prevalence of Ls is difficult to ascertain since that would require tissue sampling for all the prepubertal boys which is impracticable and unjustifiable in the absence of symptoms. Furthermore, etiological information is deficient although practically the management remains unaltered.

CONCLUSION

A vast majority of Nepalese boys with symptomatic phimosis are responsive to conservative measures while a third (30.5%) may need operative management. Of these, LS may be the underlying cause in 16.5%. A vigilant approach in diagnosis and follow up can help in avoiding the known urological complications and morbidities.

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