# Lichen Sclerosus and Isolated Bulbar Urethral Stricture Disease

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**Purpose:** Lichen sclerosus is a chronic inflammatory genital skin condition that can cause destructive urethral scarring. To our knowledge no prior study has described lichen sclerosus in isolated bulbar urethral stricture segments without progressive disease originating from the penile urethra. We report the incidence of lichen sclerosus in isolated bulbar urethral stricture segments.

**Materials and Methods:** We retrospectively reviewed the records of 70 patients after urethroplasty for isolated bulbar stricture disease was performed from 2007 to 2013. Stricture specimens were re-reviewed by a single uropathologist. Cases were evaluated using common histological features of lichen sclerosus, including hyperkeratosis or epithelial atrophy, basal cell vacuolar degeneration, lichenoid lymphocytic infiltrate and superepithelial sclerosis.

**Results:** Average patient age was 46.5 years (range 19 to 77) and average stricture length was 3.5 cm (range 1 to 7). Of the patients 51 (73.0%) underwent excision and primary anastomosis, and 19 (27.1%) underwent buccal mucosal onlay. In 6 patients (8.6%) stricture recurred during a median followup of 22 months (IQR 14, 44). Three of those patients had lichen sclerosus. Initial pathology assessment revealed lichen sclerosus in 5 patients (7.1%, 95% CI 1.0–13.3). On re-review of specimens using pathology criteria specific to lichen sclerosus 31 patients (44.3%, 95% CI 32.4–56.2) showed pathology findings highly suggestive of (13) or diagnostic for (18) lichen sclerosus ($p = 0.0001$). On pathological re-review lichen sclerosus was associated with recurrent stricture.

**Conclusions:** On re-review of surgical specimens we noted a significant incidence of lichen sclerosus in isolated bulbar strictures in men undergoing urethroplasty. The incidence of lichen sclerosus may be higher than reported in isolated bulbar urethral segments without evidence of distal to proximal progressive urethral disease.

**Key Words:** urethra; constriction, pathologic; lichen sclerosus et atrophicus; incidental findings; anatomy

**Abbreviations and Acronyms**

EPA = end primary anastomosis

LS = lichen sclerosus

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LICHEN sclerosus is a chronic inflammatory skin condition commonly involving the anogenital area.[1] LS can cause destructive genitourinary scarring and it confers an increased risk of penile squamous cell carcinoma although a causal relationship remains to be established.[2] In men with urethral stricture the incidence of urethral LS is reported to be between 4.8% and 14%.[3] In contrast to urethral stricture of other etiologies, LS related urethral strictures have a higher rate of treatment related morbidity and disease recurrence, which necessitates accurate

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diagnosis and staging to plan appropriate management.[4] While LS treatment limited to the glans and urethral meatus has acceptable outcomes with minimally invasive approaches such as circumcision and meatotomy, more extensive or panurethral disease warrants more invasive therapy, including 1-stage oral graft urethroplasty vs staged urethroplasty with nongenital skin or oral mucosa.[5–7]

Urethral LS is thought to originate at the meatus and/or preputial skin with potential disease progression proximally along the urethra.[7] The progressive proximal spread of LS is believed to result from a combination of embryological factors with disease extension through urethral glands or transformation of disease secondary to high pressure voiding and urethral inflammation.[8,9] To our knowledge no prior group has reported LS in isolated bulbar urethral stricture segments without progressive disease extending from the penile urethra or glans.

We report the incidence of LS in isolated bulbar urethral stricture segments on re-review of bulbar urethroplasty specimens. We hypothesized that the incidence of LS involvement in isolated bulbar urethral stricture disease has been underreported to date.

## MATERIALS AND METHODS

We performed an institutional review board approved, retrospective study of patients who underwent urethroplasty for isolated bulbar stricture disease at a single institution between 2007 and 2013. Isolated bulbar urethral stricture was defined based on intraoperative findings with stricture disease limited to the urethra proximal to the penoscrotal junction and distal to the sphincter. Patients with less than 1 year of followup, history of LS involvement of the more distal penile urethra and meatus or a history of urethral trauma (ie straddle injury, urethral disruption or tear, pelvic fracture) were excluded from analysis. The final study cohort included 70 patients. Patient data were retrospectively gathered from electronic medical records. Demographic information, etiology, comorbidities, smoking history, prior procedures, surgical intervention, outcomes and pathology findings were reviewed based on inpatient and outpatient history, and physical, problem list and progress notes. Initial surgical pathology results of the excised stricture were reviewed from the electronic medical records and categorized according to the original pathological diagnosis.

At our institution we routinely encounter and excise the stricture during EPA or a small sample of scar tissue at the cut edges of the urethrotomy during onlay urethroplasty and send it for pathological analysis. Stricture specimens at urethroplasty were retrospectively reviewed by a single uropathologist (XJY) blinded to patient history and prior histopathological diagnoses. Slides stained with hematoxylin and eosin were requested and obtained. Cases were evaluated using 5 common histological features in LS, including 1) hyperkeratosis, 2) thinning or thickening of the epidermis or squamous epithelium, 3) attenuation or vacuolar degeneration of the basal cell layer, 4) subepithelial hyalinization/dermal collagen homogenization and 5) lichenoid lymphocytic or plasmacytic infiltrate.[10,11] While each individual finding is suggestive of LS, the combination of these pathological features is the basis of the pathological diagnosis of LS.[12] There is no gold standard of objective criteria for systematically evaluating LS. Recently new diagnostic pathological criteria were developed for LS in which cases with 0 or 1 features were deemed negative for LS, cases with 2 features were deemed suggestive of LS and cases with 3 or more features were deemed diagnostic for LS.[13]

Using the Student t-test we compared the incidence of LS on original pathology results based on review of the medical record pathology report and on specimen re-review categorized as pathology findings suggestive or diagnostic of LS based on the described scheme.[13] Characteristics were compared between patients with vs without LS on re-review of pathology slides using the Mann-Whitney U and Fisher exact tests. Recurrence was defined by patient reported urinary symptoms confirmed by endoscopic diagnosis of recurrent urethral stricture 16Fr or less in caliber. The recurrence rate was compared between patients with and without LS on re-review using the chi-square test. For all statistical analyses $p < 0.05$ was considered statistically significant. Analysis was done with SPSS®, version 21.

## RESULTS

A total of 70 men with an average age of 46.5 years (range 19 to 77) underwent bulbar urethroplasty for isolated bulbar stricture disease with no history of urethral trauma and at least 1 year of followup. Average urethral stricture length was 3.5 cm (range 1 to 7). Ten patients (14.2%) had a smoking history and 43 (61.4%) had undergone prior intervention for stricture, including urethroplasty in 3 (4.3%) and hypospadias repair related urethral complications in 5 (7.1%). EPA was performed in 51 patients (73.0%), and 18 (25.7%) and 1 (1.4%) underwent dorsal and ventral onlay of buccal mucosal graft, respectively.

Initial surgical pathology reports mentioned LS involvement in 5 patients (7.1%, 95% CI 1.0–13.3) with findings suggestive of LS in 1 (1.4%) and a LS diagnosis in 4 (5.7%). On re-review of pathology slides in blinded fashion by a single, specialized uropathologist using the previously described diagnostic criteria[13] 31 patients (44.3%, 95% CI 32.4–56.2) fulfilled pathology criteria for LS. Of these 31 patients pathology findings were highly suggestive for LS in 13 (18.6%) and diagnostic for LS in 18 (25.7%) (fig. 1). Figure 2 shows representative sections highlighting characteristic histopathological findings of LS.

The incidence of LS on the initial pathology report compared to re-review differed significantly