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Incidence, Causes, and Complications of Urethral Stricture Disease

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Abstract

Urethral stricture refers to any narrowing of the urethra, independent of whether it affects the flow of urine out of the bladder. Urethral stricture occurs mainly in men, and the disease is a common and challenging urologic condition. The real incidence of male urethral stricture disease remains unknown, and worldwide differences have been observed based on geography, population, and mean country income. The number of patients with urethral strictures climbs sharply after 55 yr of age in the Western population. The main causes of urethral strictures consist of congenital anomalies of the mucosal membrane, infection, traumatic scarring after blunt pelviperineal trauma, urethral instrumentation, catheterisation, hypospadias failures, and inflammatory disease of the corpus spongiosum caused by lichen sclerosus. Idiopathic and iatrogenic aetiology are the main causes of urethral strictures in developed countries. Trauma remains the most common aetiology of urethral strictures in developing and Third World countries. About 90% of men with urethral stricture disease present complications. The management of urethral stricture disease may result in complications. The main direct complications of urethral surgery are bleeding, infection, incontinence, impotence, and stricture recurrence.

Patient summary: Urethral stricture is a common urologic disease affecting men. Urethral strictures result in lower urinary tract symptoms and affect quality of life. Perineal trauma, long-term urethral catheterisation, urologic instrumentation, chronic inflammatory disorders such as lichen sclerosis, and sexually transmitted diseases are typical causes.

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1. Introduction

Urethral stricture disease occurs mainly in men and is a common and challenging urologic condition at any age [1]. Clinically, patients suffer from voiding and storage symptoms that greatly affect quality of life [2]. Incidence and epidemiology differ worldwide based on geography, population, and mean country income. Both the principal causes and treatments of urethral strictures have changed over time. The majority of urologists still routinely use internal urethrotomy or dilatation, although research has shown no definitive satisfactory outcome following this approach [3–6]. Endoscopic treatment can transiently improve urinary flow; however, open urethroplasty is now regarded as the gold standard treatment for urethral strictures. Oral mucosa is currently considered the most

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widespread substitute material for urethral reconstructive surgery [7]. Nevertheless, according to some authors, OM harvesting is associated with early and long-term oral complications or sequelae, such as pain, perioral numbness, tightness of the mouth, persistent difficulty with mouth opening, change in salivary function, and motor deficits [8–10]. Moreover, some authors have suggested that oral mucosa could be a potential source of human papillomavirus (HPV) transmission [11]. The most common complication of open urethral stricture surgery remains stricture recurrence. Although very discreet bands or ringlike strictures can be successfully treated with a simple incision, failed repairs are often troublesome because subsequent repairs are complex, and the reconstructive surgical options are limited.

Understanding the epidemiology of urethral strictures helps identify risk factors and causes of disease occurrence or progression that may be amenable to preventive measures to decrease disease severity, the need for intervention, and health care expenditure. The aim of this paper is to report the prevalence and incidence of urethral strictures, to investigate the causes, and to provide an overview of the complications of urethral disease and urethral reconstruction.

2. Incidence

The real incidence of male urethral stricture disease remains unknown. In 2007, Santucci et al used 10 sets of public and private health care databases to examine disease rates in the United States [12]. Data from a Veterans Administration Hospitals database showed that the raw rate of urethral stricture diagnosis was 274 per 100 000 in 1998. In 2003, there was a decrease to 193 per 100 000, although the number increased to 627 per 100 000 among veterans who were also Medicare patients and thus were usually aged >65 yr. The number of patients with urethral strictures climbed sharply after 55 yr of age, and the authors concluded that the disease might be highly prevalent in elderly populations. For patients aged >65 yr, the incidence of stricture disease was of 9.0 per 100 000 in 2001 compared with 5.8 per 100 000 in patients aged <65 yr. In the United States, the hospitalisation rate trend, recorded at the beginning of the 21st century, decreased at a rate of 3.8 per 100 000 in 2000, which is 50% less than in 1994. Racial differences were observed. Data indicated that black Americans have higher stricture rates than white Americans. Finally, the incidence of stricture was 2.6-fold more common at urban hospitals. This could reflect either a true increase in incidence in urban settings or, more simply, the tendency to refer patients with urethral strictures to urban medical centres for definitive treatment.

According to the International Consultation on Urethral Strictures, which was held in Morocco in 2010, there are no direct measures of the true incidence of urethral stricture disease (level of evidence 3 and grade of recommendation not applicable) [13]. Compared with US populations, the authors found that the men were younger, with a mean age of 45.1 yr at urethral stricture presentation. Patients with bulbar strictures tended to be younger than patients with strictures in any other part of the urethra. Stein et al looked retrospectively at 2589 patients who underwent urethroplasty procedures from 2000 to 2011 in the United States (n = 228), Italy (n = 1646), and India (n = 715) [14]. US and Italian populations had higher proportions of penile strictures, largely owing to more iatrogenic strictures and, in particular, failed hypospadias repairs, whereas Indians had a higher proportion of posterior urethral strictures (mainly post-traumatic) and lichen sclerosus (LS)–associated strictures. Fenton et al retrospectively analysed 175 patients with anterior urethral strictures in the US state of Texas and in Honduras and identified a mean stricture length of 4.1 cm, with the bulbar urethra being the most common site, constituting 52% of the cases [3]. Barbagli et al recently investigated the incidence of pelvic fracture urethral injury (PFUI) in the Italian population and found that children and adolescents, compared with adults, did not often sustain PFUI (15% vs 85%) [15]. The authors speculated that this was because young people travel in the safety of cars driven by their parents; they are not pedestrians or on bicycles or motorcycles in traffic. In a comparative study of the spectrum of PFUI between India and Italy, Kulkarni et al reported that in India, 9.4% of patients were children and 16.2% were adolescents, whereas in Italy, only 1.5% were children and 6.5% adolescents [16]. Pratap and colleagues found that in a small sample of Nepalese patients with PFUI, 48% were prepubescent boys [17]. Zhang and coworkers reported similar incidence of posterior urethral disease in China [18]. No different figures were observed in Egypt by Koraitim [19].

3. Causes

Urethral strictures involving the anterior urethra can stem from several causes: congenital anomalies of the mucosal membrane, infection, traumatic scarring after blunt perineal trauma, urethral instrumentation, catheterisation, hypospadias failures, inflammatory disease of the corpus spongiosum caused by LS, or balanitis xerotica obliterans.

Studies focusing specifically on stricture aetiology are scarce. In 1981, De Sy et al presented a review of the aetiology of urethral strictures [20]. They surveyed 20 articles published between 1961 and 1981 with a total of 1549 patients. The most common cause of urethral strictures at that time was infection (urethritis in 40% of cases). Infection-induced strictures that were associated with LS were reported as *inflammatory strictures* and were the third leading cause of stricture disease after idiopathic (31.9%) and iatrogenic causes (31.9%), with a rate of 26.6%. When the authors split the data into two time periods (1969–1975 and 1976–1981), they found a considerable shift towards iatrogenic causes of urethral strictures in the second time interval. The incidence of postinflammatory strictures has decreased dramatically due to prevention campaigns for sexually transmitted diseases, public awareness of these diseases (not only for gonorrhoea, but especially for HIV), and rapid and adequate antibiotic treatment for urethritis. Such data are confirmed by Lumen et al, who reported that urethritis was the cause of