A MODERN VIEW ON THE STATE OF PROBLEMS OF URETHRAL STRICTURES

(literature review)

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Key words: urethral stricture, cystoscopy, stricture disease.
Annotation: According to the definition of the International Urological Council of Leading Experts of the International Society of Urology (ISLSTO, 2014), urethral stricture is understood as a pathological narrowing of any part of the urethra, surrounded by the spongy body, as a result of the development of spongiofibrosis [1]. In our country, the most cited definition is M.I. Kogan: urethral stricture is a polyetiological obstructive lesion of the urethra, accompanied by symptoms from the lower urinary tract [2]. Recently, due to the peculiarities of the pathogenesis and the tendency of this disease to a recurrent course, many authors use the term stricture disease as a definition, which is considered equal along with urethral stricture.

Urethral stricture is a common and complex urological pathology. The incidence has been steadily increasing in recent decades, varies from 0.6% to 0.9% in the population and depends on the age composition of patients. At the same time, extended and subtotal lesions are diagnosed in 15-18% of cases of urethral stricture disease [3-5].

According to a study by R. San-Shsa et al. in the United States, about 1,500,000 patients a year see an outpatient urologist and an average of 5,000 patients receive specialized inpatient care. The total cost of treating these patients in 2000 was $191 million. At the same time, the average individual costs per patient with stricture disease are three times higher than those with other urological pathologies (10,472 vs. 3,713 US dollars) [6].

Risk factors for the development of urethral stricture traditionally include: advanced age, sexually transmitted infections, lichensclerosis, complications after radical or radiation treatment of prostate cancer [1, 7].

In a retrospective study et al. analyzed the localization of strictures in a large group of 1,439 patients, the vast majority were diagnosed with stricture of the anterior urethra (92.2%), of which 46.9% of strictures were in the bulbous urethra, and 30.5% in the penis, penile and bulbous - 9.9%, the entire urethra - 4.9% [5].

Etiology. To date, inflammatory strictures are more commonly associated with lichen sclerosis and non-gonococcal urethritis. In countries with a high level of medical development, strictures of iatrogenic etiology are most common. The reason for the increase in the incidence, obviously, is the widespread use of "minimally invasive" transurethral endoscopic operations. Catheterization, cystoscopy, especially when the diameter of the instrument does not correspond to the lumen of the urethra, in addition to damage to the mucous membrane, contribute to the formation of zones of compression and ischemia of the urethra. The occurrence of idiopathic strictures, according to D.E. Andrich and A.R. Mundy, in some cases is the result of asymptomatic minor injuries or urethritis that were not recognized at an earlier date [4]. The SIU/ICUD guidelines published in 2014 clarified the concepts and definitions related to urethral constrictions. Thus, the terms stricture and stricture disease refer only to the anterior urethra surrounded by spongy tissue. Narrowing of the posterior urethra that is not associated with a pelvic fracture should be referred to as stenosis. The correct term is also stenosis of the vesicourethral anastomosis after prostatectomy. Thus, the term "posterior urethral stricture" or

"bladder neck stricture" is currently not recommended for use [1]. The pathogenesis of urethral stricture is based on damage to the epithelium of the urethra or the adjacent part of the spongiform body, followed by squamous metaplasia, changes in the extracellular matrix of the spongy tissue of the urethra, and the development of spongiofibrosis [8, 9]. The normal connective tissue of the wall of the urethra is replaced by dense fibrous tissue with a decrease in the ratio of collagen types I and III. These changes lead to a decrease in the proportion of smooth muscle tissue and collagen in the spongy body and, as a result, to a decrease in the synthesis of nitric oxide in the area of stricture, tissue hypoxia and scar progression [10]. With the development and introduction into clinical practice of ultrasound research methods in 1988]". Also in the foreign literature, the clinical gradation of G. Barbagli et al., based on the etiology of the disease, is popular [12]. In our country, the most famous classification is M.I. Kogan Nevertheless, today there is no single and generally accepted classification of stricture disease of the urethra, which creates certain problems for clinicians. Symptoms depend on the degree of narrowing of the lumen of the urethra. Clinically significant manifestations manifest when the narrowing of the lumen of the urethra is less than 3-5 mm. Such patients most often complain of a weak or thin stream of urine, straining to urinate, a feeling of incomplete emptying of the bladder, frequent urination or urinary retention, as well as periodic pain in the urethra during and after micturition. A history may include recurrent urinary tract infections, prostatitis, epididymitis, hematuria, microcystis, bladder stones, or bladder diverticula. The course of stricture disease can be complicated by paraurethral abscesses and fistulas [13, 14]. In modern literature, undeservedly little attention is paid to the problems of preoperative diagnosis and operational planning. The modern standard for examining a patient with urethral stricture, in addition to routine methods of urological screening, includes retrograde urethrography in combination with voiding cystourethrography as a basic diagnostic method. This technique allows you to determine the location and extent of the stricture. Despite its high sensitivity (75-100%) and specificity (72-97%), urethrography has two significant drawbacks. First, with the standard oblique positioning of the patient, projection distortions in the size of the urethra occur, which can lead to an underestimation of the length of the stricture, and, consequently, to the wrong choice of the method of surgical treatment. Secondly, retrograde urethrography does not give an idea of the depth and extent of spongiofibrosis, which is the most important factor in the choice of treatment tactics. It should also be noted the possibility of different interpretations of urethrography by radiologists and urologists. Curious are the data obtained by Sh. Eswara et al. , who proposed to evaluate 10 urethrograms to 60 urological residents and specialists in radiology at Washington, Stanford and Northwestern Universities (USA). [10]. In another study, Canadian urologists P. Bach and K. Rourke analyzed the description of urethrograms by radiologists in a group of 397 patients who subsequently underwent urethroplasty. Only in 49% of cases, the description of radiographs was adequate and coincided with the intraoperative picture. In 13% of patients, urethral stricture was not described at all [6]. Urethroscopy helps to determine the degree of narrowing of the urethra. In the presence of a suprapubic fistula, it is sometimes advisable to use fibrocystouretroscopy to determine the proximal border of the stricture and the state of the sphincter apparatus. The 2014 SIU/ICUD guidelines on the diagnostic value of ureteroscopy state the following:

1. Urethroscopy is recommended as the most specific method for determining the presence of urethral stricture (level of evidence 4A).

2. The method is recommended as an aid in the diagnosis of anterior urethral strictures in case of ambiguous interpretation of other studies (level of evidence 3B).

Since the mid-1980s, the appearance of sonourethrography proposed by J.W. McAninch [17]. The sensitivity of this method for diagnosing urethral strictures ranges from 66-100%, and the specificity is 97-98%. Unfortunately, when performing this study, the accuracy of determining the length of the stricture is limited to 3–5 cm [18]. Also, the disadvantages of the method can be conditionally attributed to the fact that the doctor performing the study must be highly qualified, both in the methodology for its implementation and in the interpretation of the data obtained [19]. It should be noted the general trend of decreasing interest of urologists in the use of sonourethrography, as evidenced in recent years by a clear decrease in the number of publications that mention this study. Thus, we did not find a single article in MEDLINE for 2014 and 2015 for the query "Sonourethrography", and only one work was published for 2013. The ambiguity of modern ideas about the role of sonourethrography in the diagnosis of urethral strictures is reflected in the recommendations of SIU / ICUD (2014):
1. Sonourethrography can be used as an adjunct to urethrography in the preoperative evaluation of patients with anterior urethral stricture (LE: 2C).
2. Sonourethrography may be more sensitive diagnostic method than retrograde urethrography in assessing the extent of stricture and the degree of spongiofibrosis, however, the clinical significance of these results remains uncertain (level of evidence 2C) [2].
In 2006, Y. Osman et al. An interesting comparison has been made between the diagnostic value of magnetic resonance and retrograde urethrography [2,1]. Although the overall accuracy of diagnosing urethral strictures in the two types of studies was equal (85%), magnetic resonance urethrography provided additional clinical data that influenced the choice of treatment in 35% of cases. Korean scientists D.J. came to similar conclusions. Sung et al. Their study showed that magnetic resonance urethrography has a significantly lower error in measuring the extent of stricture than retrograde urethrography in combination with voiding cystourethrography. Another major advantage of magnetic resonance urethrography is the ability to accurately assess changes in the spongy body of the urethra. More recently, Mayo Clinic scientists B. Kim, A. Kawashima, and A.J. LeRoy, analyzing the reliability of methods for diagnosing the pathology of the male urethra, assigned the paramount importance of magnetic resonance imaging compared to retrograde urethrography, sonourethrography and CT. Thus, these data indicate the promise of using magnetic resonance urethrography, both to detect urethral strictures and to clarify their location and length, and most importantly, the depth and extent of spongiofibrosis, which is a necessary condition for high-quality operational planning. Unresolved problems remain high cost and limited availability, combined with the lack of a standardized protocol for this study.
Diagnosis of urethral strictures
In the recent past, it was believed that in the treatment of narrowing of the urethra, it is necessary to adhere to the so-called "surgical ladder", i.e. before embarking on complex open correction methods, it is necessary to use simple, though not always effective, but affordable methods of treatment, such as bougienage and internal optical urethrotomy. This approach is now considered obsolete. In general, the methods of treatment of urethral strictures can be divided into endourethral and open surgical interventions. The most ancient and widely known method of treatment is bougienage (dilatation) of the urethra. The method is low-cost and quite feasible on an outpatient basis. However, low efficiency (less than 10%), high frequency of relapses and complications determine the limited indications for the use of this technique. Treatment results

comparable to bougienage are achieved using internal optical urethrotomy, usually with a “cold knife” or various types of lasers: (diode, titanyl-phosphate-potassium, yttrium-aluminum garnet doped with neodymium ions, holmium and excimer lasers). Despite the fact that at present in the United States about 20% of urologists use laser technologies for the treatment of urethral strictures, the use of this technique is not recommended due to the comparability of treatment results with internal optical urethrotomy at a significantly higher financial cost [6]. Since the 70s of the 20th century, in order to reduce the frequency of relapses, it was proposed to administer pharmacological preparations with anticollagen and antifibroblast effects intraoperatively into the area of scar tissue under the mucous membrane. Steroid preparations, cytostatics (Mitomycin C), type 2 cyclooxygenase inhibitors, and glucocorticoids were studied, but this did not lead to a significant increase in efficiency [7–9]. The use of urethral stents in combination with internal optical urethrotomy has been intensively studied, but due to the high incidence of complications (perineal pain, scarring, stent migration, stone encrustation, urinary incontinence, infection), these methods have not been widely used in everyday practice [3, 10].

Thus, according to modern recommendations, bougienage and internal optical urethrotomy can be used as the first line of treatment only in patients with short (less than 1 cm), single strictures of the bulbar urethra without pronounced spongiofibrosis [2]. However, in debilitated patients or in patients who refuse radical treatment, the use of endourethral procedures is possible as a palliative method of treatment. Despite the fact that the effectiveness of endourethral methods does not exceed 10-35%, most urologists, both in our country and abroad, are in no hurry to abandon their use. According to many authors, the unjustified widespread use of endoscopic techniques and ignoring indications for open urethroplasty may lead to an increase in the incidence of extended anterior urethral strictures in the future [8].

Open operations in modern reconstructive surgery of the urethra are the most preferable for stricture disease, because. have high efficiency, low complication rate and good long-term results. Despite the fact that anastomotic urethroplasty has been performed for more than 100 years, to date, no prospective and randomized studies have been conducted on this type of surgical treatment. All studies are retrospective cohort studies. Most experts agree that:

1. Indications for anastomotic urethroplasty are strictures of the bulbous urethra, the length of which does not exceed 2-3 cm.
2. Performing an anastomosis for strictures of the penile urethra is not recommended, because associated with a high risk of shortening and curvature of the penis.
3. Anastomosis should be accompanied by spatulation of the edges of the resected urethra, which significantly reduces the risk of recurrence.

An analysis of publications shows that anastomotic urethroplasty is successful in more than 90% of cases [7,8]. It should be noted that spatulation increases the tension of the edges by about 11.5 cm. The recently proposed original technique of Andrich-Mundy non-transection anastomosis allows preserving axial blood flow of the spongiform body of the urethra [6]. However, this operation is not indicated for post-traumatic strictures. It should also be noted that the effectiveness is comparable compared to conventional anastomosis, with a greater technical complexity of this operation. Therefore, given the small number of publications and the lack of data on long-term results, it is still difficult to judge what place this operation should occupy in the arsenal of a modern urologist.Replacement urethroplasty is based on the concept of partial or complete replacement of the lumen of the urethra with a tissue flap. Despite the diversity, all these operations can be divided into 3 groups:

1. Augmentation urethroplasty (urethral augmentation, augmentation with anastomosis).
2. Staged urethroplasty.
3. Urethroplasty with tubular flaps.

As a plastic material, free (devoid of connection with the donor site) and displaced (on a feeding leg) flaps are used. Free flaps are usually called grafts, and the operation is transplantation, in the case of displaced flaps, the term transposition is used. In the English-language literature, in relation to free flaps, the term "Graft" is used - a cutting. The displaced flaps are called "Flap" - a flap. Accordingly, the operations are called "Grafting" and "Flap-ing". Both of these methods are used for urethral augmentation. Among the free flaps (grafts), the use of the oral mucosa (buccal and lingual flaps) is the most common, the skin of the prepuce is used less often, and among the displaced, the preputial and penile flaps on the fascial feeding pedicle are used. The use of scrotal skin has now been abandoned due to the presence of hair follicles. The use of a flap of the oral mucosa for replacement urethroplasty was first proposed by the domestic scientist K.M. Sapezhko in 1894 [3,7]. According to the world's leading experts, the buccal mucosa is an ideal plastic material for transplantation into the urethra [9, 10]. This is explained by the following circumstances:
• development of subepithelial vascular network.
• good strength and elastic properties.
• resistance to infection.
• high regenerative capacity of the donor site.
The effectiveness of urethroplasty with tubularized flaps is significantly lower than in two-stage operations and ranges from 45 to 80%. From use Radial and thoracodorsal flaps are currently abandoned due to the low efficiency of these operations.
According to many authors, the correction of strictures of the navicular fossa is the most difficult section in urethral surgery. This is explained by the fact that in addition to restoring the lumen of the urethra, the surgeon must also solve aesthetic problems associated with the appearance of the glans penis after surgery. It should be remembered that it is in the navicular fossa that the transformation of turbulent urine flow into laminar occurs and urethroplasty in this area makes special demands on the surgeon. There is a huge variety of surgical techniques proposed for the correction of strictures of the capitate urethra. Another important circumstance influencing the choice of the method of surgical treatment is the etiology of strictures of the navicular fossa. And on this basis, all strictures of the capitate urethra can be divided into strictures associated with lichensclerosis and others, most often iatrogenic [19]. A feature of the strictures associated with lichensclerosis is that only extragenital flaps are suitable as a plastic material, because. genital skin is considered potentially diseased and its use leads to a multiple increase in the number of relapses [4,5].
Over the past half century, many different methods have been proposed for correcting stricture disease of the urethra, which has led to qualitative progress in the treatment of this pathology. Among the current trends in the development of this area of urology, the following can be distinguished:
1. A significant decrease in indications and a skeptical attitude of specialists towards the use of endo-urethral methods of treatment (bougiering, internal optical urethrotomy).
2. Most operating urologists prefer transplantation of the oral mucosa AND experimental and clinical urology of the mouth, considering the buccal flap as an ideal plastic material for transplantation into the urethra.

3. A clear decrease in interest in the transplantation of skin-fascial flaps.
4. The use of tissue engineering products seems to be very promising.
5. The emergence of new types of anastomotic urethroplasty (anastomosis without crossing the spongy body of the urethra).

Despite significant progress in the treatment of urethral stricture, I would like to highlight the main unresolved problems:

• modern standards for diagnosing urethral stricture do not allow us to judge the depth and extent of spongiofibrosis, which, obviously, can affect how rational planning, and the result of urethroplasty. In this sense, the introduction of the method of magnetic resonance urethrography into wide practice can be considered a promising direction;
• Most of the studies are retrospective cohort in nature, which makes it impossible to draw up European and national clinical guidelines. In this regard, it seems appropriate to establish regional centers for urethral surgery in our country and organize multicenter prospective studies;
• the lack of clear clinical guidelines is the reason for the current situation with the widespread unjustified use of bougienage and internal optical urethrotomy, which leads to disease progression and an increase in the frequency of extended strictures;
• lack of generally accepted classification of urethral strictures;
• lack of uniform standards for evaluating the results of surgical treatment and postoperative monitoring of patients;
• the problem of one-stage correction of pan-urethral strictures and complex cases of lichensclerosis is unresolved;
• the practical absence of works devoted to the adaptation of the buccal mucosa to new conditions.

Research in this area may be of not only scientific but also clinical interest in terms of postoperative prognosis. Another problem is the preoperative diagnosis of the depth and extent of spongiofibrosis. A small number of well-planned (from the standpoint of evidence-based medicine) studies on the treatment of urethral strictures makes it impossible to draw up European and national clinical recommendations, and therefore it seems obvious that there is a need to establish regional centers for reconstructive surgery of the urethra and organize multicenter prospective studies on their basis in this areas.

LITERATURE

1. Latini JM, McAninch JW, Brandes SB, Chung JY, Rosenstein D. SIU/ICUD Consultation on urethral strictures: epidemiology, etiology, anatomy, and nomenclature of urethral stenoses, strictures, and pelvic fracture urethral disruption injuries. Urology 2014;83(3):1-7.
2. Kogan M.I. Male urethral strictures: reconstructive surgery: an illustrated guide. M.: Practical medicine, 2020. 139 p..
3. Anger JT, Buckley JC, Santucci RA, Elliott SP, Saigal CS. Trends in stricture management among male Medicare beneficiaries: underuse of urethroplasty. Urology 2011;77(2):481-485.
4. Mundy AR, Andrich DE. Urethral strictures. BJU International 2019;107(1):6-26.
5. Palminteri E, Berdondini E, Verze P, De Nunzio C, Vitarelli A, Carmignani L. Contemporary urethral stricture characteristics in the developed world. Urology 2018;81 (1):191-196.
6. Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. J Urol 2017; 177:1667-1674.
7. Liu JS, Walker K, Stein D, Prabhu S, Hofer MD, Han J, et al. Lichen sclerosus and isolated bulbar urethral stricture disease. J Urol 2018;92(3):775-779.
8. Chambers RM, Baitera B. The anatomy of the urethral stricture. Br J Urol 2017;49(5): 545-

551.
9. Cavalcanti A, Costa WS, Baskin LS, McAninch JA, Sampaio FJ. A morphometric analysis of bulbar urethral strictures. BJU Int 2020;100(2):397-402.
10. Cavalcanti A, Yucel S, Deng DY, McAninch JW, Baskin LS. The distribution of neuronal and inducible nitric oxide synthase in urethral stricture formation. J Urol 2020; 171:1943-1947.