A METHOD FOR IMPROVING THE RESULTS OF SURGICAL TREATMENT OF POST-TRAUMATIC STRICTURES IN CHILDREN, THE EXPERIENCE OF THE INSTITUTION

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The material was analyzed as a result of treatment in 70 patients with post-traumatic urethral strictures. Prior to admission to the children's surgical department, all patients were previously operated on in other medical institutions using the Marion-Holtsov method. Repeated operations of this category of patients present difficulties due to roughly expressed cicatricial changes in the wall of the urethra and surrounding tissues. The success of the surgical intervention depends on the level of the selected proximal end of the urethra, which allows it to align in any area, as well as on the correctly applied anastomosis.

Effective drainage and washing of the anastomosis zone using a draining catheter prevents infection and has a beneficial effect on tissue healing processes. Satisfactory results were noted in 98.6% of cases, and only one patient had a poor result, and subsequently this patient underwent surgery – restoration of the urethra from the skin of the scrotum.

Keywords: *urethra, trauma, stricture, operation.*

Surgical treatment of post-traumatic urethral strictures in pediatric patients has good results. Prostate and bladder neck injuries are more common. Posterior urethral injuries occur in 4–19% of cases associated with pelvic fractures due to motor vehicle accidents. Anterior urethral injuries occur with penile injuries. The complexity of treatment is due to urinary complications such as recurrent strictures, urinary incontinence and erectile dysfunction [1, 2]. A comparative analysis of the Clinical Guidelines for Urogenital Trauma of the European Association of Urology (EAU), and the Sociëtë Internationale d'Urologie (SIU) demonstrated that multicenter research is still relevant today. This is necessary to optimize, improve the quality, and enhance the diagnosis and treatment of urethral injuries [3].

Despite the successes achieved in surgical elimination of strictures and obliterations of traumatic origin in the membranous and prostatic parts of the urethra, the percentage of unsuccessful outcomes is still very high, and they range from 25 to 50% [4–8]. The range of reasons for unsuccessful outcomes is quite diverse, ranging from violations in primary care and diagnostics to imperfections and errors in surgical technique and postoperative management.In this regard, the issue of preventing the formation of post-traumatic strictures and their recurrence remains a particularly pressing problem in pediatric surgery.

Target. To improve the treatment outcomes of post-traumatic urethral strictures and obliterations.

Material and methods. At the Center for the Development of Professional Qualifications of Medical Workers, the treatment outcomes of 70 patients aged three to 15 years were analyzed. Of these, 27 (39%) had strictures and 43 (61%) had obliterations. By localization – in the membranous section in 33 (47%) patients, in the prostatic section in 17 (24%) or in both sections of the urethra in 19 (27%). One patient (2%) had a complete separation of the urethra from the bladder neck with subsequent development of stricture of the posterior urethra.The causes were pelvic bone injuries in 51 children (73%) and falls from height in 19 (27%). In terms of age, 5 children were aged 3 to 7 years, 38 were aged 7 to 12 years, and 37 were aged 12 to 15 years.

Fifty-one (73%) children had previously undergone surgery at the clinics where they were stationed. This means that when they presented to us, they had recurrent strictures and obliterations. Of these, 27 were operated on using the Marion-Holtzow method, and 24 patients were operated on using the Kreuss-Fronstein method. Following these operations, 17 patients underwent prolonged, unsuccessful urethral dilation. The remaining 19 patients (27%) had only undergone an epicystostomy prior to admission to our clinic.

All patients underwent ascending and descending urethrography, ultrasound of the urethra and bladder, and urethroscopy. Fifty-one patients underwent voiding cystourethrography. Nineteen patients underwent examination of the bladder neck and internal urethral opening through a cystostomy fistula. Postoperatively, after the catheters and drains were removed, control uroflowmetry was performed.

All 70 patients had a suprapubic cystostomy drainage system in place upon admission. After collecting urine for bacteriological analysis, the drainage system was replaced and the urinary tract

was sanitized. When the urinary tract infection was "controlled", surgical treatment was performed – a modified Marion-Holtz operation with the installation of a special catheter (IDP patent No. 05277, 11/19/2001).

We used a perineal incision strictly along the midline, providing ample access to the posterior urethra. Unlike the previous incision, deepening this incision does not damage the muscles. After incising the skin and subcutaneous tissue and exposing the surface of the bulbocavernosus muscle, we separate it from the spongy tissue ofthe urethral bulb. The muscle is then retracted to both sides, preserving it as much as possible from injury, since damage to this muscle can lead to subsequent erectile dysfunction, we separate the spongy portion and the urethra from the attachment site by dissecting the ligament attaching it to the lower edge of the pubic bones.We do not separate the spongy tissue from the urethra, as the wall ofa child's urethra is very thin and delicate. We continue to release the bulbous urethra, along with the membranous portion, down to the prostate gland. After this, we cut off the urethra from the scarred part (in case of strictures and obliterations of the membranous section) or as close as possible to the scarred part of the urethra (when there is a stricture or obliteration in the prostatic section, or in cases of separation of the urethra from the neck of the bladder). It's important to remember that every millimeter of unscarred urethral wall tissue is valuable for preventing tension on the anastomosis line. In cases of reoperation due to multiple adhesions and scarring of surrounding tissues, as well as complete obliteration of the membranous, It is not possible to accurately adhere to the principles of topographic-anatomical operations in the prostatic or both parts of the urethra. Therefore, at this stage of the operation, the main focus should be on carefully freeing the distal urethra and dissecting it from obliterated or strictured portion. Removal of scars in the proximal section should begin from the inner surface of the pubic symphysis to minimize damage to the prostate. After cutting off the scar tissue and finding the blunt end of the proximal urethra, the wall of the latter is carefully dissected and its ends are freed from the surrounding tissue. After careful preparation of both ends of the urethra for end-to-end anastomosis, drainage of the bladder was performed using a two-diameter vesicoureteral tube.The proximal end of the tube (0,5–0,6 cm in diameter) extends into the suprapubic region, at the level of Leto's triangle. From the initial part of the bladder neck, the wall of this tube thins (0,15–0,18 cm in diameter) Another catheter with an outer diameter of 0,4–0,5 cm is placed on it, with multiple small drainage holes on its wall. The ends of both catheters are extended through the external opening of the urethra by 5–6 cm (Fig. 1).

When performing an anastomosis in children under 7 years of age, 4 ligatures are used, and in children aged 7–14 years, 6 ligatures are used. The sutures are evenly spaced around the circumference of the bladder neck or the remnant of the posterior urethra. Typically, in these cases, the posterior urethra is a remnant of the wall, no more than 0,2–0,3 cm in length. According to urethrograms, the

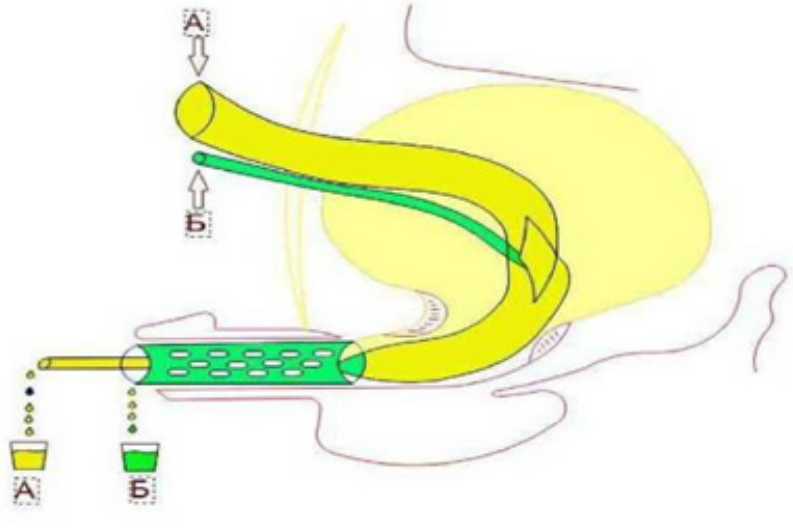

Fig. 1. Catheter operation diagram: Inlet A is used to irrigate the bladder cavity, with the flushing fluid exiting through outlet A; inlet B is used to irrigate the anastomosis area, the lumen between the drain and the urethral wall, with the flushing fluid exiting through outlet B

length of strictures and obliterations averaged 1,9 ± 0,2 cm. During surgery, the affected sections of the urethra were carefully freed. The scarred portion of the urethra was excised as close to the pathological areas as possible. After excision, the diastasis between the proximal and distal sections averaged 3,8 ± 0,2 cm. Therefore, to reduce tension on the anastomotic line, maximum mobilization of the distal urethra was performed. In one case, in a patient with a urethral separation from the bladder neck, bladder neck mobilization was performed. The next step was to insert a two-diameter polyvinyl chloride catheter, the size of which was individually selected for each case. Then, the anastomosis was performed using monofilament sutures placed evenly around the circumference, as described above.

Late-term surgical outcomes at 3-6 months (n=64) and 1 year (n=57) were assessed through interviews, physical examination, and screening.

Results. Postoperative treatment did not deviate from generally accepted principles. However, particular attention was paid to the following factors: - selection of parenteral antibiotics, based not only on the results of bacteriological testing but also on the microbial composition of the entire patient cohort. This is because our patients have a predominantly nosocomial flora, when it is necessary to choose a protected antibiotic that has bactericidal properties against nosocomial strains with a sufficient evidence base.

– This is the continuous irrigation of the bladder we propose with sterile solutions containing an antiseptic component. For this purpose, we used chlorhexidine bigluconate or dioxidine.

– This involved regular irrigation of the urethral anastomosis site followed by the administration of antibiotics through the microcatheter we proposed. In other words, we performed systematic local wound debridement and local treatment ofthe infection.

Microbiological testing of urine to determine the pathogen and susceptibility to antibacterial drugs was performed in 66 (100%) patients. No microbial growth was detected in urine tests in 15 (22,7%) children, and positive urine culture results were found in 51 (77,3%) patients. Of these, 31 (47,1%) children had Enterobacteriaceae bacteria, 15 (22,7%) had Proteus bacteria, 3 (4,5%) had St. saprophiticus, and 2 (3,0%) had Candida. We explain this pattern of uropathogen culture by the fact that 15 (22,8%) children received antibacterial treatment immediately before admission to the hospital.

Susceptibility testing of the isolated microorganisms was performed only for antibacterial drugs approved for use in pediatric practice. The anastomotic area was irrigated with sterile saline (0,9% sodium chloride solution) containing an antiseptic. Chlorhexidine bigluconate (in all age groups) or Dioxidine (only in the older age group) were used as the antiseptic component. For antiseptic treatment ofthe urethral wound site (anastomosis) A 0,5% sterile solution was prepared by diluting the drug 1:40 in 0,9% saline (sodium chloride) with sterile glycerin. This solution is known to increase bacterial sensitivity to chloramphenicol,Kanamycin, neomycin, and cephalosporins. For irrigation, 5–10 ml of solution was injected through the drain into the anastomotic area, usually 2–3 times daily. The course of treatment was 7–9 days, daily, until the catheter was removed.

Thanks to the use of a special drainage catheter, local complications of infectious origin were not observed in any case, preventing recurrence, as noted by other surgeons. Recurrence of the stricture was observed only in one case. During the repeat operation, a significant diastasis between the healthy ends of the urethra was discovered. It was more than 6 cm, and for technical reasons, a scrotal skin flap with a vascular pedicle had to be used to reconstruct the urethra. The local manipulations and surgical technique performed ensured a smooth postoperative period: the wounds healed primarily, which allowed the special drainage catheter to be removed from the urethra no later than 8–9 days. After surgery, the maximum bladder capacity, bladder wall thickness, residual urine volume, and voiding time were monitored. The results of these studies revealed no deviations from age-appropriate norms. No significant differences were observed with long-term follow-up data 69 children had no complaints, the urine stream was normal, the data of the simplified uroflowmetric index (Goldberg B.V., 1974) were within the normal range (14,3+3,3 ml/s after removal of the catheter on the 10th day after surgery; 23,6+4,9 ml/s 3–6 months after surgery; 24,9+5,8 ml/s 12 months after surgery, p> 0,05). Taking into account all objective data, no recurrence of stricture was noted.

Conclusion. Careful preparation and correct execution of the surgical procedures for urethral anastomosis using a special drainage catheter, with the correct selection of antimicrobial agents for parenteral and topical use this approach achieved good results in 98.6% of cases, including repeat corrections for recurrent urethral strictures and obliterations. The proposed specialized drainage catheter offers promising results for widespread use.

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