Received: 17 January 2023 / Accepted: 06 April 2023 / Published online: 30 April 2023

***DOI 10.34689/SH.2023.25.2.038***

***UDC 616.71-007.234***

# SURGICAL CORRECTION OF PENILE HYPOSPADIAS IN BOYS WITH INCOMPLETE URETHRAL DUPLICATION

**Almira D. Zharkimbayeva[1], https://orcid.org/0000-0003-3487-0170**

**Zhalgaskan K. Kanapiyanov[1],**

**Maratbek T. Aubakirov[1], https://orcid.org/0000-0002-8650-2225**

**Azat A. Dyussembayev[1], https://orcid.org/0000-0002-3398-7329**

**Yury V. Ten[2], Vasily M. Lozovoy[3],**

**Madina R. Madiyeva[1], https://orcid.org/0000-0001-6431-9713**

[1] **NCJSC «Semey Medical University», Semey c., Republic of Kazakhstan.**
[2] **Altai State Medical University, Barnaul c., Altai Krai, Siberian Federal District, Russian Federation**.
[3] **NCJSC « Astana Medical University», Astana c., Republic of Kazakhstan.**

**Abstract**

**Relevance of the problem.** Hypospadias is a congenital anomaly of the male urinary system. The prevalence of hypospadias varies worldwide. The combination of hypospadias with incomplete duplicated urethra is less common.

**Aim:** We present a case of surgical correction of urethral anomaly in a boy with hypospadias and incomplete duplicated urethra.

**Materials and methods**: Patients with hypospadias and congenital incomplete duplicated urethra who underwent urethroplasty with excision of the interurethral septum were reviewed.

**Results:** From 2016 to 2023, six patients with incomplete duplicated urethra and different forms of primary and secondary hypospadias were operated on. In all patients, the septum between the urethras was excised, creating a common urethral tube with stenting with a Nelaton catheter. To prevent postoperative complications, urine was diverted using an epicystostomy tube and urethral catheter. No complications were observed in any of the six patients in the early and delayed postoperative period.

**Conclusion:** The form of hypospadias is often determined intraoperatively. Hypospadias can be accompanied by various developmental anomalies of the external genitalia and urethra.

***Keywords:*** *urethrocutaneous fistula, hypospadias in boys, incomplete duplication of the urethra.*

**Резюме**

# ХИРУРГИЧЕСКАЯ КОРРЕКЦИЯ СТВОЛОВОЙ ФОРМЫ ГИПОСПАДИИ У МАЛЬЧИКОВ С НЕПОЛНЫМ УДВОЕНИЕМ УРЕТРЫ

**Альмира Д. Жаркимбаева[1], https://orcid.org/0000-0003-3487-0170**

**Жалгаскан К. Канапиянов[1],**

**Маратбек Т. Аубакиров[1], https://orcid.org/0000-0002-8650-2225**

**Азат А. Дюсембаев[1], https://orcid.org/0000-0002-3398-7329**

**Юрий В. Тен[2], Василий М. Лозовой[3],**

**Мадина Р. Мадиева[1], https://orcid.org/0000-0001-6431-9713**

[1] **НАО «Медицинский университет Семей», г. Семей, Республика Казахстан;**
[2] **«Алтайский государственный медицинский университет», г. Барнаул, Алтайский край, Сибирский федеральный округ, Российская Федерация;**
[3] **НАО «Медицинский университет Астана», г. Астана, Республика Казахстан;**

**Актуальность.** Гипоспадия - врожденная аномалия развития мочевыделительной системы у мальчиков. Распространеность гипоспадии в мире различна. Сочетание гипоспадии с удвоением мочевыделительной трубки встречается реже.

**Цель:** мы представляем случай хирургической корекции устранения аномалии развития уретры у мальчика с гипоспадией и неполной удвоенной уретрой.

**Материалы и методы:** рассмотрены пациенты с гипоспадией с сочетанием врожденной неполной удвоенной уретрой, которым проведена уретропластика с иссечением межуретральной перегородки.

**Результаты:** С 2016-2023 годы нами были прооперированы 6 пациентов с неполной удвоенной уретрой с различными формами первичной и вторичной гипоспадии. У всех пациентов перегородка между уретрами была иссечена с созданием общей уретральной трубки со стентированием катетером Нелатона. Во избежание развития послеоперационных осложнений было использовано отведение мочи с помощью эпицистостомической трубки и уретрального катетера. У всех шести пациентов в раннем и отсроченном послеоперационном периоде осложнения не наблюдались.

**Заключение:** Форма гипоспадии определяется зачастую интраоперационно. Гипоспадия может сопровождаться различными аномалиями развития со стороны наружных половых органов и уретры.

***Keywords:*** *urethrocutaneous fistula, hypospadias in boys, incomplete duplication of the urethra.*

**Түйіндеме**

# ҰЛ БАЛАЛАРДАҒЫ УРЕТРАНЫҢ ТОЛЫҚ ЕМЕС ЕКІ ЕСЕЛЕНУІМЕН ҚАТАР КЕЗДЕСЕТІН ГИПОСПАДИЯНЫҢ БАҒАНАЛЫ ФОРМАСЫНЫҢ ХИРУРГИЯЛЫҚ КОРРЕКЦИЯСЫ

**Альмира Д. Жаркимбаева[1], https://orcid.org/0000-0003-3487-0170**

**Жалгаскан К. Канапиянов[1],**

**Маратбек Т. Аубакиров[1], https://orcid.org/0000-0002-8650-2225**

**Азат А. Дюсембаев[1], https://orcid.org/0000-0002-3398-7329**

**Юрий В. Тен[2], Василий М. Лозовой[3],**

**Мадина Р. Мадиева[1], https://orcid.org/0000-0001-6431-9713**

**[1] КеАҚ "Семей медицина университеті", Семей қ., Қазақстан Республикасы.**

**[2] Алтай Мемлекеттік Медицина Университеті, Барнаул қ., Алтай өңірі, Сібір Федералды Округі, Ресей Федерациясы**.

**[3] КеАҚ "Астана медицина университеті", Астана қ., Қазақстан Республикасы.**

**Мәселенің өзектілігі.** Гипоспадия – ер балалардың зәр шығару жүйесінің туа біткен ақауы. Әлем бойынша гипоспадияның таралуы жиілігі әртүрлі. Гипоспадияның несеп шығару түтігінің екі еселенуімен үйлесуі сирек кездеседі.

**Мақсаты:** ер балалардағы уретраның даму ақаулары гипоспадия және несепағардың толық емес екі еселенуін хирургиялық түзету жағдайларын ұсынамыз.

**Материалдар мен әдістер:** гипоспадия мен уретраның туа біткен толық емес екі еселенуі қатар кездесетін науқастарға уретра аралық пердені алып тастау операциясы жүргізілген жағдайлар қарастырылды.

**Нәтижелер:** 2016-2023 жылдар аралығында біз уретраның толық емес екі еселенуі қатар кездесетін бірінші лік және екінші лік әртүрлі формадағы гипоспадиясы бар 6 науқасқа операция жасадық. Барлық науқастарда уретрааралық пердені алып тастау арқылы жалпы уретралық түтік қалыптастырылып, Нелатон катетерімен стенттеу жүргізілді. Операциядан кейінгі асқынулардың дамуын болдырмау үшін эпицистостомиялық түтік пен уретральды катетерді қолдану арқылы зәр шығару әдісі қолданылды. Барлық алты науқаста операциядан кейін ерте және кеш кезеңде асқынулар байқалмады.

**Қорытынды:** Гипоспадияның формасы көбінесе операция кезінде анықталады. Гипоспадия сыртқы жыныс мүшелері мен уретраның әртүрлі даму аномалияларымен бірге жүруі мүмкін.

***Түйінді сөздер:*** *тері-уретральді жыланкөз, ер балалардағы гипоспадия, уретраның толық емес екі еселенуі.*

**Bibliographic citation:**

Zharkimbayeva A.D., Kanapiyanov Zh.K., Aubakirov M.T., Dyussembayev A.A., Ten Yu.V., Lozovoy V.M., Madiyeva M.R. Surgical correction of penile hypospadias in boys with incomplete urethral duplication // *Nauka i Zdravookhranenie* [Science & Healthcare]. 2023, (Vol.25) 2, pp. 293-296. *doi 10.34689/SH.2023.25.2.038*

*Жаркимбаева А.Д., Канапиянов Ж.К., Аубакиров М.Т., Дюсембаев А.А., Тен Ю.В., Лозовой В.М., Мадиева М.Р.* Хирургическая коррекция стволовой формы гипоспадии у мальчиков с неполным удвоением уретры // Наука и Здравоохранение. 2023. 2(Т.25). С. 293-296. *doi 10.34689/SH.2023.25.2.038*

*Жаркимбаева А.Д., Канапиянов Ж.К., Аубакиров М.Т., Дюсембаев А.А., Тен Ю.В., Лозовой В.М., Мадиева М.Р.* Ұл балалардағы уретраның толық емес екі еселенуімен қатар кездесетін гипоспадияның бағаналы формасының хирургиялық коррекциясы // Ғылым және Денсаулық сақтау. 2023. 2 (Т.25). Б. 293-296. *doi 10.34689/SH.2023.25.2.038*

**Relevance.**

Hypospadias is one of the most complex pathologies in children, requiring multiple surgeries to address postoperative complications. Various types of complications are encountered in the early and late postoperative periods. The overall frequency of combined complications is 32% - 49%, as described in the works of authors who used different surgical methods such as Onlay urethroplasty, Bracka 2 stages repair, Duckett's tubularized flaps urethroplasty, and Koyanagi repair. The frequency of urethral fistula after the Bracka 2 stages repair was 23% [1]. Within 2 years of postoperative follow-up, complications such as suture dehiscence and urethral fistula developed in 10% of cases in patients who underwent stage 2 surgery using foreskin [5]. Various types of postoperative complications have been described in the literature for addressing this anomaly, including urethrocutaneous fistula, urethral diverticulum, neomeatal stenosis, and glans dehiscence [3].

**Case Report.**

From 2016 to 2023, six patients with incomplete duplicated urethra with various forms of primary and secondary hypospadias were operated on by us. One of these cases from our practice is presented below.

Patient S. was admitted to the hospital for planned treatment with a diagnosis of Congenital anomaly of the urinary system. Hypoplasia of the penile shaft form of hypospadias.

*Complaints on admission:* dystopia of the urethral opening, bending of the head of the penis downwards.

Medical history: According to the patient's mother, the abnormality was congenital and they had not sought medical help before. The patient was examined on an outpatient basis and was admitted for planned surgical treatment at the

Department of Pediatric Surgery of the Semey Medical University.

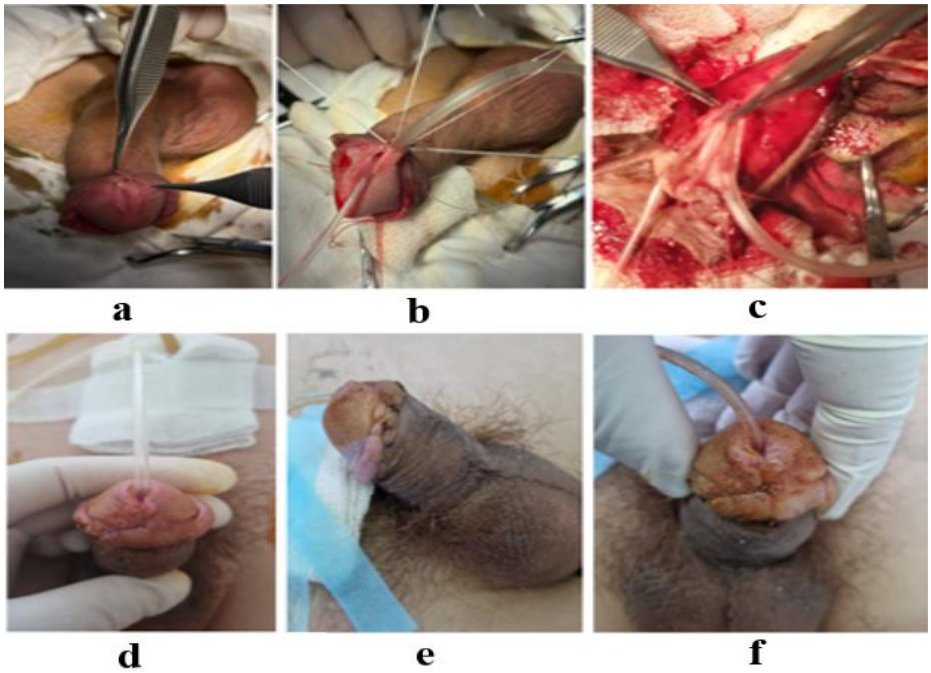
Life history: The patient grew and developed in accordance with their age. They are not registered with any medical facilities. They received preventive vaccinations according to the schedule. The patient had a history of common colds. There were no surgeries, traumas, or blood transfusions.

Allergological history: not significant.

Objective data: The overall condition is of moderate severity due to the existing pathology. Body temperature is 36.6°C. Consciousness is clear. Skin and visible mucous membranes are clean, pink in color. Subcutaneous tissue is moderately developed. The musculoskeletal system shows no visible abnormalities. Respiratory system: breathing is free through the nose. The chest is conical in shape. Both halves of the chest participate equally in the act of breathing. Clear pulmonary sound is heard over all areas on percussion. Auscultation over the lungs reveals vesicular breathing. No wheezing is heard. Respiratory rate is 19 breaths per minute. Cardiovascular system: visible pulsation is absent in the area of the heart and large vessels. Heart sounds are clear and no murmurs are heard. Heart rhythm is regular. Heart rate is 88 beats per minute. Blood pressure is 110/70. Digestive system: Tongue is clean, moist, mucous membranes are pink. Swallowing is free. The abdomen has a normal shape. The abdomen is soft and painless on palpation. The liver is painless on palpation. The lower edge is along the costal arch. The spleen is not palpable. Bowel movements are normal. Urinary system: Kidneys are not palpable. The percussion test is negative on both sides.

St.localis: On visual examination, the penis is curved ventrally. The foreskin is underdeveloped on the ventral surface and hangs like a "hood". The urethral opening is located below the coronal sulcus by 1.0 cm with a diameter of up to 0.3 cm. The patient urinates standing up. Urination is free and painless.

The laboratory and instrumental test results are within the age norms. The ultrasound of the penis vessels showed a dorsal artery of the penis with a diameter of 1.5 mm on the right and 1.1 mm on the left. The renal and bladder ultrasound showed diffuse changes in the kidney parenchyma, right calicopieloectasia, left calicoectasia, and thickening of the left urinary bladder wall. The intravenous urography showed a preserved secretion and excretion function of the kidneys. The panoramic urography did not detect any radiopaque stone shadows in the urinary system. The patient underwent a simultaneous urethroplasty with trocar epicystostomy under combined intubation general anesthesia with extended epidural anesthesia (L1-Th12-bupivacaine) and total intravenous anesthesia (propofol+keta). After twice treating the operation area with povidone, a Nelaton catheter was inserted into the bladder through the distopiated meatus of the urethra (Pict. 1).




**Picture 1. Incomplete duplication of the urethra in hypospadias.**

**a-** Atypical location of the meatus
**b-** The catheter is inserted into the orifices of the double urethra
**c-** Incomplete doubling of the urethra in the section to the middle third of the body of the penis
**d-** Typical location of neomeatus - result 2 weeks after urethroplasty
**e-** Straight body of the penis-result 4 weeks after urethroplasty
**f-** Typical location of neomeatus-result 4 weeks after urethroplasty

The penis head and foreskin were held by clamps. A ventral skin incision was made 0.5 cm away from the coronal sulcus with a border of the hypospadiac urethra meatus. The chord was excised, and the embryonic spikes were severed. An erection test was conducted using a 0.9% sodium chloride solution. The penis stem was straight. An additional meatus of an incomplete urethra was detected in the projection of the lower angle of the sternum fossa, a catheter was inserted, and the urethra was found to run longitudinally along the midline and intimately about the hypospadiac urethra, blindly ending in the lower third of the penis stem. The urethra's underdeveloped wall was opened along the 1/3 of the stem by the catheter. The urethral wall was opened above the catheter #12. The partition between the urethral walls was excised, and hemostasis was

performed. A flap on the "feeding leg" of the inner layer of the foreskin was mobilized on the right and laid on the urethral area. An "end-to-end" anastomosis of the urethral wall was performed along the entire length, sutured with a continuous intradermal stitch. A protective layer of the neo-urethra stitch was made from the remnants of the fleshy membrane of the foreskin on the left. The meatus was moved to the head, and the incision was sutured.

**Discussion**.

The choice of the surgical method is based on the classification of hypospadias. The authors proposed a new classification system based on the assessment of the location of the bifurcation of the corpus spongiosum relative to the penile shaft as an indicator of hypospadias severity, to facilitate the selection of the urethroplasty method. The urethral defect ratio (UDR) was calculated by dividing the length of the urethral defect (distance between the glandular knobs and BCS) by the stretched penile length (SPL). Then, the severity of hypospadias was divided into three separate degrees (UDR <0.5, 0.5-0.99,> 1.0). In order to increase the urethral plate for tubularized incised plate urethroplasty (TIPU) inlay graft surgery, a free preputial graft was used from the dorsal surface, which was placed on the incised plate. To prevent the development of a urethral fistula, a Buck's fascia flap was applied as a protective layer over the neourethra. Other authors in a meta-analysis study showed that compared to dartos fascia (DF), tunica vaginalis fascia (TVF) is a better transplant as a protective layer after tubularized incised plate surgery for primary hypospadias. In our case, we used a newly developed method of urethroplasty with a vascularized graft on a vascular pedicle from the inner leaf of the prepuce with the creation of an end-to-end anastomosis after excision of the wall of the underdeveloped urethra and mobilization of the distopiated meatus. As a protective layer over the neourethra suture, we used a flap of the fleshy sheath of the foreskin, moved from the left to the ventral surface of the shaft.

In the study, the authors used a stent placed in a short silicone catheter for up to 7 days to divert urine, which was later used as a bougie after removing the stent for up to 4 weeks to eliminate urethral stricture. Urethral fistula complication was observed in 6% of cases. In our study, a trocar cystostomy was applied to divert urine, and a Nelaton catheter No. 12 was used to drain the urethra, which was removed after 10 days.

According to the authors, the use of feeding catheters and silicone Foley catheters for urine diversion as a stent after urethral plastic surgery resulted in fistula in 4.5% and 31.3% of cases, respectively. According to the results of the authors' meta-analysis, after Mathieu surgery with plate incision and standard TIP technique for correcting distal hypospadias, complications included meatus stenosis, narrow urine stream, and cutaneous-urethral fistula. In our case, during the observation period of 3-36 months, complications such as glans dehiscence, neomeatus and urethral stricture, neourethral diverticulum, and cutaneous-urethral fistula were not observed.

**Conclusion:** The form of hypospadias is often determined intraoperatively. Hypospadias can be accompanied by various developmental anomalies of the external genitalia and urethra.

**Outcome:** Prolonged epidural anesthesia did not cause postoperative complications. Trocaric epicystostomy improves urine drainage in the early postoperative period and contributes to creating conditions for rapid healing of the neourethra after removal of the urethral catheter. The use of foreskin as a graft yielded good results. Considering the complexity and rarity of congenital urethral anomalies, this article is useful for general practitioners, pediatric surgeons, urologists-andrologists, and anesthesiologists.

***Authors' contribution:*** *All authors participated in collecting, processing information, directly diagnosing, and treating patients with this developmental pathology.*

***Conflict of interest:*** *None.* ***Funding:*** *Not conducted.*

*The article is an original manuscript. The material has not been submitted to other publishers before.*

***Literature:***

1. *Cousin I., De Vires P., et al.* Complication rates of proximal hypospadias: meta-analyses of four surgical repairs // Journal of Pediatric Urology,Volume 18, Issue 5, October 2022, Pages 587-597 https://doi.org/10.1016/j.jpurol.2022.08.005 (Accessed 05.01.2023)

2. *Jamhari M., Rahman I., et al.,* Postoperative complications of Mathieu incised plate versus standard tubularized incide plate urethroplasty for distal hypospasdias: a systematic review and meta-analysis // Bali Medical Journal 2023, Volume 12, Number 1: 306-311, doi: 0.15562/bmj.v12i1.4058

3. *Magdi M., Anwar A.* Experience with modified two stage inner preputial flap for repair of proximal hypospadias with chordee: A single institution study with intermediate follow up // Journal of Pediatric Surgery, Volume 57, Issue 7, July 2022, Pages 1404-1408 https://doi.org/10.1016/j.jpedsurg.2021.05 (Accessed 05.01.2023)

4. *Sarac M., Bakal U., et al.,* Is Stent Type Used in Snodgrass Method a Factor in Fistula Formation? // Nigerian Journal of Clinical Practice 2018, Volume 21, Issue 9: 1198-1201 eISSN: 2229-7731

5. *Snodgrass W., Bush N.* Stages Tubularized Autograft Repair for Primary Proximal Hypospadias with 30- Degree or Greater Ventral Curvature // The Journal of Urology, Volume 198, Issue 3, September 2017, Pages 680-686 https://doi.org/10.1016/j.juro.2017.04.019 (Accessed 05.01.2023)

6. *Tarig J. Abbas,* An objective hypospadias classification system // Journal of Pediatric Urology, Volume 18, Issue4, August 2022, Pages 481.e1-481.e8 https://doi.org/10.1016/j.jpurol.2022.05 (Accessed 05.01.2023)

7. *Ting Zhan, Xu Cao, et al.* Spongioplasty with Buck›s fascia covering dorsal inlay graft uretroplasty for primary hypospadias repair // Journal of Pediatric Urology, https://doi.org/10.1016/j.jpurol.2023.02. (Accessed 05.01.2023)

8. *Yang H., Xuan Xx., Hu Dl. et al.* Comparison on effect between dartos fascia and tunica vaginalis fascia in TIP urethroplasty: a meta-analysis of comparative studies // BMC Urol 20, 161. 2020. https://doi.org/10.1186/s12894-020-00737-9 (Accessed 05.01.2023)

**Coresponding Author:**
**Zharkimbayeva Almira Dalelevna,** - child surgeon, urologist, master of medical sciences, assistant of the Department of Traumatology and Pediatric Surgery, Non–Commercial Joint Stock Company «Semey Medical University»,
**Mailing Address:** 071400, Republic of Kazakhstan, Semey city, Abaya st. 103.
**E-mail:** zhar_77@mail.ru, **Phone:** +77783399209