



## SURGICAL TREATMENT OF BLADDER EXSTROPHY IN NEWBORNS AND INFANTS: EVALUATION OF THE EFFECTIVENESS OF VARIOUS TACTICS

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### ABSTRACT

*This study investigates the surgical treatment of bladder exstrophy (BE) in 64 newborns and infants. Researchers compared one-stage cystosphincterourethroplasty with a staged approach starting with cystosphincteroplasty followed by urethroplasty. The staged correction group (18 patients) showed significantly better results, with fewer recurrences of exstrophy and epispadias compared to the one-stage group (46 patients), where recurrence was observed in a notable percentage. The study concludes that a staged surgical approach is the preferred method for treating BE in newborns and infants, leading to more favorable outcomes, except in specific cases for girls.*

**Relevance.** Bladder exstrophy (BE) is a severe congenital malformation that occurs in one of 40,000-50,000 newborns, with a higher incidence in males [2, 3]. Issues concerning early antenatal diagnosis, management strategy, and surgical treatment of BE remain among the pressing and unresolved problems in modern pediatric surgery and urology [4, 5]. In particular, there is no consensus regarding the optimal timing, methods, and stages of surgical intervention [1, 2, 5]. Some researchers propose one-stage cystosphincterourethroplasty, while other specialists favor staged corrections of BE.

**Objective of the study** – to improve the results of surgical treatment of bladder exstrophy in newborns and infants.

**Materials and Methods.** The study included the results of a comprehensive examination and treatment of 64 patients with bladder exstrophy aged from 1 day to 1 year, who underwent treatment at the Republican Educational, Medical, and Methodological Center for Neonatal Surgery at the RPC between 2008 and 2018. Among them, there were 48 boys (75%) and 16 girls (25%). 62 children (96.9%) were born at full term, and 2 (3.1%) were premature. BE was diagnosed three times more often in boys. 20 children (31.2%) were born at the RPC, while 44 children (68.8%) were admitted from other medical institutions.

Clinical forms of BE: classical form – 61 children; partial exstrophy (without epispadias) – 2 children; cloacal exstrophy – 1 child.

Patient examination included: clinical examination with assessment of the exstrophied plate; laboratory tests (complete blood count, urinalysis, blood biochemistry, blood typing



and Rh factor determination, stool analysis); instrumental methods: ultrasound examination and Doppler ultrasonography with color mapping of the abdominal cavity, retroperitoneal space, genitourinary system, heart, brain; pelvic X-ray with determination of the distance between the pubic bones and assessment of the condition of the hip joints.

If concomitant malformations were suspected, additional chest X-ray, skull X-ray, and X-rays of the extremities, as well as excretory urography, were performed.

**Results and Discussion.** Diagnosis in newborns was not difficult due to the pronounced clinical presentation. The size of the exstrophied plate ranged from 2.0 to 10.0 cm in diameter.

Concomitant pathologies: inguinal hernia – in 28 children (bilateral in 9 of them); cryptorchidism – in 10 boys; rectal atresia – in 1 patient.

For an objective evaluation of the results of surgical treatment, patients were divided into two groups: the main group (n=18, 28.1%) – primary cystosphincteroplasty was performed, followed by urethroplasty after 2-3 months; the comparison group (n=46, 71.9%) – one-stage cystosphincterourethroplasty.

In both groups, the first surgical intervention was performed at the age of 2-3 months. Preference was given to primary bladder plasty using local tissues, even with small sizes of the exstrophied plate (1.5-2.0 cm).

The optimal age for primary bladder plasty (without osteotomy and approximation of the pubic bones) was considered to be 2–3 months. This is due to: an increase in the child's body weight, which reduces anesthetic risks (possibility of spinal anesthesia without intubation); skin adaptation and a decrease in the severity of contact dermatitis caused by exposure to urine; the possibility of correcting concomitant malformations (bilateral inguinal and inguinoscrotal hernias).

We adhere to the tactic of bladder plasty for BE without approximation of the bones of the pubic symphysis. In almost all children, regardless of the size of the bladder plate, the first stage of correction of the defect is bladder plasty using local tissues. At the same time, we modified the technique of bladder drainage. Unlike the classical version, catheters were not placed in the ureteral orifices. Instead, a catheter was left in the cavity of the newly formed bladder, the end of which was brought out through the apex of the bladder via a counter-aperture and fixed. The bladder was sutured with two-layer interrupted sutures (Vicryl 4/0 and 5/0).

We also improved the technique of bladder neck plasty. Its essence is as follows: after transecting the muscles of the urogenital diaphragm and dissecting the tissues in the bladder neck area, a zone in the form of a narrow longitudinal strip measuring 1.5-2 cm was formed. Then, the bladder neck was covered with a layer of muscles using two P-shaped sutures. The second stage, after 2-3 months, involved urethroplasty with interrupted sutures (Vicryl 6/0) over a urethral catheter, which allowed for the elimination of total epispadias. We adhere to the tactic of cystosphincteroplasty without approximation of the pubic bones.

Inguinal hernia was detected in 28 of our patients with BE. Given the risk of incarceration, we consider it advisable to treat unilateral inguinal hernias during bladder plasty or at the first stage of exstrophy correction (cystosphincteroplasty). In cases of bilateral



inguinal hernia (9 children), bilateral herniorrhaphy was performed first, followed by bladder plasty a month later.

Plasty of the urethra, clitoris, and labia in girls (16 patients) with BE was performed simultaneously with bladder plasty. In one case of a newborn with an isolated form of BE, and in another case of a patient with an isolated form of BE and an anorectal anomaly, sigmoidostomy and bladder plasty were performed in one stage. In a newborn with cloacal exstrophy, staged operations were performed. Orchidopexy for cryptorchidism in patients with BE was performed after the first year of life.

Until 2016, all patients with BE underwent one-stage cystosphincterourethroplasty (46 children). However, 5 patients (10.9%) experienced a recurrence of exstrophy and epispadias, which manifested as complete dehiscence of sutures on the anterior abdominal wall, bladder wall, and urethra. In this group, recurrence of epispadias after one-stage cystosphincterourethroplasty was noted in 43 (93.5%) patients.

Given the above, since 2017, we have switched to staged correction of BE in newborns and infants. All patients in the main group (18 patients) underwent bladder and bladder neck plasty (cystosphincteroplasty) at the first stage. 1.5-2 months after the first operation, plasty of the external urethra was performed to eliminate total epispadias. An exception was made for girls with BE (2 patients), in whom, due to the anatomical features of the urethra, one-stage cystosphincterourethroplasty was performed.

The best results of primary bladder plasty were achieved in patients of the main group after staged cystosphincteroplasty and urethroplasty. In this group, no complete dehiscence of sutures on the bladder wall was observed, and recurrence of total epispadias in the early postoperative period was noted in only 2 (11.1%) patients. Furthermore, the total duration of the first and second stages of the operation did not significantly increase compared to one-stage cystosphincterourethroplasty.

**Conclusion:** The results of the conducted study demonstrate that staged surgical correction of bladder exstrophy in newborns and infants, starting with cystosphincteroplasty followed by urethroplasty, provides more favorable outcomes compared to one-stage intervention. This approach is characterized by a reduction in the frequency of recurrences of exstrophy and epispadias, which allows us to recommend it as the preferred approach, with the exception of individual cases in girls.

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