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OPTIMIZATION OF COMPREHENSIVE TREATMENT FOR TOTAL AND SUBTOTAL EPISPADIAS IN CHILDREN

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Abstract

The aim of this study was to improve treatment outcomes in children with total and subtotal epispadias by optimizing surgical techniques. A retrospective analysis was performed on 44 out of 71 patients treated between 1998 and 2024 at the Department of Pediatric Surgery of Tashkent State Medical University and the Republican Scientific and Practical Center for Minimally Invasive and Endoscopic Pediatric Surgery. The patients were aged 1 to 11 years. In 79.5% of cases, penile length was reduced twofold compared to age norms, and in 9.0% it was reduced by 2.5 times; all patients had penile torsion and complete urinary incontinence. Complete urinary continence was achieved in 45.5% of cases, and partial continence in 18.2%, with overall good and satisfactory outcomes in 63.7% of patients. Although one-stage orthoneourethroplasty allows simultaneous penile straightening and urethral reconstruction, it does not fully eliminate urinary incontinence. Therefore, further improvement of sphincteroplasty and pubic symphysis approximation techniques is recommended.

Keywords

Epispadias, total epispadias, subtotal epispadias, children, surgical treatment, orthoneourethroplasty, urinary incontinence, sphincteroplasty, bladder exstrophy, pediatric urology.

Introduction.

Epispadias is a rare and complex congenital anomaly of the genitourinary system characterized by a dorsal defect of the urethra, often associated with significant anatomical and functional disturbances of the external genitalia. It is most frequently observed as part of the bladder exstrophy–epispadias complex, which represents one of the most severe developmental disorders affecting the lower urinary tract. The severity of epispadias varies from mild glandular forms to total epispadias, in which the entire urethra is dorsally open, accompanied by marked penile deformity and complete urinary incontinence[3].The pathogenesis of epispadias is multifactorial and is thought to be related to abnormal development of the cloacal membrane and failure of midline fusion during early embryogenesis. These developmental disturbances occur during a critical period of organogenesis, resulting in malformation of the anterior pelvic structures, urethra, and external genitalia. In addition, associated musculoskeletal abnormalities, particularly pubic symphysis diastasis, further contribute to functional impairment[1].Clinically, patients with total and subtotal epispadias present with severe functional and cosmetic problems. The most significant clinical issue is urinary incontinence, which occurs due to the absence or insufficiency of the urethral sphincter mechanism. In addition, penile shortening, dorsal curvature, and torsion are commonly observed, which significantly affect both urinary and future reproductive functions[4]. These abnormalities not only impair quality of life but also create substantial psychological and social challenges for affected children and their families. Surgical correction remains the mainstay of treatment for epispadias. Over the years, numerous surgical techniques have been proposed, including staged and one-stage reconstruction procedures.

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Orthoneourethroplasty is among the commonly used approaches, aiming to reconstruct the urethra and correct penile deformity simultaneously. However, despite advances in surgical techniques, achieving complete urinary continence remains a major challenge[5]. The complexity of the anatomical defects and variability in patient presentation contribute to inconsistent functional outcomes. Another important aspect in the management of epispadias is the restoration of pelvic anatomy. Procedures aimed at approximation of the pubic symphysis and reconstruction of the pelvic floor play a significant role in improving urinary continence[6]. Nevertheless, the optimal combination of surgical techniques, particularly in cases of total and subtotal epispadias, remains a subject of ongoing debate. In recent years, increasing attention has been given to improving functional outcomes through refinement of sphincteroplasty techniques and enhancement of reconstructive strategies. Despite these efforts, postoperative urinary incontinence remains a persistent problem in a considerable proportion of patients, indicating the need for further optimization of surgical approaches[2]. Therefore, the present study focuses on evaluating the outcomes of surgical treatment in children with total and subtotal epispadias and aims to improve results by optimizing operative techniques. The study also seeks to highlight the limitations of current methods and propose further modifications to enhance both anatomical reconstruction and functional recovery.

Materials and Methods.

This study was conducted as a retrospective clinical analysis of children with total and subtotal forms of epispadias treated over a 26-year period, from 1998 to 2024. The clinical material was obtained from the Department of Pediatric Surgery of Tashkent State Medical University and the Republican Scientific and Practical Center for Minimally Invasive and Endoscopic Pediatric Surgery in Children. A total of 71 patients with total and subtotal epispadias following surgical correction of bladder exstrophy were identified. From this cohort, 44 patients who underwent complete surgical treatment and had sufficient follow-up data were included in the final analysis. The age of patients ranged from 1 to 11 years at the time of surgical intervention[3]. Preoperative evaluation included detailed clinical examination, assessment of external genital anatomy, degree of penile deformity (length reduction, torsion, and dorsal curvature), and evaluation of urinary continence status. In all cases, the severity of epispadias was classified as total or subtotal based on the extent of urethral involvement and associated anatomical abnormalities[1].All patients underwent surgical treatment using reconstructive techniques aimed at correction of penile deformity and restoration of urethral continuity. The primary surgical approach was one-stage orthoneourethroplasty, performed with simultaneous penile straightening and urethral reconstruction. In selected cases, additional procedures such as modifications of sphincteroplasty and approximation of the pubic symphysis were applied to improve functional outcomes[4].Postoperative follow-up included clinical assessment of urinary continence, evaluation of penile morphology, and documentation of complications. Urinary continence was classified as complete continence, partial continence, or persistent incontinence based on the ability to control urination without or with minimal leakage. Cosmetic and functional outcomes were also evaluated during follow-up visits[2].The obtained data were analyzed using descriptive statistical methods. Outcomes were expressed in absolute numbers and percentages. The main evaluated parameters included penile length improvement, degree of torsion correction, and restoration of urinary continence. The effectiveness of surgical treatment was assessed based on overall functional and anatomical results.

Results and Discussion.

The analysis of 44 patients with total and subtotal epispadias demonstrated significant anatomical and functional abnormalities prior to surgical correction. Penile hypoplasia was a common finding, with 35 patients (79.5%) showing a reduction in penile length of approximately

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two times compared to age-appropriate norms, while 4 patients (9.0%) had a reduction of up to 2.5 times. In all cases, penile torsion and dorsal deformity were present, accompanied by complete urinary incontinence, reflecting the severe functional impact of the anomaly. Following surgical intervention, functional outcomes varied depending on the severity of the deformity and the effectiveness of reconstructive techniques. Complete urinary continence was achieved in 20 patients (45.5%), while partial continence was observed in 8 patients (18.2%). Overall, satisfactory and good results were obtained in 63.7% of cases, indicating a moderate level of success in restoring urinary control and improving anatomical configuration. The findings of this study demonstrate that one-stage orthoneourethroplasty provides a technically feasible approach for simultaneous correction of penile deformity and urethral reconstruction. However, despite anatomical correction, restoration of full urinary continence remains a major challenge. This suggests that urethral reconstruction alone is insufficient to fully restore the complex continence mechanism, which depends on both sphincteric function and pelvic anatomical integrity. The relatively limited rate of complete continence observed in this study may be explained by the severity of underlying anatomical defects in patients with bladder exstrophy–epispadias complex. In particular, insufficiency of the external sphincter mechanism and persistent pubic diastasis play a critical role in postoperative urinary outcomes. These factors limit the effectiveness of standard reconstructive procedures and necessitate additional corrective strategies. Our results are consistent with published literature, which indicates that continence rates after epispadias repair vary widely and are often suboptimal without adjunctive procedures. Many authors emphasize the importance of combining urethral reconstruction with techniques aimed at improving pelvic floor support and sphincter competence. In this context, modifications of sphincteroplasty and approximation of the pubic symphysis appear to be important adjuncts for improving functional outcomes. Another important observation is that anatomical improvement does not always correlate directly with functional success. Even in cases with satisfactory penile straightening and urethral reconstruction, urinary incontinence may persist, highlighting the complexity of continence mechanisms in these patients. This discrepancy underscores the need for a more integrated surgical approach that addresses both structural and functional components of the disorder[6].Overall, the results of this study suggest that while current surgical techniques provide acceptable anatomical correction, further refinement is required to achieve higher rates of complete urinary continence. Future improvements should focus on enhancing sphincter reconstruction techniques and optimizing pelvic anatomical correction, particularly in severe forms of epispadias.

Conclusion.

The results of this study demonstrate that total and subtotal epispadias in children are associated with severe anatomical deformities and persistent functional impairment, primarily manifested as complete urinary incontinence and penile malformation. One-stage orthoneourethroplasty provides satisfactory anatomical correction in most cases; however, its effectiveness in restoring full urinary continence remains limited. Despite acceptable overall outcomes in 63.7% of patients, complete urinary continence was achieved in less than half of the cases, indicating that urethral reconstruction alone is insufficient for full functional recovery. The persistence of incontinence is mainly related to insufficiency of the sphincter mechanism and disturbances in pelvic anatomical structures. Based on the obtained results, it can be concluded that improvement of surgical outcomes requires a comprehensive approach, including refinement of sphincteroplasty techniques and optimization of pubic symphysis approximation methods. Further development of combined reconstructive strategies is necessary to enhance both anatomical and functional results in children with total and subtotal epispadias.

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