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# Bladder Exstrophy: Etiology and Treatment

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**Abstract**

Bladder exstrophy is a rare congenital anomaly characterized by protrusion of the urinary bladder through a defect in the lower abdominal wall. Its management is challenging and requires multi-stage reconstructive surgery, long-term follow-up, and multidisciplinary care. In this article, we review the epidemiology, embryology, clinical features, surgical strategies, outcomes, and present a case of delayed presentation in adolescence.

**Keywords**: bladder exstrophy, reconstructive urology, pediatric surgery, continence, long-term outcomes.

## Introduction

Bladder exstrophy (BE) is part of the exstrophy-epispadias complex and is characterized by eversion of the bladder mucosa through a defect in the abdominal wall. The estimated prevalence is about 2.0 to 3.3 per 100,000 live births. It is more common in males than females. Because of its complexity, treatment involves staged reconstructive surgery, with the goals of urinary continence, preservation of renal function, and acceptable cosmesis.

## Embryology and Etiology

The precise cause remains unclear, but theories involve abnormal development of the cloacal membrane and mesenchymal defects preventing proper closure of the lower abdominal wall. Genetic factors (e.g., Wnt, BMP4, Alx4, ISL1 pathways) and environmental factors (maternal smoking, older maternal age, exposure to valproic acid) may contribute.

## Epidemiology

Bladder exstrophy prevalence is estimated at 2–3 per 100,000 live births, with a male-to-female ratio of approximately 2:1. The condition occurs globally without strong geographic clustering.

## Clinical Features and Diagnosis

At birth, the bladder plate is exposed on the abdominal wall with pubic diastasis and abnormal genitourinary anatomy. Associated anomalies include epispadias, pelvic deformities, and reproductive tract abnormalities. Prenatal diagnosis is sometimes possible via ultrasound. Postnatal imaging (ultrasound, VCUG, MRI) aids surgical planning.

## Management / Surgical Treatment

The goals of treatment include primary bladder closure, bladder neck reconstruction, and long-term follow-up.

1. Primary closure: performed soon after birth to preserve bladder capacity and minimize fibrosis.
2. Bladder neck reconstruction: performed later to achieve continence, sometimes with bladder augmentation.
3. Long-term follow-up: monitoring for infections, reflux, stones, and renal function.

**Outcomes and Challenges**

Initial closure success is critical for continence. Long-term issues include urinary incontinence, stones, infections, and psychosocial impact. With proper multidisciplinary care, many patients achieve good renal function and acceptable quality of life.

**Case Report Example**

A 15-year-old male presented with lifelong urinary incontinence and exposed bladder plate. Imaging showed preserved kidneys and pubic diastasis. Surgery involved staged closure and augmentation. At 1-year follow-up, continence improved with intermittent catheterization. Outcome was satisfactory with occasional infections.

**Discussion**

Delayed presentation increases surgical complexity due to fibrosis and psychological factors. Modern reconstructive approaches, including staged closure and augmentation, can still yield functional outcomes. Long-term multidisciplinary follow-up is essential.

**Conclusion**

Bladder exstrophy is a rare but surgically correctable anomaly requiring lifelong care. Early intervention improves outcomes, but even late cases can benefit from individualized reconstructive approaches.

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