



Minimally invasive treatment options for bladder neck obstruction in pediatric patients

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Description

Bladder Neck Obstruction (BNO) in pediatric patients presents a challenge in management, requiring careful consideration of treatment options that can effectively relieve obstruction while minimizing morbidity and preserving bladder function. Bladder neck obstruction in children involves an impairment of the smooth muscle relaxation at the bladder neck during voiding, leading to obstructive urinary symptoms such as hesitancy, weak stream and urinary retention. It can be congenital or acquired and may result from anatomical abnormalities, neurogenic dysfunction, or iatrogenic causes.

Diagnosis of BNO in pediatric patients typically involves a combination of clinical evaluation, urodynamic studies and imaging modalities such as ultrasound, Voiding Cystourethrography (VCUG) and Magnetic Resonance Imaging (MRI). Urodynamic studies, including pressure-flow studies, help assess the severity and nature of obstruction, guiding treatment decisions. TUI-BN is a minimally invasive procedure performed under anesthesia using a cystoscope. It involves making small incisions in the bladder neck to widen the urethral opening and improve urinary flow.

TUI-BN is suitable for children with mild to moderate BNO and can be performed as an outpatient procedure with minimal morbidity.

Botox injection into the bladder neck or periurethral sphincter can relax smooth muscle tone and alleviate obstruction. It is performed under anesthesia using cystoscopic guidance and may provide symptomatic relief in children with refractory BNO or detrusor sphincter dyssynergia. Botox injection is associated with transient urinary retention and the risk of Urinary Tract Infection (UTI) but offers a minimally invasive alternative to surgery. Endoscopic vaporization techniques, such as holmium laser vaporization or Potassium-Titanyl-Phosphate (KTP) laser vaporization, can be used to ablate obstructive tissue at the bladder neck. These procedures are performed using a laser fiber inserted through a cystoscope, allowing precise and targeted tissue ablation.

Endoscopic vaporization techniques are effective for treating moderate to severe BNO in pediatric patients and may be preferred in cases where incision or dilation is inadequate. Urethral stent placement involves inserting a temporary or permanent stent into the urethra to relieve obstruction and facilitate urine passage. It is reserved for children with severe or recurrent BNO who are not candidates for other minimally invasive treatments or surgery. Urethral stents can provide immediate symptom relief but carry the risk of stent migration, encrustation and urinary tract infection.

Patient selection for minimally invasive treatment options in pediatric BNO requires careful consideration of factors such as age, severity of obstruction, anatomical abnormalities, bladder function and

underlying etiology. Children with mild to moderate BNO, intact bladder sensation and preserved detrusor function are suitable candidates for minimally invasive interventions. However, those with severe obstruction, neurogenic bladder dysfunction, or complex anatomical anomalies may require more extensive evaluation and individualized treatment planning.

Minimally invasive treatment options for pediatric BNO are generally associated with favorable outcomes, including symptomatic improvement, increased urinary flow rates and reduced post-void residual volumes. However, complications such as urinary retention, UTI, hematuria, and urethral stricture may occur, particularly in the immediate postoperative period. Long-term follow-up is essential to monitor treatment efficacy, bladder function, and the recurrence of obstruction.

Conclusion

In conclusion, minimally invasive treatment options for bladder neck obstruction in pediatric patients offer effective alternatives to traditional surgical interventions, allowing for symptom relief, improved bladder function, and reduced morbidity. Transurethral incision, botulinum toxin injection, endoscopic vaporization techniques and urethral stent placement are valuable tools in the management of pediatric BNO, providing individualized treatment options tailored to each child's unique needs. With careful patient selection, meticulous technique and comprehensive follow-up, minimally invasive interventions can optimize outcomes and enhance the quality of life for children with bladder neck obstruction.