# EVALUATION OF URETEROCYSTOPLASTY AS AN ALTERNATIVE FOR AUGMENTATION ILEOCYSTOPLASTY IN THE PRESENCE OF DILATED URETERS

*Thesis*

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*By*

**Ahmad Hefnawy Mohammad**

*M.Sc. Urology*

*Supervised by*

**Prof. Dr. Mohammad Sherif Mourad**

*Professor of Urology*

*Faculty of Medicine – Ain Shams University*

**Prof. Dr. Youssef Mahmoud Kotb**

*Professor of Urology*

*Faculty of Medicine – Ain Shams University*

**Faculty of Medicine**

**Ain Shams University**

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## Abstract

**Background:**Ureterocystoplasty has been considered as an alternative for iliocystoplasty when there is dilated ureters in association with renal impairment/extensive ileal resection, several studies reported variable results after ureterocystoplasty

**Aim of the work:** To compare the outcomes of augmentation ureterocystoplasty in patients with dilated ureters to conventional augmentation iliocystoplasty in patients who can undergo both procedures.

**Patients and Methods:** in a prospective randomized clinical study, 10 patients will undergo ureterocystoplasty ; another 10 patients will undergo iliocystoplasty.

**The inclusion criteria** include patients with unilateral or bilateral ureteric dilatation after failure of conservative measures. **The Exclusion criteria** were insufficient ureteric dilatation, elevated S.creat. or previous extensive ileal resection

**Results:** Our results showed significant improvement in capacity and compliance in all groups, the degree of urodynamic improvement was however inferior when the distal segment of 2 ureters were used for augmentation versus the use of ileum or an entire ureter of a non-functioning kidney, the degree of hydronephrosis improved or resolved in all patients, continence improved in all patients despite the requirement for CIC in most patients, the frequency of urinary tract infections was similar in both groups.

**Conclusions** Our study concludes that augmentation with sufficient amount of ureteric tissue provides adequate augmentation with similar urodynamic outcome to augmentation with the use of ileum, however if the ureteric tissue used was insufficient such as when using the distal segment of 1 or 2 ureters especially when the ureters are not sufficiently dilated the improvement in urodynamic outcome was inferior to the use of ileum.



**Key Words:** ureterocystoplasty, augmentation, neurogenic bladder, posterior urethral valves, urodynamic.

# Introduction

Bladder augmentation or augmentation cystoplasty is the addition of a segment of bowel or other suitable tissue to the in-situ bladder to increase capacity, improve compliance, or treat uncontrollable detrusor contractility. It is frequently used in the reconstruction of neurogenic bladders that have failed medical therapy or other conservative therapies ***(Graham et al., 2004)***.

The majority of patients requiring augmentation cystoplasty have small-capacity, noncompliant, or hypertonic bladders. This is usually due to neuropathicity, which is either due to myelodysplasia, traumatic spinal cord injury, or due to myogenic failure as a result of posterior urethral valves. On occasion, augmentation cystoplasty is required to provide adequate bladder volume in cases of classic extrophy, cloacal extrophy, and cloacal malformations. Bladder dysfunction should initially be treated with anticholinergic medications and clean intermittent catheterization (CIC) in an effort to diminish neurogenic detrusor overactivity, improve compliance, and provide regular and effective bladder emptying. When urodynamic evidence exists that non operative measures have failed, augmentation cystoplasty is indicated. Intravesical storage pressure greater than 40 cm H2O is the most robust indication for augmenting the bladder ***(Graham et al., 2004)***.

Incontinence and urinary tract infections (UTIs), with or without vesicoureteral reflux, are associated symptoms that may benefit from augmentation cystoplasty. Although ileum is preferred in most cases, many different bowel segments have been used, each with its own specific advantages and disadvantages; however, no bowel segment is clearly superior in all circumstances. The most important factor is detubularization of the bowel to reduce intravesical pressure from peristalsis or mass contractions ***(Graham et al., 2004)***.

However the use of gastrointestinal tissue for augmentation cystoplasty is associated with numerous complications like increased mucus production, infection, stone formation, perforation, metabolic disturbances and rarely even malignant changes. So the ideal substitute for bladder augmentation remains the urothelium itself which unfortunately is unavailable in cases of small capacity urinary bladder ***(Singh et al., 2009)***.

Patient selection remains an important issue before augmentation cystoplasty. Chronic renal failure (as documented by creatinine clearance) is a relative contraindication to bowel augmentation because both the small and large bowel resorb many urinary solutes that may cause deterioration of the metabolic status of the patient ***(Graham et al., 2004)***.

Alternatives to conventional enterocystoplasty have been developed in order to avoid the most common complications derived from contact of the urine with intestinal mucosa ***(Gonzalez and Ludwikowski, 2013)***.

Recognizing the frequency of cases, especially in PUV and neuropathic bladders, in which the small capacity-high pressure bladder is associated with a large-urothelium lined megaureter, it is concluded that ureterocystoplasty can be useful in selected cases when a large dilated ureter is available. Seromuscular colocystoplasty lined with urothelium (SCLU) has been urodynamically effective in several series when the outlet resistance is high and no additional intravesical procedures are necessary ***(Gonzalez et al., 1995)***. Sero-muscular gastrocystoplasty lined with urothelium seems to offer no distinct advantages and involves a much more involved operation ***(Adams et al., 1988).***The use of seromuscular segments with-out urothelial preservation, with or without the use of an intravesical balloon has been reported as successful in two centers but strict urodynamic evidence of its effectiveness is lacking ***(Rocha et al., 2011)***. The published evidence argues strongly against the use of detrusorectomy or detrusorotomy alone because of the lack of significant urodynamic benefits. Two recent reports discourage the use of small intestinal submucosa patches because of a high failure rate. Finally, research into the development of a bioengineered bladder

constructed with cell harvested from the same patient continues but is fraught with technical and conceptual problems. In conclusion of the methods reviewed, only ureterocystoplasty and SCLU have been proven urodynamically effective and reproducible ***(Gonzalez and Ludwikowski, 2013)***.

Although the original reports regarding ureterocystoplasty were extremely favorable, many authors became concerned with the results of this procedure because of the frequent need for reaugmentation afterwards. Attempts to assess the efficacy of and/or identify which patients would be best suited for this procedure by reviewing the published literature were fraught with problems. In most publications it was difficult to assess if the operation was successful or not because there are no standardized end points in various publications about ureterocystoplasty, this highlights the need for further studies in this subject with standardized uniform endpoints to be comparable to enable us to assess the usefulness of the procedure more accurately. ***(Husmann et al., 2004)***.

# Aim of the Work

To compare the outcomes of augmentation ureterocystoplasty in patients with dilated ureters to conventional augmentation ileocystoplasty.

# Anatomical Background

A filled bladder has the capacity of approximately 500 ml, it assumes an ovoid shape, when emptied, the bladder becomes tetrahedral, it is described as having a superior surface with the apex at the urachus, two inferolateral surfaces and a posteroinferior surface or the base with the bladder neck at the lowest point ***(Wein et al., 2016).***

Superiorly the bladder is covered by peritoneum, Anteriorly, the peritoneum sweeps gently onto the anterior abdominal wall, when the bladder distends to full capacity, it rises out of the true pelvis and separates the peritoneum from the anterior abdominal wall, so one can do a suprapubic cystostomy without the risk of entering the peritoneal cavity, Posteriorly the peritoneum passes to the level of seminal vesicles and joins the peritoneum on the anterior rectum to form the rectovesical space ***(Wein et al., 2016).***

The bladder is cushioned anteroinferiorly and laterally by the perivesical fat from the pelvic side wall, forming a potential space called the space of Retzius, which can be entered anteriorly by dividing the trasnversalis fascia and this allows one to gain access to the pelvic viscera as far posteriorly as the iliac vessels and ureters. The bladder base is related to the seminal vesicles, ampullae of the vasa deferentia and the terminal ureter ***(Reiner et al., 1979).***

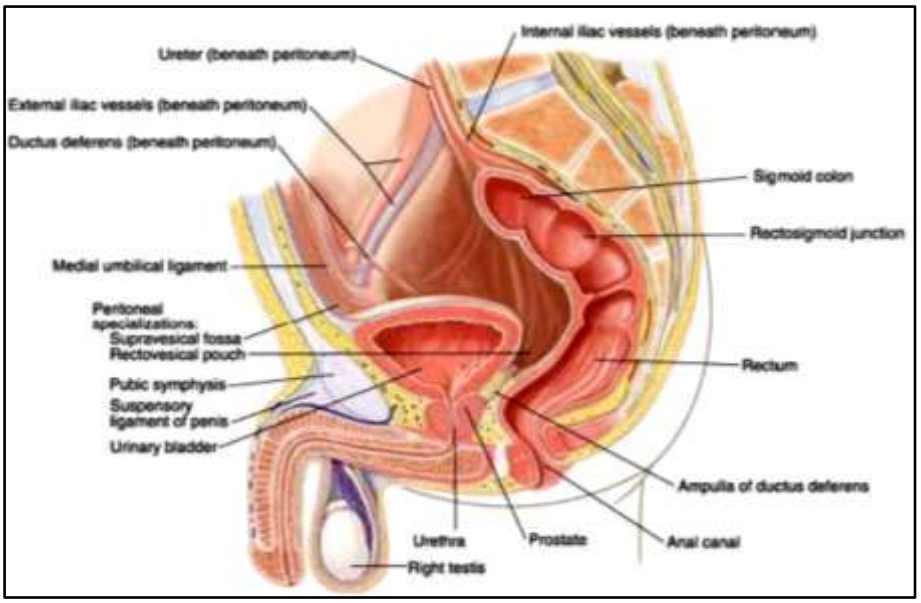


**Figure (1):** Anatomy of the bladder in males ***(Wein et al., 2016)***

The bladder neck, which is located at the internal urethral meatus, is about 3-4 cm behind the midpoint of the symphysis pubis. It is firmly fixed by the pelvic fascia and by its continuity with the prostate, its location changes little with changes in conditions of the bladder and rectum ***(Golimbu et al., 1990).***

In females, however, the peritoneum of the superior surface of the bladder reflects over the uterus forming the vesico-uterine pouch, then it continues posteriorly to form the recto-uterine pouch. The vagina and uterus lie between the bladder and rectum so that the base of the bladder and the urethra rest on the anterior vaginal wall ***(DeCaro et al., 1998).***

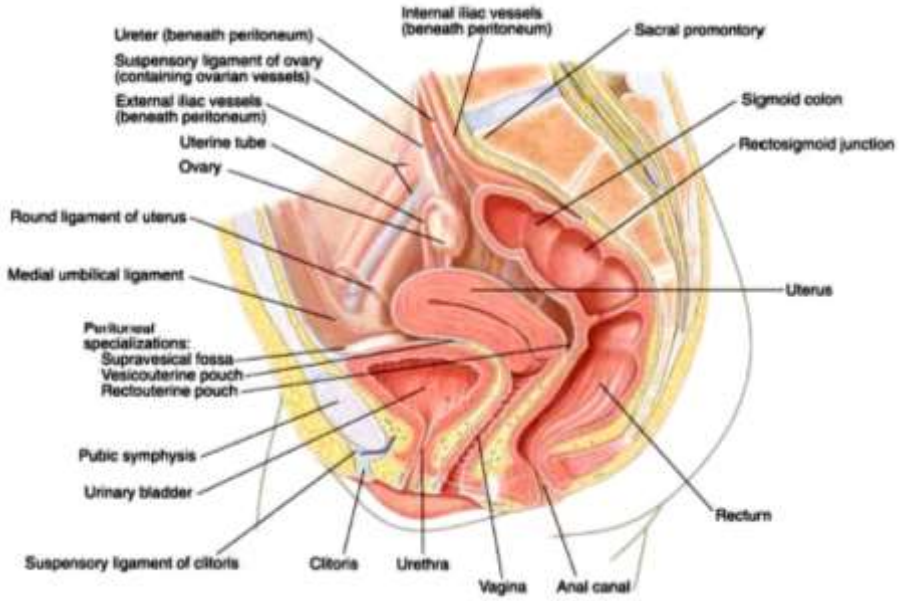


**Figure (2):** Anatomy of the bladder in females ***(Wein et al., 2016)***.

Because the lateral part of the anterior vaginal wall is firmly attached to the levator ani, contraction of the pelvic diaphragm (as during increases in intra-abdominal pressure) will elevate the bladder neck and pull it anteriorly, however in women with stress incontinence the bladder neck may drop below the pubic symphysis, in children since the pelvis is shallow, the bladder neck is level with the upper border of the symphysis. The bladder is a true abdominal organ that can project to the level of the umbilicus when full, by puberty the bladder is mainly confined in the deepened true pelvis ***(DeCaro et al., 1998).***

**Structure:**

The internal surface of the bladder is lined with six layers of transitional epithelium, they appear forming a smooth surface when the bladder is full but when emptied the bladder mucosa contracts into numerous folds, the epithelium rests on a thin basement membrane, deep to the mucosa there is a lamina propria that forms a relatively thick layer of the fibroelastic tissue allowing considerable distension ***(Wein et al., 2016).***

This layer is traversed by numerous blood vessels and it contains smooth muscle fibers that are collected in a poorly defined muscularis mucosa, and under this layer there is the smooth muscle of the bladder wall, the relatively large muscle fibers form branching interlacing bundles that are loosely arranged into inner and outer longitudinal and middle circular layers ***(Wein et al., 2016).***

In the upper part of the bladder the layers cannot be separated from one another and any one fiber can travel from one layer into the other, change orientation or branch into circular and longitudinal muscle fibers, this detrusor meshwork forms the best possible configuration for efficient bladder emptying. In the lower part of the bladder and especially near to the bladder neck the detrusor muscle becomes more distinctively separable into the 3 layers described earlier and the large diameter muscle fascicles become replaced by much finer fibers ***(Hutch et al., 1961).***

The bladder neck is structurally different in men and women, in men there are radially oriented inner longitudinal fibers that pass through the internal meatus and become continuous with the inner longitudinal layer of smooth muscle in the urethra, the middle layer forms a circular preprostatic sphincter that is responsible for continence at the level of the bladder neck(fundus ring), the sphincter has the shape of an inverted cone projecting down in the prostatic urethra till the level of the veromontanum, this sphincter is the reason why continence can be maintained in men with destroyed striated sphincter. The sphincter is richly innervated with adrenergic fibers, they act to prevent retrograde ejaculation when stimulated, and their damage due to diabetes or retroperitoneal lymph node dissection for testicular malignancy can result in retrograde ejaculation ***(Hutch et al., 1961).***

In the female bladder neck the inner longitudinal fibers converge radially downward as the inner longitudinal layer of the urethra, the middle circular layer, however, is not as well developed as in males, and some authors denied its existence in female bladder neck, also, the bladder neck in females differs from in males in that it possesses little adrenergic innervation with limited sphincteric function, it is reported that 50% of continent women have urine entering the proximal urethra during cough ***(Versi et al., 1986).***