Research Article

Upper Urinary Tract and Voiding Pattern Changes Following Different Modalities of Orthotopic Ileal Bladder Substitution.

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Abstract

Objective: To study the upper urinary tract and the voiding pattern changes that follow three different modalities (Y-shaped, modified Camey II and W-shaped) orthotopic ileal neobladder substitution with different ways of uretero-ileal anastomosis. **Patients & Methods:** This study included (٤٥) male patients who were admitted in the urology department, Minia university and Ain-shams university Hospital in the period from September ٢٠١٠ to October ٢٠١٣ and subjected to radical cysto-prostatectomy and orthotopic ileal urinary diversion. Indication of cystectomy in all patients was invasive bladder carcinoma whether squamous, transitional or adenocarcinoma. The patient's age at the time of surgery ranged from ٤٥ to ٧٠ years with a mean ± SD of 53.2 ± 7.46 years. All patients were subjected to complete history and physical examination, all laboratory tests and radiological investigations in the form of abdominal ultrasonography, intravenous urography, abdomino-pelvic computed tomography with contrast**.** Diagnostic cystoscopy and biopsy from the bladder mass for histopathology was done for all patients. Patients were followed by a follow up protocol including laboratory, radiological and urodynamic investigations at ٣ and ٦ months postoperative. **Results:** Compliance of the ileal neobladder was comparable between the three groups with statistically significant difference in Y shaped reservoirs. In comparing between the uroflowmetric parameters, a statistically insignificant difference was encountered between the ٣ groups regarding the maximum and average flow rate. However, the voided volume and voiding time were significantly higher in group ١١١ (W shaped neobladder). Highest incidence of renal deterioration was reported in the Le-Duc technique for uretero-ileal anastomosis followed by extra mural serosally tunneled ureteral implantation followed by direct uretero-ileal anastomosis. **Conclusion:** Changing ileal neobladder configuration from Y, U shaped to W shaped reservoirs did not improve diurnal or nocturnal continence significantly in the early or late postoperative period.All patients exhibited abdominal pattern of flow curve as voiding is accomplished in all of them by abdominal straining. We recommend proper detubularization and configuration of the ileal reservoir and meticulous handling of the external urethral sphincter with great attention to the urethro- ileal anastomosis and nerve sparing protocols to ensure good sphincteric function with efficient voiding.

Keywords: Urinary diversion; Orthotopic reconstruction; Bladder substitution; Cystectomy; Urinary incontence.

Introduction

In the present time, bowel has become an important part of the urologic surgeon's armamentarium for dealing with a wide variety of reconstructive problems in both pediatric and adult patients. However, the use of bowel as a substitute in the urinary tract was described nearly a century ago **(**Hendren, ١٩٩٧).

The orthotopic bladder substitute has evolved into the most ideal form of urinary diversion available today, and may be

considered the gold standard with which other forms of diversion are compared. In fact, in ١٩٩٣ at the Fourth International Consensus Conference on Bladder Cancer in Antwerp, Belgium, consensus opinion was that in the properly selected male bladder cancer patient, urinary reconstruction to the urethra is the procedure of choice in most centers worldwide (Skinner, Studer, Okada, et al., ١٩٩٥).

Materials and Methods

Our study included ٤٥ male patients with operable invasive bladder carcinoma whether squamous, transitional or adenocarcinoma who were admitted in the urology department, Minia university and Ain-shams university Hospital in the period from September ٢٠١٠ to October ٢٠١٣ and subjected to radical cysto-prostatectomy and orthotopic ileal urinary diversion.

Patients with one or more of the following criteria were excluded from the study, carcinoma in situ or invasive tumor at the bladder neck or the prostatic urethra, extensive pelvic disease (T_4) involving prostate or extending close to the pelvic floor that found at the operation time. Compromised renal function (serum creatinine of ٢.٥mg or more) was also a contraindication for the procedure.

Patients were evaluated clinically by complete history taking, clinical examination. Radiological evaluation using abdomino-pelvic ultrasonography, intravenous urography, abdomino-pelvic computed tomography with contrast. Diagnostic cystoscopy and biopsy from the bladder mass for histopathological analysis was done for all our patients

Patients were classified into three groups according to the configuration of the ileal bladder and the method of uretero-ileal reimplantation.

Group (١): included ١٥ patients with orthotopic (Y) shaped ileal neobladder with direct uretero-ileal anastomosis whether end to end or end to side.

Group (٢): included ١٥ patients with orthotopic modified Camey II ileal neobladder; ureters were implanted using Le-Duc method.

Group (٣): included ١٥ patients with (W) shaped ileal neobladder with serosally lined extramural tunneled ureteral implantation.

Patients were followed up for up to ١٢ months in a follow up protocol including complete history taking, physical examination, laboratory and radiological evaluation three to six months post-operative. Urodynamic evaluation was a main parameter in the follow up protocol.

Upper urinary tract was evaluated post-operatively using abdominal ultrasonography, intravenous urography, ascending & micturating pouchogram.

Urodynamic evaluation in the form of uroflowmetry, enterocystometry and urethral pressure profilometry were done for all patients six months postoperatively.

Results

The study included ٤٥ patients who underwent radical cysto-prostatectomy and orthotopic ileal substitution in the period from September ٢٠١٠ to October ٢٠١٣. The indication was invasive bladder cancer. Their ages ranged from ٤٥ to ٧٠ years with a mean of ٥٣.٢ ± ٧.٤.

All the included patients in our study were males.

Total diurnal continence was achieved in ١٢ patients (٨٠٪) having Y shaped ileal neobladders, ١٠ patients (٦٦.٦٪) having Camey II ileal neobladder and ١٠ patients (٦٦.٦٪) having W- shaped neobladders.

Complete nocturnal continence was achieved in ١٠ of the patients (٦٦.٦٪) having Y shaped ileal neobladders, in ٩ of the patients (٦٠٪) having Camey II bladders and in ٩ of the patients (٦٠٪) having W-shaped ileal neobladders.

Most of the patients had to wake up 2-3 times per night, this was recorded in all patients (100%) having Y shaped neobladders, in thirteen (13) patients (86.6%) having Camey II neobladders and in thirteen (13) patients (86.6%) having W- shaped ileal neobladders.

Le Duc anastomosis showed deterioration in five units in the group of the Camey II bladders, four units deteriorated due to obstruction and one unit due to reflux. Direct anastomosis showed deterioration in two units of Y shaped bladders due to reflux resulting in raising the serum creatinine level. Extramural serosally lined tunnels for ureteral anastomosis showed deterioration in four units in the group of patients having W- shaped bladders. This deterioration was due to uretero-ileal obstruction in three units and reflux in one unit.

In comparing between the uroflowmetry parameters between group I, II and III, a statistically insignificant difference was encountered between the three studied groups regarding Mean maximum flow rate (P=0.07). Mean average flow rate (P= 0.09) While it was relatively significant in comparing group 1&11 with group 111 regarding Mean voiding volume (P= 0.02) Mean voiding time (P=0.01)

In comparing between group I (Y shaped ileal neobladders) and Camey II ileal neobladder, a statistically significant difference (P> ٠.٠١) was found regarding the pressure at maximum capacity.

In comparing between group I (Y shaped ileal neobladders) and group III (W- shaped ileal neobladder), a statistically significant difference was detected regarding the amount of the residual urine (P> ٠.٠٣). Also, a statistically significant difference was found regarding the maximum capacity (P=٠.٠٢). In comparing between group I (Y shaped ileal bladders) and group II (Camey II ileal neobladder) there is a statistically significant difference regarding the maximum urethral pressure (P= ٠.٠١).

In comparing between group I (Y shaped ileal neobladders) and group III (W- shaped ileal neobladder) a statistically significant difference was detected regarding functional urethral length (P> ٠.٠١).

Discussion

Orthotopic bladder substitution in men provides an excellent outcome of quality of life following radical cystectomy. However the radical demands for cancer surgery must not be compromised in favor of an

orthotopic substitute. Therefore, these patients with carcinoma in situ of the prostatic urethra, tumors near the bladder neck or infiltrating the prostate, multifocal papillary tumors, history of upper tract tumors or positive margins of frozen section of the transected prostatic urethra must be excluded (Ghoneim et al., ١٩٩٣).

In our study in evaluating diurnal continence, total diurnal continence was achieved in 12 patients (80%) having Y shaped ileal neobladder, 10 patients (66.6%) having Camey II ileal neobladder and 10 patients (66.6%) having W-shaped ileal neobladder.

Regarding nocturnal continence, complete nocturnal continence was achieved in 10 of the patients (66.6%) having Y shaped ileal neobladder, 9 patients (60 %) having Camey II ileal neobladder and 9 patients (60%) having W shaped ileal neobladder. Yoichi et al., (1999) enumerated the possible causes of nocturnal incontinence which include: loss of vesico-spinal external sphincter reflexes, osmotic pseudodiuresis, denervation of the sphincter mechanism, decreased nocturnal muscle tone and elevated pouch pressures.

Parekh et al., (2000) in their study on the cystectomy and orthotopic neobladder concluded that all patients acquired good day time continence and none required use of protective pads during the day. Of their patients, 71% were completely dry at night while 11% had good control with sporadic episodes of minor nocturnal leakage "occasional wetting". Nocturnal continence was fair in 15% who required only a single pad.

All patients in our study exhibited abdominal pattern of flow curve, mean maximum flow rate was above 15ml/sec in all the studied three groups. With analysis of the uroflowmetry of the three groups showed that there were no statistically significant difference between the three

groups regarding the maximum and average flow rate while the voided volume and the voiding time were higher in group ١١١ (W shaped bladder).

The ideal orthotopic reservoirs are adequately evacuated with residual urine less than ١٠٠ ml, in our study regarding group I (Y shaped ileal neobladder) residual urine was ٢٥.٣ ± ٩.٤ ml, in group II (Camey II ileal neobladder), residual urine was ٢٩.٨ ± ١٢.٦ ml and in group III (W-shaped ileal neobladders) was ٦٨ ± ١٩.٣ ml. Residual urine was statistically significant in case of ileal W neobladder.

Using anti-reflux techniques for uretero-ileal anastomosis is still under debate. The use of anti reflux technique in orthotopic reservoirs is of extreme importance to prevent ascending infection from the frequently infected reservoirs which could be deleterious to renal function, also absence of reflux allows progressive enlargement and maturation of the pouch otherwise it would remain small in size with limited capacity (Abo Enien et al., ٢٠٠١).

Stephan et al., (١٩٩٧) had advocated that anti reflux procedures may carry the risk of anastomotic stenosis especially in complicated procedures, to date it is unknown whether the complications arising from stenosis always overweight the potential advantages of preventing reflux or not.

In our study, Ie-Duc anastomosis showed deterioration in four units, three units deteriorated due to obstruction and one unit due to reflux. Direct anastomosis showed deterioration in two units in group I (Y shaped ileal neobladders) due to reflux while extramural serosally lined tunnels for ureteral anastomosis showed deterioration in five units that was due to obstruction in four units and reflux in one unit.

Conclusion

Changing ileal neobladder configuration from Y, U shaped to W shaped reservoirs did not improve diurnal or nocturnal continence significantly in the early or late postoperative period. Nocturnal incontinence and nocturea were common problems in all the studied groups. All patients exhibited abdominal pattern of flow curve as voiding is accomplished in all of them by abdominal straining.

We recommend proper detubularization and configuration of the ileal reservoir and meticulous handling of the external urethral sphincter with great attention to the urethro-ileal anastomosis and nerve sparing protocols to ensure good sphincteric function with efficient voiding.

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