Early Experiences with Studer's Orthotopic Neobladder

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ABSTRACT

Introduction: Radical cystectomy and urinary diversion is the standard treatment option for muscle invasive urothelial carcinoma of urinary bladder. We analyzed the complications and functional outcome of 21 consecutive patients who underwent radical cystectomy and studer ileal neobladder substitution.

Methods: This was a retrospective study from the review of chart and follow up details of 21 patients who underwent radical cystectomy and Studer ileal neobladder substitution from January 2009 to February 2014. Data obtained were the disease characteristics, both the early and late complications and urinary continence.

Results: Total 21 patients were evaluated. 17 patients were available for follow up of one year or more. One patient died secondary to surgery related complications and 2 died due to exacerbation of comorbidities. And one patient lost follow up after one year. The rates of early and late morbidity were 33.3% (7) and 19% (4). Prolonged ileus developed in three patients and urinary tract infection was the most common among early and late complications (2, 8%). Two patients developed anastomotic stricture. Complete day time and night time continence was achieved in 82% (14) and 33.3% (7) respectively. The mean maximum neobladder capacity at end of one year was 345 ml.

Conclusions: Outcome of studer's ileal orhtotopic neobladder in our series is comparable with others. The result of our study is promising and encouraging to pursue it as a primary treatment option for muscle invasive and recurrent urothelial carcinoma of urinary bladder.

Keywords: invasive urothelial carcinoma; radical cystectomy; sutder's orthotopoic neobladder; nocturnal incontinence.

INTRODUCTION

The worldwide incidence of bladder cancer is 386,000 per year[1]. It represents 4.7% of all cancers in men and 1.5% in female. Histologically 90% of bladder cancers are of urothelial origin and urothelial carcinoma is the second most common genitourinary tumors[2]. Urothelial carcinoma of urinary bladder was the 12th most common cancer visiting BP koirala Memorial Cancer Hospital and commonest among urological malignancy[3]. Radical cystectomy for urothelial carcinoma of urinary bladder serves as the gold standard for local control and survival of muscle invasive tumors and for recurrent and refractory tumors following bladder preservation therapies[4].

The goal of urinary diversion after radical cystectomy is not only simple diversion and protection of the upper tracts but also the natural functional and anatomic restoration of urinary tract. Since 1980 AD orthotopic reconstruction has evolved from "experimental surgery" to "standard of care at larger medical centers" to the "preferred method of urinary diversion" in both sexes[5]. The use of the ileum for orthotopic bladder substitution has gained general acceptance within the past decade, and orthotopic continent diversions have

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become the "gold standard" reconstructive procedure after radical cystectomy[6].

METHODS

Between January 2009 and February 2014, we performed 21 consecutive radical cystectomy and pelvic lymphadenectomy with urinary diversion by a Studer bladder substitute for the management of muscle invasive urinary bladder cancer and high risk bladder cancer. The criteria for selection was based on disease stage, renal and liver function, patient's choice of urinary diversion and compliance with routine follow up.

The cystectomy was performed following the standard procedure and the extent of lymph node dissection was decided by surgeon depending on the preoperative staging. The reservoir was constructed by isolating a 45 cm ileal segment about 15 cm proximal to the ileocecal valve (figure.1). The technique of the ileal neo bladder substitution has been followed after the studer et al.[7, 8,9] The pouch was then sutured to the edge of membranous urethra with a silicon catheter in situ. Cystostoma was placed in all cases. For the first week of the postoperative period, the reservoir was irrigated with 50 cc saline solution every four hours in order to dissolve mucous inside the reservoir. The ureteral stents were left inside for one week and were irrigated as needed. Three weeks postoperatively, pouchogram was done to evaluate for leakage, reflux, and anastomotic site stricture.

All patients were educated on how to reduce post-void residual urine and how to increase voiding volume and intervals. Initially, they were taught to empty the pouch less than 4 hours in a sitting position by relaxing the pelvic floor and increasing intra-abdominal pressure by valsalval maneuver. Our patients were followed regularly every 3 months for 2 years and then at yearly intervals thereafter. Out of 21 patients only 17 were available for follow up for more than one year.

Oncological and functional outcome was evaluated which included clinical, laboratory and metabolic assessments, and imaging procedures. Complete continence was defined as no involuntarily loss of urine and no pad use. Early and late complications were defined as complications that developed post operatively within 30 days and beyond 30 days.[9] Complications were defined as graded according to a modified Dindo-Clavein classification.[10] Variables evaluated include preoperative patient demographics, operative parameters post-operative parameters, pathological features, median survival and functional outcome. Values are expressed as means plus or minus standard deviation. Data were analyzed using SPSS 16.0 (SPSS Inc., Chicago, USA.)

RESULTS

We evaluated 21 male patients aged between 48 to 69 years who had undergone radical cystectoprostatectomy and orthotopoic ileal neobladder substitution. Details of patient's characteristics and operative details are outlined in table. 1. The pathological stage of the disease were Stage 0a (2), Stage 0is (1), Stage I (4), Stage II (10), Stage III (2) and stage IV (2) with no distant metastasis in all cases.

Table 1. Patient demographics (n=25)

Age (years)	60 ± 9.2
Underlying disease	
Diabetes	2
Hypertension	2
Respiratory Disease	1
ASA score	
I	9(42.8%)
II	12(57.2%)
III	0
Hospital stay (days)	28.6±11.5
Follow up duration (months)	58.2±30.4
Total operative time (min)	396.1±65.4
Estimated blood loss (ml)	767±298.9
Transfusion (n, %)	9(42.8%)
Number of dissected lymph node	10.7 ±8.8
Pathological Stage (n, %)	
Tis	1 (4.7)
Ta	2 (9.5)
T1	4(19)
T2	11 (47.6)
T3	3(14.2)
T4	0

Pathological node positive (n, %)	2 (9.5)
Resection margin positive (n, %)	0
Median survival time (months)	60.3

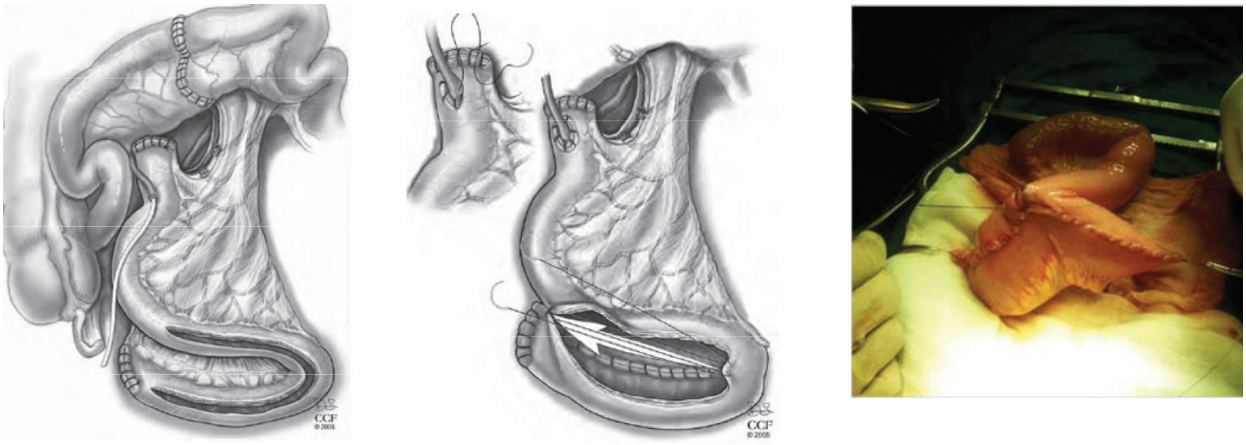
Complications were assessed in short term (within 30 days) and long term (90 days) which were 33.3% (7) and 19 % (4) respectively. The perioperative mortality is 1 (4.7%).) The mortality in periopeative period was due to severe sepsis secondary to anastomotic leakage. Three patients died during follow up, one due to surgical complications (acute intestinal obstruction) and other two secondary to chronic cardiaopulmonary diseases.

Table 2. Functional Outcome of 20 patients evaluated at 1 year or more.

Complete Continence	At 6 months (n= 19)	At 1 year (n=17)
Day time	14(73.3%)	14(82%)
Night time	6(31.5%)	7(33.3 %)
Mean Maximum Bladder capacity (ml)	280	345
Mean maximum Residual Volume (ml)	32	22

Table 3. List of Short and long term complications following surgery.

Complication parameter	Short term complications	Long term complications
Number of morbid patients (n, %)	7(33.3)	4 (19)
Clavien-DindoClassificaiton (n)		
Grade I	2	0
Grade II	3	1
Grade IIIa	0	2
Grade IIIb	1	0
Grade IV	1	1
Grade V (mortality)	1	1
Complications (n)		
Metabolic acidosis	1	
Prolonged Ileus	3	
Wound dehiscence/ Burst abdomen	1	
Respiratory complications	1	
Urinary tract infection (pyelonephritis)	2	2
Acute/chronic Renal insufficiency	1	
Sepsis	1	
Ureteroenteric stricture/obstruction	0	1
Ureteroenteric leakage/disruption	1	
Enteric anastomotic leakage/ disruption	1	
Intestinal obstruction	0	2
Urethral stricture	0	1



(A) (B) (C)

Fig 1.(A) 45-55 cm of distal ileum is isolated, beginning 15-20 cm proximal to the ileocecal valve. 10- 15 cm of the proximal segment (afferent limb) is left intact for attachment to the ureters.The small bowel anastomosis is completed and 30-45 cm of the ileal segement is detubularised along the antimesenteric border. **(B)** The back wall of the neobladder is closed with running absorbable suture. The neobladder is then folded end-to-end and closed with additional running suture. The end to side ureteral-intestinal anastomosis is done overstent (**C)** Intraoperative appearance of the completed neobladder ready for the neobladder-urethral anastomsis.

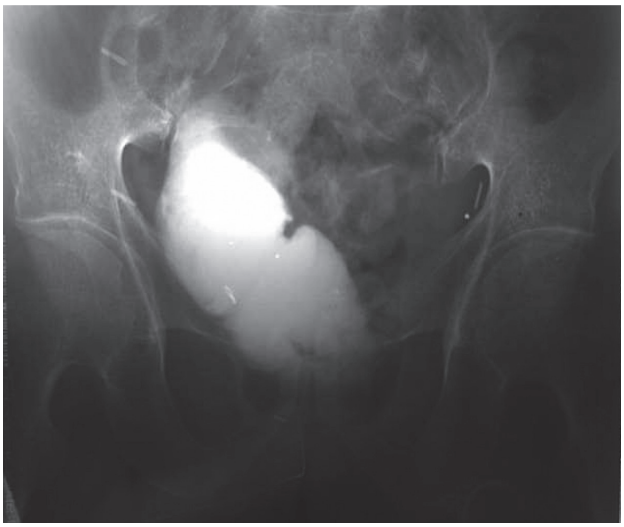


Fig 2. Pouchogram of ileal studer orthotopic neobladder at 3 weeks.

DISCUSSION

Radical cystectomy (RC) with pelvic lymphadenectomy has been established as the standard for the treatment of muscle invasive and high risk bladder cancer. It effectively removes the primary tumor and the regional lymph nodes that may contain metastasis in about 25 % of patients undergoing this procedure[11,12]. According to the treatment EUA Guidelines, patients with non metastatic, operable invasive bladder cancer are treated with radical cystectomy, pelvic lymphadenectomy and urinary diversion[13]. Contemporary objectives of the urinary diversion should consider quality of life issues, eliminating the need for cutaneous urostomy, the need for a urostomy appliance and the need for intermittent catheterization while maintaining a more natural voiding pattern that allows micturation through the intact native urethra[14].

The characteristics of an ideal intestinal bladder substitution are low pressure, adequate capacity and high compliance, which provide continence and voluntary control of voiding without residual urine in order to provide improved quality of life and self image. The Studer orthotopic ileal neobladder has the advantages of satisfactory continence rate, absence of urinary leakage and freedom from intermittent catheterization[15]. In addition, renal function is preserved, and intestinal malabsorption and fluid and electrolyte imbalances are avoided[8,16]. These features have rendered the Studer bladder substitution one of the most ideal orthotopic urinary diversions.

The early and late complications rates in our series were 33.3 % and 19 % respectively. Also the complications related mortality is 1 (4%) in both early and late period. Reported rates and types of complications vary widely. Studer et al. over twenty years experienced overall perioperative complications of 12.6% (61 out of 482) that required prolonged hospital stay and late complications rate of 23.8% (115 out of 482).[17]The result of the previously reported large numbered studies involving orthotopic neobladder subsitution showed early and late modbidity and mortality rate of (11.0–57.2%/2.0–3.1% and 19.0–40.8%/ 5.7–8.3%, respectively)[16,18-21]. Morbidity of RC has been significantly influenced by many factors, including age, baseline underlying diseases, operative skills and methods and disease status. Most early complications are bleeding, neurologic, thromboembolic, cardiac and pulmonary complications. The early diversion related complications are wound related, gastrointestinal related, genitourinary and infection. Similarly late complications that may be related to the diversion itself include loss of kidney funciton, pyelonephritis, anastomotic related, urinary tract stones, and incontinence[6,22].

A wide range in prevalence of acidosis has been reported among patients with neobladder, as has the need for early or long-term sodium bicarbonate therapy. All of our patients received 3 – 6 gm of Sodium Bicarbonate orally for 3 to 4 weeks. The rate of metabolic acidosis ranges from 5.5 % to 13.3 % and largely depend upon the bowel segment used for neobladder reconstruction[23]. Bacterial colonization of the neobladder diversion occurs in 40-80 % of patients. Colonization is usually secondary to residual urine, and nearly 6% patient progress to overt pyelonephritis at some point following urinary diversion[24-26]. In the absence of obstruction, upper urinary tract infections can be managed with an administration of culture-specific antibiotics. In our cases, two (9.5%) patients had recurrent pyelonephritis. Ureterointestinal and urethral stricture are the most difficult complications. The reported incidence of this complication is approximately 2.4-9%[22,27].

The functional capacity of neobladder increases gradually with time[28]. The mean functional capacity of neobladder was 280 ml and 345 ml in 6 months and one year follow up. An intact urethral sphincter mechanism and pelvic floor are responsible for the continence mechanism[22,29,30]. Additional factors that may influence continence include urethral length and sensitivity, patient age and mental status, intact pelvic nerve supply to the rhabdosphincter, completeness of voiding, and presence or absence of bacteriuria.

In our study complete day and night time continence was observed in 82 % and 33.3 % of the patients respectively at the end of one year. 66 % of the patients have some degree of night time incontinence. Most series reported complete day and night time continence of range 89 % - 94 % and 29 % - 36 %[22,28]. Nocturnal incontinence following orthotopic bladder substitution results from the absence of a neuro-feedback to the brain, of sphincter-detrusor reflex, as well as decreased sphincter tone at night[30]. The functional voiding outcome with an orthotopic neobladder is excellent with high continence rates and generally good bladder emptying that offers higher quality of life in comparison to incontinent diversion[15].

Small sample size and short follow up with subjective assessment of urine flow were some of the limitations.

CONCLUSIONS

Our results with the Studer orthotopic ileal neobladder have an acceptable complication rate and technically feasible, with good functional outcome. However the impact of urinary diversion on the quality of life still remains controversial, although long-term data argue in favor of orthotopic bladder substitution

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