

Functional outcome of robotic-assisted intracorporeal versus extracorporeal neobladder following radical cystectomy: Initial experience

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Abstract

Introduction: Worldwide, the seventh most commonly diagnosed cancer in the male population is Bladder cancer (BC), while it drops to eleventh when both genders are considered. Radical cystectomy is the surgical treatment of choice for patients with all muscle-invasive and some nonmuscle invasive BCs. An orthotopic continent diversion (neobladder) is preferred whenever possible to achieve a better postoperative quality of life. We attempt to study the functional outcomes of intracorporeal neobladder (ICNB) versus extracorporeal neobladder (ECNB) (ICNB vs. ECNB).

Materials and Methods: Forty patients who underwent robot-assisted radical cystectomy with neobladder in our institute during the period of March 2016–March 2018 were included in the study. An orthotopic neobladder (Studer method) was created in all our patients. Our main outcomes of interest were peak flow rates, residual urine, attainment of continence, and Pdet at qmax of the neobladder.

Results: The mean age of patients in our study group was 54 ± 6 years. The mean body mass index was 23 ± 2 kg/m². The mean follow-up period was 24 ± 5 months. Twenty patients underwent ICNB and 20 patients underwent ECNB. The urodynamic assessment was done 1-year postprocedure. The same parameters applied to an intact bladder are used, and results analyzed by comparing it with other studies. Common in the initial postoperative period was incontinence which reduced substantially over time. After 1-year, 75% of patients did not require pads in the daytime, and a meager, <10% used more than one pad per day. There was no difference in outcome between both the groups, which was statistically significant.

Conclusion: Both ICNB and ECNB groups achieved urodynamically proven values of adequate bladder capacity and compliance. Daytime continence was excellent, and night time continence was good in both groups. Furthermore, there was no significant difference between both the groups as regards to urodynamic parameters. However, continence is attained little earlier in the ICNB group. There is no perceived superiority of ICNB over ECNB.

Keywords: Bladder cancer, neobladder, radical cystectomy, urodynamic parameter

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INTRODUCTION

The seventh most commonly diagnosed cancer in the male population worldwide is Bladder cancer (BC), while it drops to eleventh when both genders are considered.^[1] Almost 75% of patients with BC present with stage Ta, i.e., disease confined to the mucosa (stage Ta, carcinoma *in situ*) or submucosa (Stage T1).^[2]

Radical cystectomy is the surgical treatment of choice for patients with muscle-invasive and certain nonmuscle invasive BCs. With the advent of Robotic surgery and increasing expertise robot-assisted radical cystectomy (RARC) is likely to become the minimally invasive technique of choice.^[3]

When choosing the method of urinary diversion, maintaining the quality of life following radical cystectomy is an important consideration. An orthotopic continent diversion (neobladder) is preferred over an ileal conduit, which is the traditional form of urinary diversion, whenever possible, to achieve a better postoperative quality of life.^[3]

The advantages of neobladder include avoidance of stoma, better physical function, permits urethral voiding, and improved psychological well-being.

Neobladders ideally function as a continent reservoir that allows for efficient urethral emptying. However, there is a potential for both incontinence and urinary retention.

There are many studies on perioperative outcomes and complications of intracorporeal neobladder (ICNB) versus extracorporeal neobladder (ECNB) following RARC. However only a few studies compare the functional outcomes of the neobladder. Hence, we attempt to study the functional outcomes of neobladder (ECNB vs. ICNB).

MATERIALS AND METHODS

Forty male patients who underwent RARC with neobladder in Yenepoya Medical College during the period of March 2016–March 2018 were included in the study.

While no strict eligibility criteria were used in general, neobladder diversions were advocated for patients with good physical, cognitive and renal function and were randomly categorized into ECNB versus ICNB according to patient's wish (after explaining the procedure, advantages and disadvantages of both ECNB and ICNB and taking consent).

Alternative forms of diversion (ileal conduit or continent catheterizable pouches) are offered to patients who are not candidates for neobladder due to other medical conditions

(e.g., renal dysfunction), preexisting urinary incontinence, urethral strictures, etc.

In all cases, an orthotopic neobladder (ONB) (Studer method) was created. Ureteral stents were routinely externalized, and suprapubic catheters not used.

Operative procedure

The terminal portion of the ileum (54–56 cm long) is isolated approximately 15–20 cm proximal to the ileocecal valve.^[4]

The distal mesenteric division is placed on the avascular plane between the terminal branches of the superior mesenteric artery and ileocolic artery and. The proximal mesenteric division, which is short, provides a broad vascular blood supply to the reservoir.

Discarding a small window of the mesentery and 5 cm of small bowel proximal to the overall ileal segment ensures mobility to the pouch and small bowel anastomosis. Bowel anastomosis is performed using staplers.

Forty–44 cm of distal ileum is used to create the Studer pouch with each limb of the U measuring 20–22 cm and a proximal 15-cm segment of ileum used as the afferent limb. An absorbable suture is used to close the proximal end of the isolated afferent ileal segment.

The isolated ileal segment is opened about 2 cm away from the mesentery, and the incised ileal mucosa is then oversewn with two layers of a running 3-0 polyglycolic acid suture.

The urethral catheter and ureteral stents were removed 3 weeks following surgery.

All patients were assessed postoperatively with ultrasonography and uroflowmetry.

The severity of incontinence (during the day and night) was categorized as: fully continent (no use of pads); mild incontinence (one pad per day or night), or incontinent (two or more pads per day or night).

Our main outcomes of interest were peak flow rates, residual urine, attainment of continence, and Pdet at qmax of neobladder.

Urodynamic assessment

Initially, patient was allowed to void and was then catheterized to drain the reservoir of urine to determine Post Void Residual Urine (PVRU). Using a 7-Fr. transurethral catheter and 10 Fr rectal balloon catheters, standard three-channel filling cystometry was performed.

The pouch was filled with normal saline at a rate of 20–50 ml/min at room temperature until any of the following occurred; discomfort, leakage, or volume of 700 ml was reached.

The parameters noted were compliance, maximum capacity, Pdet at max capacity, voided volume, flow rate, and residual volume.

Continence assessment

Continence was scored according to the standards as recommended by the International Continence Society,^[5] as shown in Table 1.

Inclusion criteria

All patients with muscle invasive BC T2 N0 M0 who are otherwise healthy and fit for general anesthesia.

Exclusion criteria

- T3 T4 lesions
- N1/N2/N3 disease
- M1 disease
- Prostatic stromal involvement
- Positive urethral margins.

RESULTS

The mean age of patients in this study was 54 ± 6 years. The mean body mass index observed was 23 ± 2 kg/m². The mean follow-up was 24 ± 5 months. The neobladder reconstruction was done using studer pouch technique in all patients.

Twenty patients underwent ICNB and 20 patients underwent ECNB. The urodynamic assessment was done 1-year postprocedure, and mean values of various parameters are enumerated in Table 2 and Figures 1-4.

Incontinence was a common symptom observed in the initial postoperative period, which reduced substantially over time.

After 1-year, 75% of patients were dry by day (did not require pads in the daytime), and <10% used more than one pad per day. However, attainment of continence is early in ICNB group.

Despite high daytime continence rates, nighttime incontinence was more prevalent, with 35% of the patients required pads at night and 28% needed more than one pad per night.

DISCUSSION

ONB is an option for urinary diversion for patients undergoing radical cystectomy and who seek near-normal functional outcomes. There are very few studies on functional outcomes of neobladder, which are prospective, longitudinal, and randomized. Ours is one among those few studies. We further strove to reduce the bias by evaluating the functional outcomes by another urologist who is not a part of the operating team. The only limitation to our study is the random assignment of patients into ICNB and ECNB groups based on patient choice alone.

Currently, there is no consensus about the urodynamic assessment of the intestinal neobladder. The same parameters applied to an intact bladder are used without considering that the intestine was not originally conceived to store or void urine. Urodynamic results depend on the type, length, and configuration of the intestinal segment

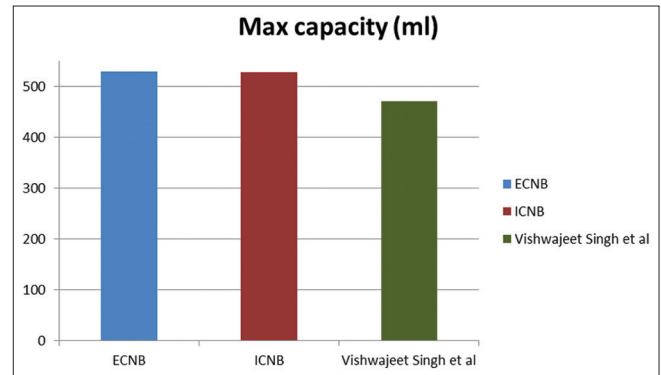


Figure 1: Comparison of maximum capacity of neobladder

Table 1: Definitions of day and night time continence according to international continence society

Characteristics	Continence status	Voiding status
Day time continence		
Completely dry (without need for protection)	Continent	Good
Completely dry (protection for safety)	Continent	Good
No more than one pad a day (damp once or twice a week)	Socially continent	Satisfactory
No more than one pad a day (damp)	Socially continent	Satisfactory
More than 1 pad a day (wet or soaked)	Incontinent	Unsatisfactory
Night time continence		
Dry (with no sanitary pad required)	Continent	Good
Dry (with one awakening)	Continent	Fair
Wet, leakage and incontinence during sleep	Incontinent	poor

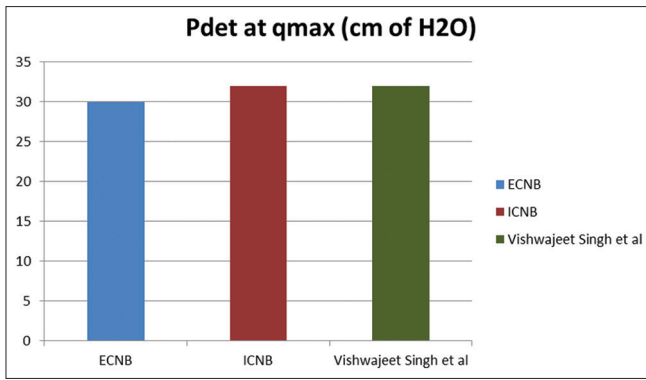


Figure 2: Comparison of detrusor pressure at maximum flowrate of neobladder

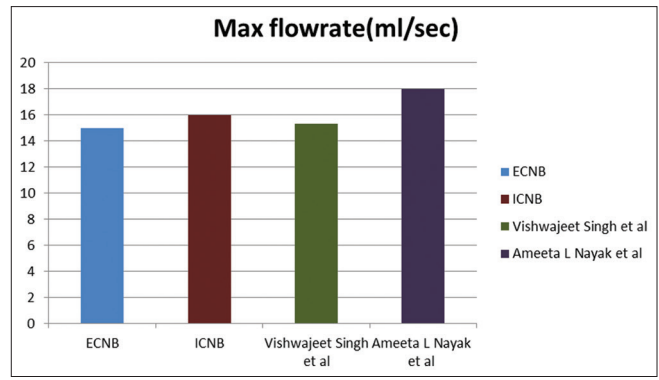


Figure 3: Comparison of maximum flowrates of neobladder

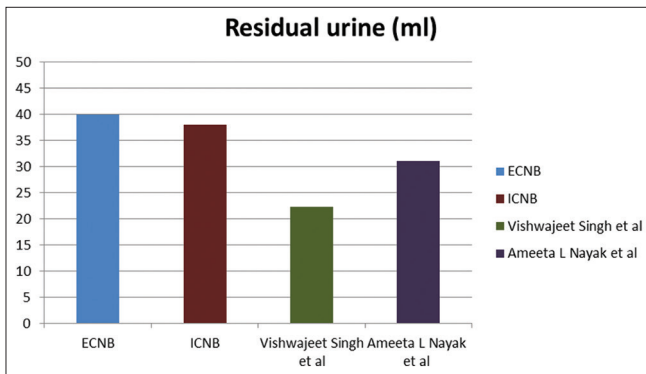


Figure 4: Comparison of residual urine in neobladder

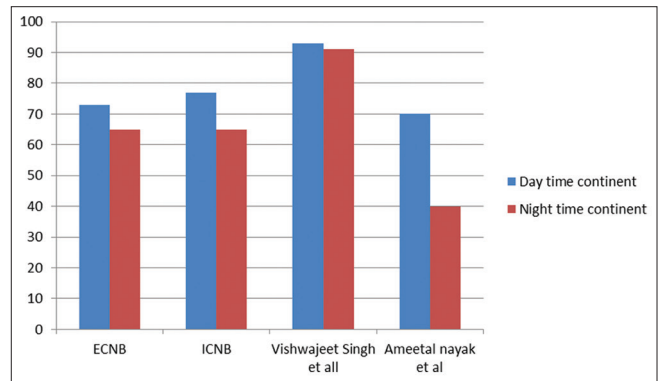


Figure 5: Percentage of patients attaining continence in various studies

Table 2: Various parameters of UDS done 1 year postprocedure

	Present study ECNB	Present study ICNB	Singh et al. ^[6]	Nayak et al. ^[3]
Max capacity (ml)	530	528	471	-
Pdet at qmax (cm of H ₂ O)	30	32	32	-
Max flow rate (ml/s)	15	16	15.3	18.0
Residual urine (ml)	40	38	22.25	31

ICNB: Intracorporeal neobladder, ECNB: Extracorporeal neobladder, UDS: Urodynamic study

Table 3: Percentage of patients attaining continence in various studies

	Present study ECNB	Present study ICNB	Singh et al. ^[6]	Nayak et al. ^[3]
Daytime continence (%)	73	77	93	70
Nighttime continence (%)	65	65	91	40

ICNB: Intracorporeal neobladder, ECNB: Extracorporeal neobladder

used. They are also dependent on the time elapsed after surgery since overall capacity seems to increase during the first 6–9 months.^[5-9]

Our urodynamic parameters are almost similar in both ICNB and ECNB groups and are consistent with the results of Singh et al.^[10] and Nayak et al.^[3]

Daytime incontinence as well as nighttime incontinence in neobladder patients is common following surgery but

improves considerably over time. By 1-year postradical cystectomy, 75% and 65% use no pads during the day and night, respectively. This is almost equal to Nayak et al.^[3] results [Figure 5 and Table 3]. However, Singh et al.^[10] observed higher continence rates. Current selection practices showed similar continence between men and women. Also, we observed that patients who underwent ICNB have attained continence earlier than the ECNB group.

For both men and women, nighttime incontinence is more prevalent than daytime incontinence. Radical cystectomy interferes in the nervous reflex loop and destroys the key anatomic structure responsible for voiding control caused by resection of the bladder neck and prostatic urethra.^[11] Therefore, continence after ONB is dependent on an intact urethral sphincter mechanism and pelvic floor. These can maintain resistance pressure across the urethral continence zone.^[12]

Additional factors influencing continence include urethral length and sensitivity, patients' age and mental status, and intact pelvic nerve supply to rhabdosphincter.^[11] Nocturnal incontinence in these patients has been attributed to several causes. The majority of the factors are the absence of a "guarding" reflex, increased dwelling time of

concentrated urine that is diluted via osmosis through the neobladder mucosa and also potentially due to increased nocturnal urine production.^[13] In our study, we have observed that continent urinary diversion is possible in radical cystectomy patients with acceptable urinary function for most patients. Future prospective studies with validated and standardized outcome measures will be helpful in improving the precision of postoperative estimates of function.

CONCLUSION

Both ICNB and ECNB groups achieved urodynamically proven adequate capacity and compliance. Both group of patients finally developed acceptable residual urine and good flow rate. There was no significant urodynamic difference between ICNB and ECNB. Daytime continence was excellent, and night time continence was good in both groups. With regard to urodynamic parameters, there was no significant difference between both groups. However, continence is attained little earlier in the ICNB group. There is no perceived superiority of ICNB over ECNB. Either of the two can be offered to all suitable Indian men undergoing radical cystectomy depending on the patient's choice.

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Conflicts of interest

There are no conflicts of interest.

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