

Santosh PGI pouch: A new innovation in urinary diversion

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Introduction To know the feasibility and outcome of the Santosh PGI pouch as a new innovative technique of continent cutaneous diversion (CCD) following cystectomy.

Material and methods Twelve patients (eleven with carcinoma of the bladder and one with an exstrophy of the bladder) underwent CCD using the Santosh PGI pouch after cystectomy. A 50-cm segment of terminal ileum was isolated 15-20 cm proximal to the ileocecal junction. The ileal segment was folded into the form of an 'S' configuration. On the antimesenteric border three longitudinal incisions were performed of about 7 cm in length. The terminal 8 cm portion of the distal part of the pouch was used for creating the intussuscepted nipple valve. Demucosalization of the interior of the nipple, fixing the nipple valve with the serosa of the pouch wall and wrapping of the catheterizable channel with a pouch wall for providing continence was done. The uretero-pouch anastomosis was done using the serosal lined tunnel technique. The catheterizable channel was brought out through the right rectus muscle.

Results Median follow-up of the patients was 13.5 months. No significant complications were noted in the pouch reconstruction. Duration of the pouch reconstruction was around 75-110 min. Postoperatively, one patient had a UTI and another had paralytic ileus on the follow-up. All patients were doing regular CIC with acceptable continence of up to 400 ml. No ureteroileal anastomotic stricture or difficulty in catheterizing the pouch was seen.

Conclusions The Santosh PGI pouch, which is a type of CCD, is technically feasible, easy to reconstruct with acceptable continence and offers minimal morbidity.

Key Words: Santosh PGI pouch ↔ carcinoma bladder ↔ urinary diversion ↔ continent cutaneous

INTRODUCTION

Urinary diversion in the form of ileal conduit, continent cutaneous diversion (CCD) or orthotopic neobladder (ONB) are indicated after cystectomy for various indications like carcinoma of the bladder, neurogenic bladder and exstrophy epispadias complex [1, 2, 3]. Retentive diversion, either CCD or ONB, is only considered in patients with normal hepatic and renal function [3, 4].

Continent cutaneous pouches using various techniques were described in the past like the Koch pouch, Indiana pouch, Penn pouch and the double T Pouch [3-7]. These pouches differ based on the segment of bowel, length of bowel and the mecha-

nism of continence being used to reconstruct them [9]. Pouches using the ileocecal valve will lead to fat malabsorption and nutritional problems [9, 10]. Pouches which do not use the ileocecal valve, like the Double T pouch, need long lengths of ileum and are complex to construct [10]. So we attempted to reconstruct a new form of the continent cutaneous pouch which involved using a short length of the ileum, preserving the ileocecal valve and easy technical reconstruction, while still providing acceptable continence.

We describe the preliminary results of our new innovative Santosh's Post Graduate Institute (PGI) pouch which is a type of continent cutaneous diversion following cystectomy for various indications.

MATERIAL AND METHODS

This is a retrospective study including twelve cystectomy patients who underwent CCD using the Santosh PGI pouch at our institute. The details of the patients were obtained from the hospital records, their perioperative course, complications encountered and the outcome of the surgery was reported. Demographic data is shown in Table 1.

Surgical technique

Midline infraumbilical incision was performed. Initially, radical cystoprostatectomy was done. After removal of the specimen, bilateral standard pelvic lymph node dissection was completed. The patient with exstrophy of the bladder underwent cystectomy only. A piece of 50-cm segment of the terminal ileum was isolated 15-20 cm proximal to the ileocecal junction (Figure 1A). Restoration of the ileal bowel continuity was done in an end to end fashion in two layers using an absorbable suture. The isolated ileal segment was thoroughly washed with saline and it was folded in the form of an 'S' configuration (Fig-

ure 1B, 1C). Proximal end of the S loop was closed with absorbable 3-0 suture. On the antimesenteric border of the S loop three longitudinal incisions were performed of around 7 cm in length (Figure 2A, 2B).

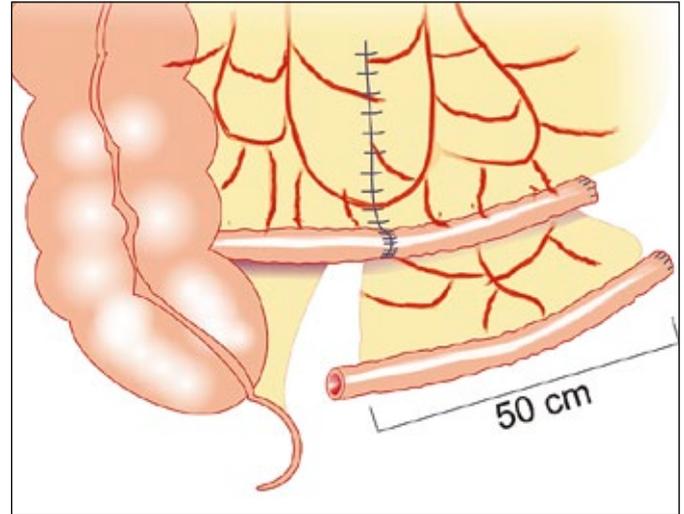


Figure 1A. Pictorial depiction of the ileal segment being used for pouch reconstruction.

Table 1. Demographic data

S. no.	Age (years)/sex	Diagnosis	Duration of pouch construction (min)	Perioperative complications	Bowel length used (CMS)	Pouch volume	Follow up (months)
1.	55/Male	Squamous cell carcinoma bladder	110	None	45	300 (no pouch wrap was done)	16
2.	46/Male	Muscle invasive carcinoma bladder Post Neoadjuvant chemotherapy	110	UTI	50	350	16
3.	50/Male	Muscle invasive carcinoma bladder	100	None	50	400	15
4.	18/Male	Extrophy epispadias complex	75	None	50	400	15
5.	53/Male	Muscle invasive carcinoma bladder	80	Paralytic ileus	50	350	14
6.	55/Male	Muscle invasive carcinoma bladder	85	None	50	400	13
7.	60/Male	Muscle invasive carcinoma bladder	80	None	50	400	13
8.	58/Male	Muscle invasive carcinoma bladder	85	None	50	350	13
9.	62/Male	Muscle invasive carcinoma bladder	85	None	50	350	12
10.	60/Male	Muscle invasive carcinoma bladder	80	None	50	400	11
11.	57/Male	Muscle invasive carcinoma bladder	85	None	50	400	11
12.	64/Male	Muscle invasive carcinoma bladder	85	None	50	400	10

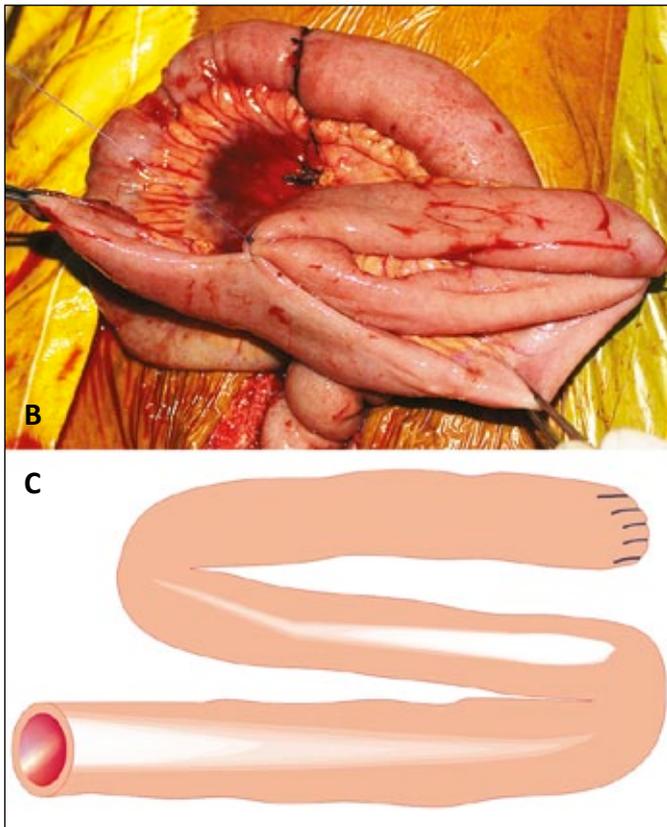


Figure 1B, 1C. 50 cm of Ileal segment kept in S configuration and its pictorial depiction.

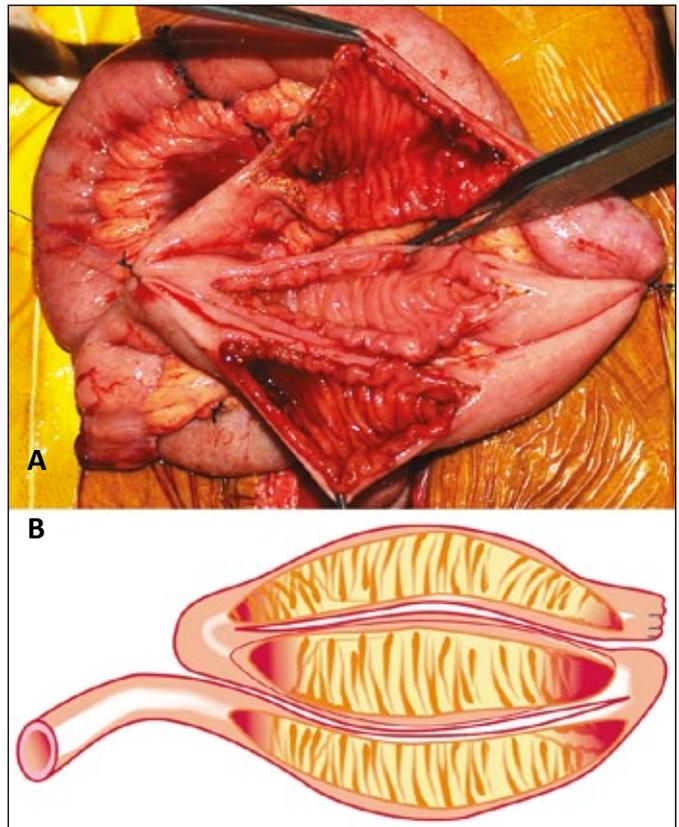


Figure 2A, 2B. Three limbs of S loop being opened in the antimesenteric border by small incisions and its pictorial depiction.

Posterior aspects of the three limbs of the S loop were sutured to one another to create the posterior wall of the pouch using a 2-0 vicryl suture (Figure 3A, 3B). The terminal 8 cm portion of the distal part of the S loop was used for creating the nipple valve. This nipple valve was constructed by intussuscepting the distal most ileal segment into the pouch (Figure 4). The nipple valve along with the adjoining pouch wall was demucosalized and both the apposed demucosalized walls were fixed with 2-0 vicryl interrupted sutures (Figure 5A, 5B). Again the constructed nipple valve was fixed outside the pouch to the surrounding ileal serosa using an interrupted 3-0 silk suture (Figure 6). The caliber of the catheterizable channel was reduced by plicating it with vicryl sutures (Figure 7A, 7B). For creating better continence the catheterizable channel was also wrapped by the pouch wall through a mesenteric window and fixed with a silk suture (Figure 8A, 8B). The ureteropouch anastomosis was done using the serosal lined tunnel technique (Figure 9A, 9B). Two 8 Fr ureteric splints, a 16 Fr perstomal catheter and an 18 Fr transmural pouchostomy catheter were placed. The pouch was closed by approximating the proximal and distal limbs of the S loop anteriorly by using

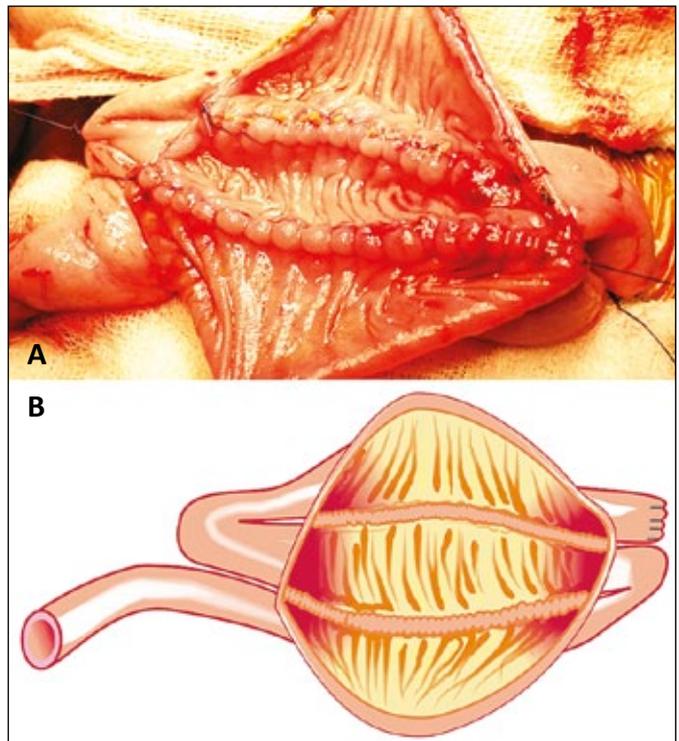


Figure 3A, 3B. Posterior wall of the pouch was reconstructed using 2-0 vicryl continuous sutures and its pictorial depiction.

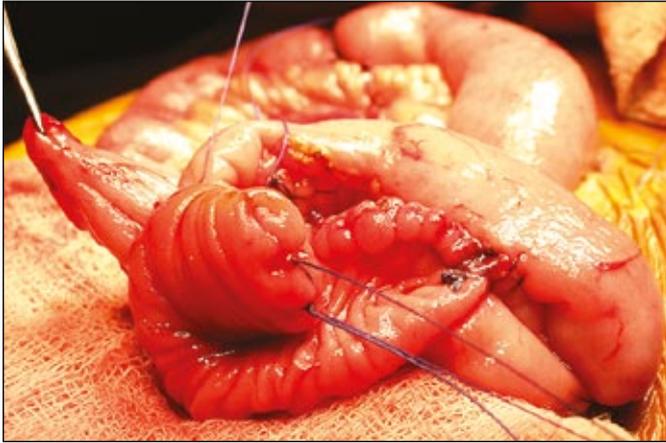


Figure 4. Intussuscepted distal ileal segment to form the nipple valve.

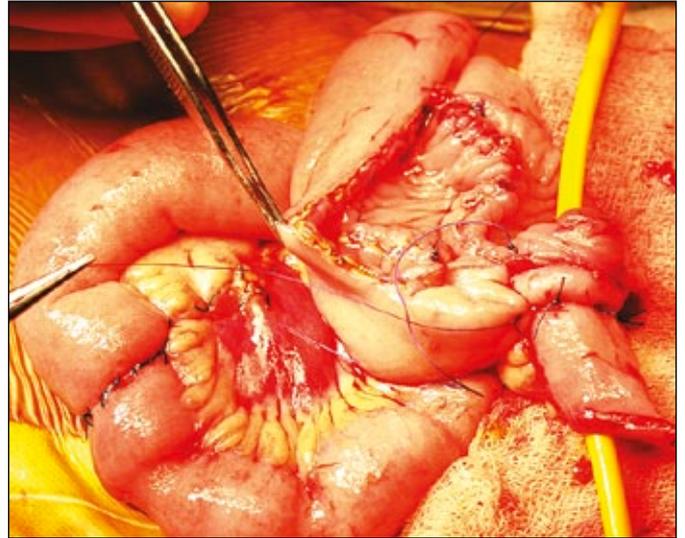


Figure 6. Nipple valve being fixed outside the pouch to the surrounding ileal serosa using 3-0 silk suture.

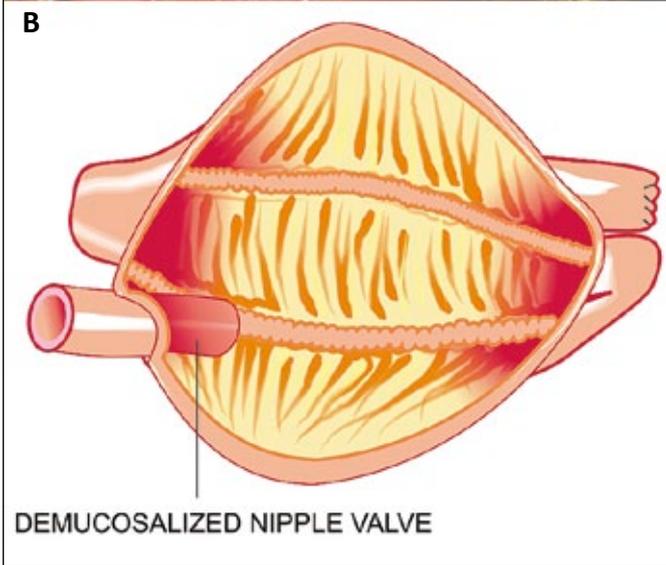
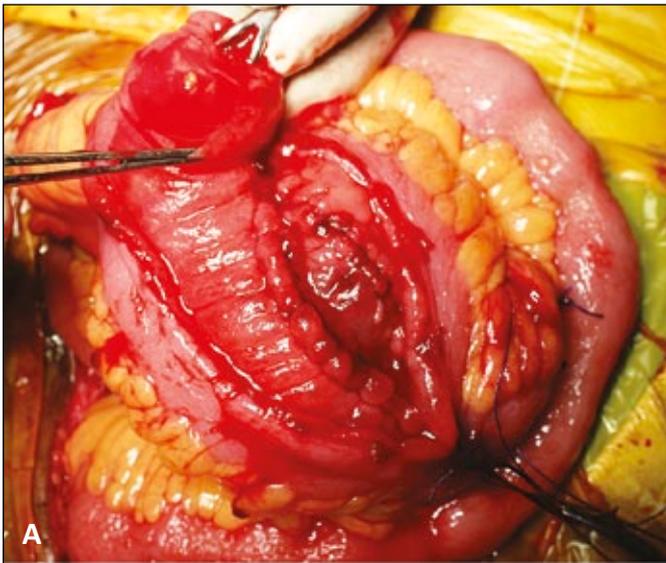


Figure 5A, 5B. Demucosalization of interior of the nipple valve and its pictorial depiction.

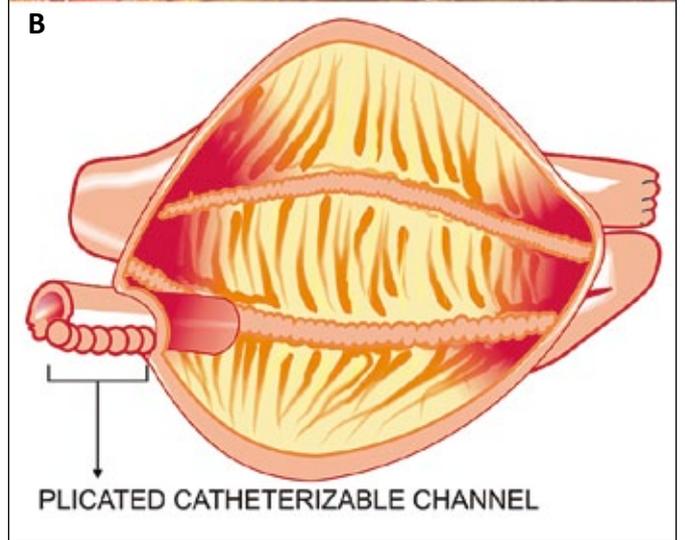
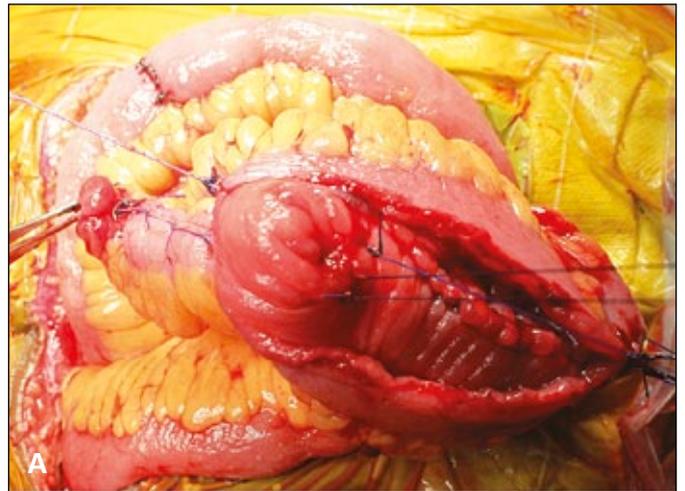


Figure 7A, 7B. Plication of the intussuscepted distal ileal segment with interrupted vicryl sutures and its pictorial depiction.

a 2-0 vicryl continuous suture. We named this pouch as the Santosh's PGI pouch (Figure 10A, 10B, 11). The catheterizable channel was brought out through the right rectus muscle via an oblique subfascial tunnel and was fixed to the rectus sheath. After pouch reconstruction, we confirmed the catheterization of the pouch on Table. The pouch integrity and continence was checked on Table with saline. The pouch was also fixed to the parietal wall inside the abdomen. The abdomen was closed in layers after placing a 24 Fr abdominal drain (Figure 12). A follow-up pouchogram was done after 3 weeks (Figure 13). Follow-up was done by performing a VBG (venous blood gas analysis), serum creatinine and ultrasound of the kidneys, if clinically indicated.

RESULTS

The duration of pouch reconstruction, perioperative complications, pouch volume and the follow-up of all the patients were shown in Table 1. An abdominal

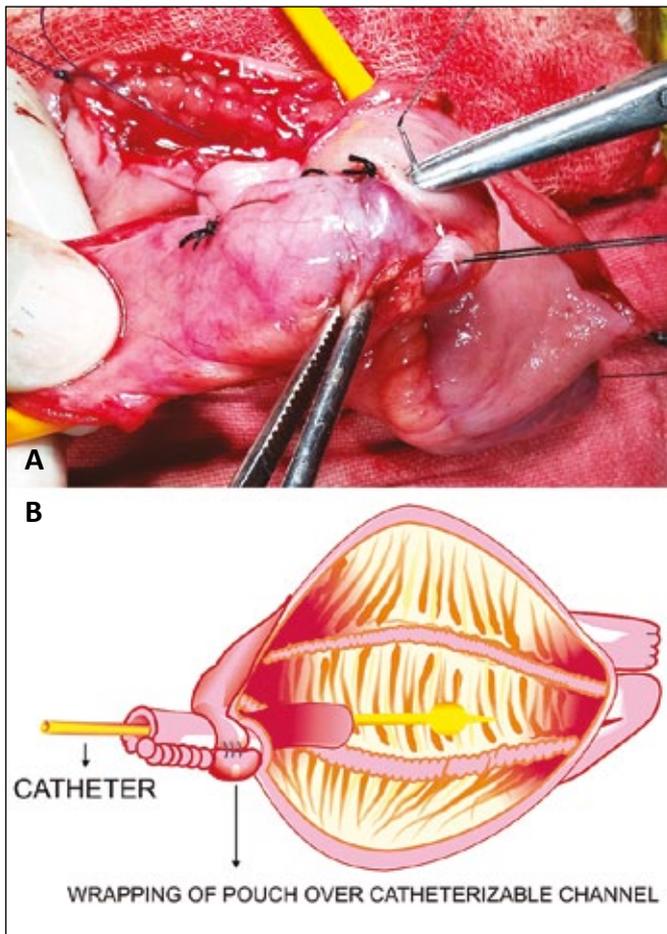


Figure 8A, 8B. Nipple valve wrapped by the pouch wall through a mesenteric window using vicryl suture and its pictorial depiction.

drain was removed when the output was less than 50 ml. Ureteric splints were removed after 10 days postoperatively. CIC was started by day 21 and by day 23 the transmural pouchostomy catheter was removed. All patients were fully continent up to 350-400 ml, except the first patient who was continent up to 300 ml only. The second patient had a UTI on follow-up requiring hospital admission and IV antibiotics for the next few days. One patient had a paralytic ileus which resolved with conservative management. According to the Clavien-Dindo classification these complications came under Grade II. No other complication was reported in the rest of the patients. No patient developed ureteroileal anastomotic stricture on follow-up. None of the patients

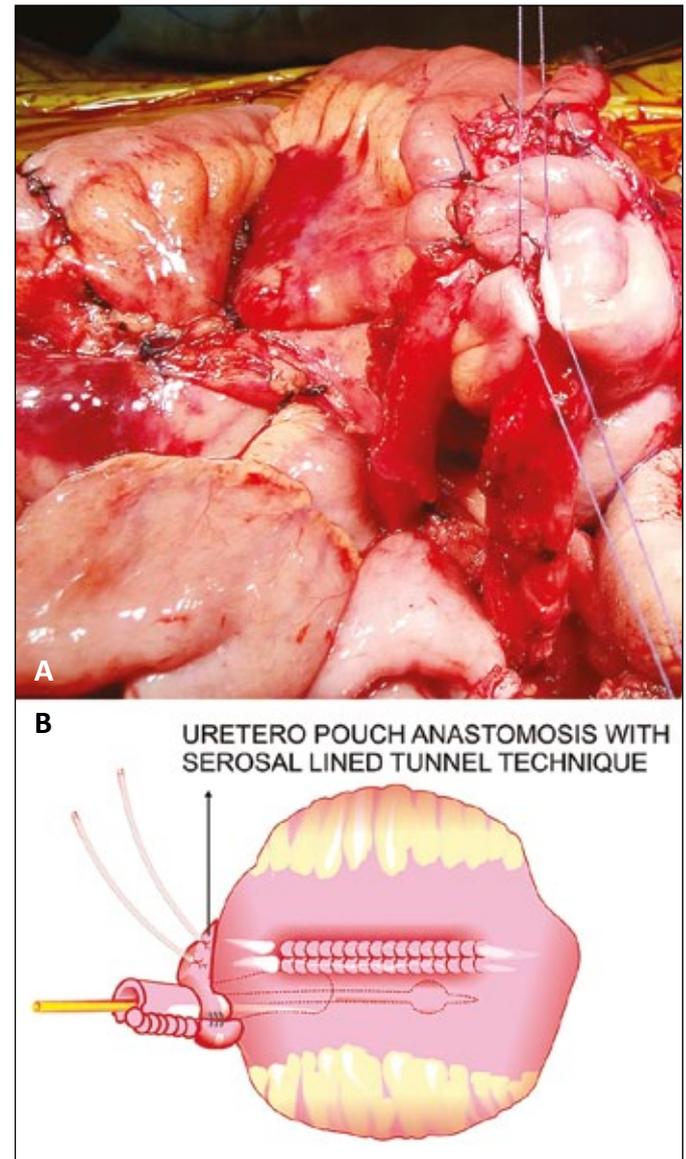


Figure 9A, 9B. Ureteroileal anastomosis using serosal lined technique and its pictorial depiction.

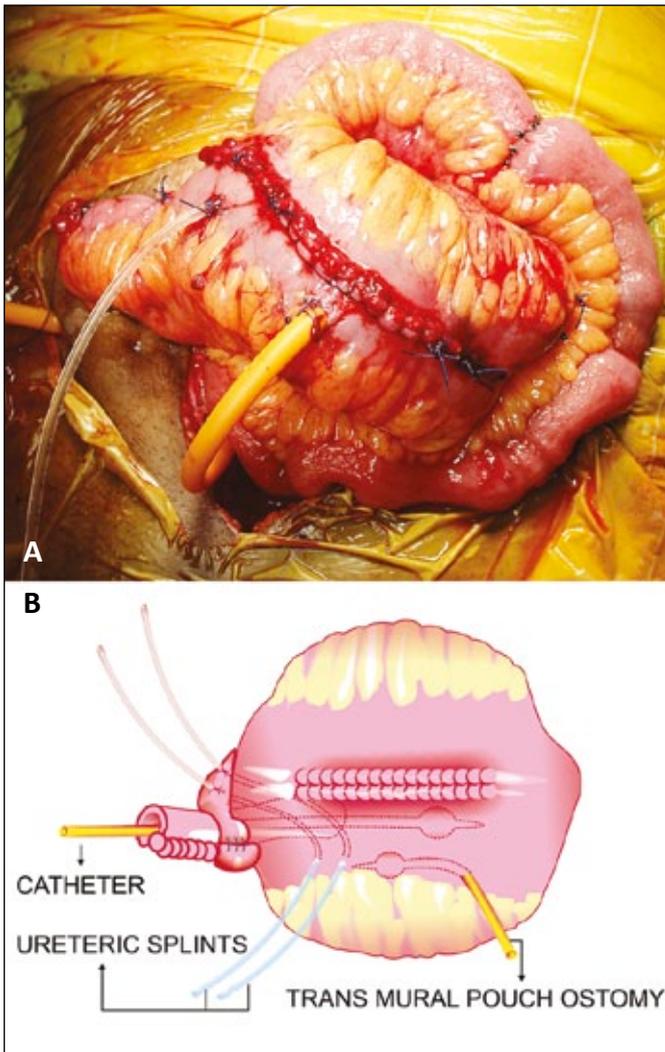


Figure 10A, 10B. The completed Santosh PGI pouch with catheters and splints insitu and its pictorial depiction.

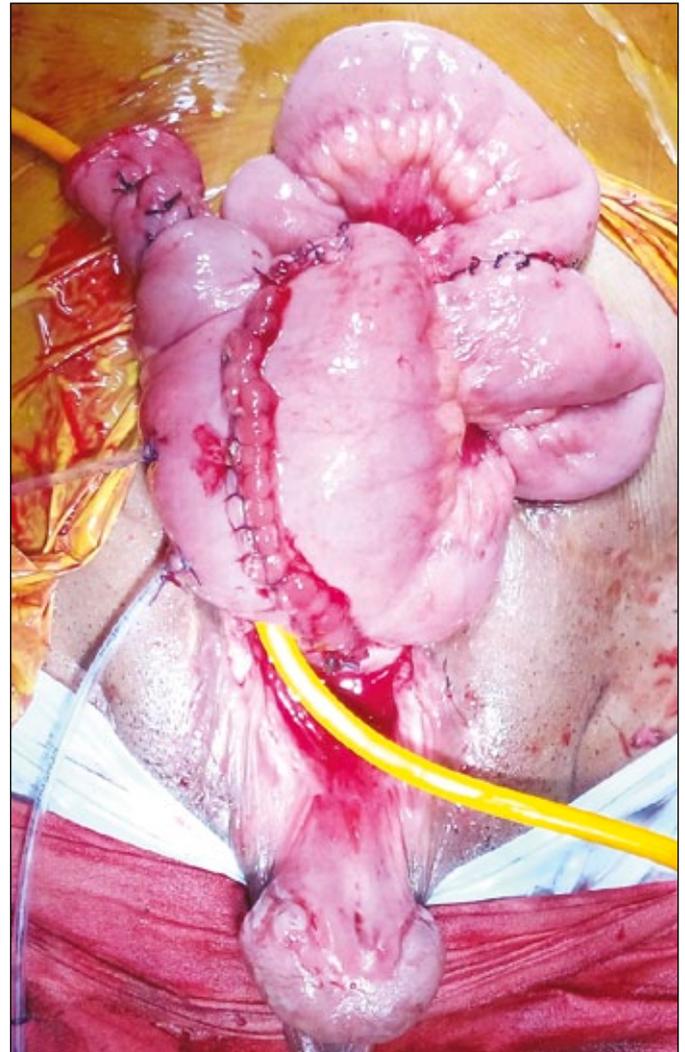


Figure 11. Completed Santosh PGI pouch in a patient with extrophy epispadias complex.

had difficulty in catheterizing the pouch. Median follow-up of the patients was 13.5 months. We also did a urodynamic study in 6 patients which showed an average compliance of 22 ml/cm H₂O.

DISCUSSION

Cystectomy is done for various conditions of the diseased bladder like carcinoma of the bladder, neurogenic bladder and extrophy epispadias complex [1, 2]. After cystectomy, urinary diversion can be done in the form of an ileal conduit, continent cutaneous diversion (CCD) and a orthotopic neobladder (ONB) [1, 2, 3]. ONB is contraindicated when the distal urethral margin is positive for malignancy after radical cystectomy, patients with stricture urethra or patients not willing for a CIC (clean intermittent catheterization) [3, 4].

Continent cutaneous diversion (CCD) is one of the types of retentive urinary diversions. A favorable CCD is the one which offers a low pressure reservoir with an acceptable continence and can be easily catheterizable. Different types of pouches are described using small bowel, large bowel and stomach [3-7]. Initially pouches are created using the ileocecal valve as it offers natural continence and the appendix can be used as a continence mechanism as well. Intussuscepted ileal nipple was created by Koch in 1962 [8] The nipple valve has numerous problems such as valve malfunction, complex reconstruction and nutritional problems due to the long segments of bowel being used for reconstruction. Later on, a buttressed ileocecal valve with tapered ileum for continence, the Indiana pouch, was described by Rowland et al. [9]. To avoid the side effects of sacrificing the ileocecal valve, the Skinner group modified the Koch

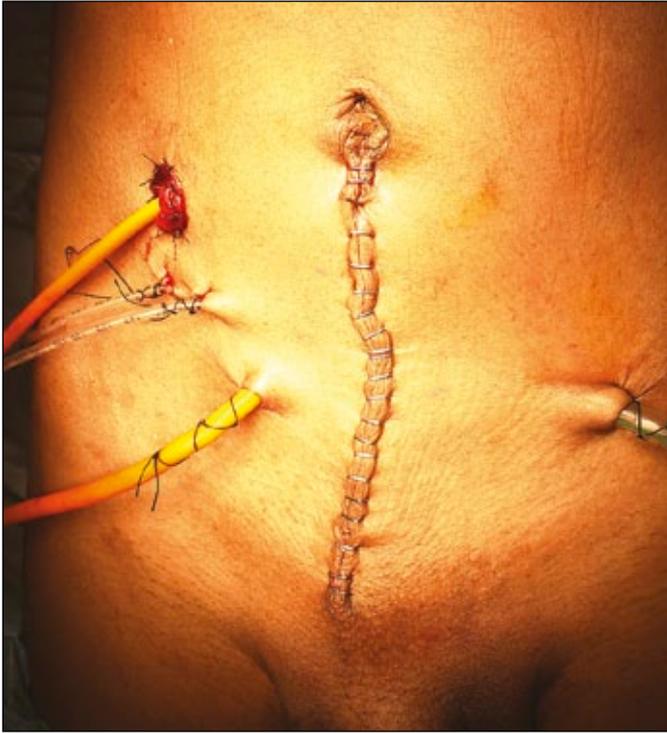


Figure 12. Abdomen showing the stoma with the perstomal catheter in situ.

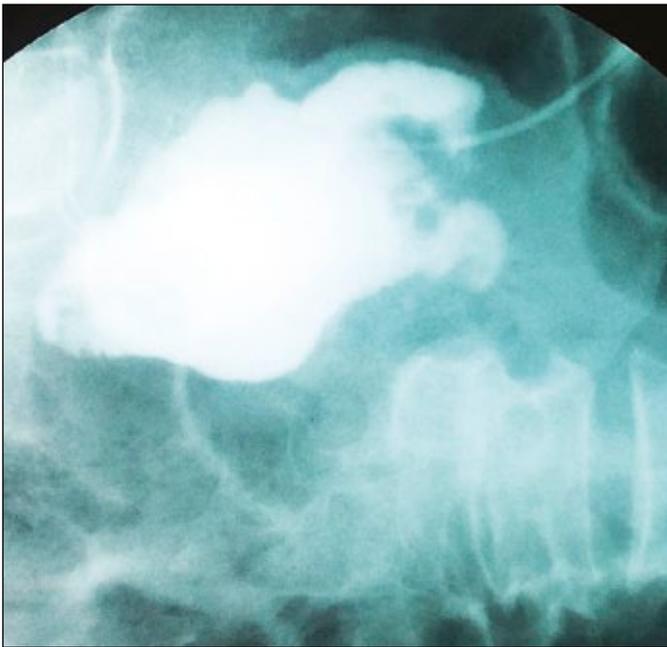


Figure 13. Abdomen showing the stoma with the perstomal catheter in situ.

pouch to the double T pouch [10, 11]. This pouch is complex to reconstruct needing around 70 cm of bowel often leading to nutritional problems. Other pouches described are the Penn pouch and

Mainz I pouch. Hence as of now, an ideal continent cutaneous pouch is yet to be made. Thus, there is a need for construction of a continent pouch which is technically easy to construct, offers minimal morbidity, provides acceptable continence and is easy to catheterize.

With this idea in mind, we designed a new pouch that we call the Santosh's PGI pouch, which is a type of continent cutaneous diversion. This pouch preserves the ileocecal valve and was reconstructed using only 50 cm of ileum, which is significantly less than that of the described pouches like the Koch pouch, Penn pouch and etc. which need around 70 cm of bowel. The quantity of urine formation in tropical climate is lesser than that in temperate climate. Moreover, the average BMI in our population is lower than that in the western population. Thus 50 cm of intestinal length for a smaller pouch suffices in our population. The complications [12] like diarrhea, fat malabsorption are less likely to occur with this pouch.

In contrary to the complex reconstruction involved in the construction of the Double T pouch, we simplified our pouch by giving minimal incisions over the bowel without completely detubularizing it and easy reconstruction of intussuscepted nipple for continence. For preventing nipple valve malfunction, we made few modifications such as demucosalizing the nipple from the inside of the pouch and apposing it with the interior of the pouch using absorbable sutures. This was supposed to incite adhesions and fibrosis, therefore preventing the nipple valve malfunction in the future. We also fixed the nipple valve outside the pouch with the serosa of the bowel using interrupted non-absorbable sutures. Continence of the nipple valve was improved by performing wrapping of the pouch wall all around the catheterizable channel, plicating the catheterizable channel and bringing it out by an oblique nondependent subfascial tunnel through the rectus sheath. The subfascial tunnel conferred continence due to apposition of its walls. A larger size transmural pouchostomy (18 Fr) helped in washing the mucus flakes which had the potential to block the narrower catheterizable channel catheter (14 Fr) in an early postoperative period. By washing the mucus using the pouchostomy it helped in preventing grave complications such as uretero-intestinal anastomotic dehiscence.

All these modifications helped us to attain an acceptable continence (of around 400 ml) in almost all our patients, except the first patient where we took only 45 cm of the bowel and we did not do the wrapping of the pouch wall around the catheterizable channel. This led to attaining a continence

of up to only 300 ml of pouch capacity. Our patients did not have any major complications. Our second patient, where the radical cystectomy was done after neoadjuvant chemotherapy, developed UTI on the follow-up. Operative time in the creation of our pouch was much less (around 80–10 min) leading to the lower chances of bowel exposure to the outside environment and so resulting in decreased postoperative paralytic ileus and early recovery. Ureteric reimplantation by serosal lined tunnel technique was quick and easy to construct. Another advantage of our pouch was the need for a smaller abdominal incision unlike the Indiana pouch which needs a long abdominal incision in view of the ileotransverse anastomosis.

CONCLUSIONS

Santosh's PGI pouch, which we described here as a type of continent cutaneous diversion following cystectomy, needs only a short segment of ileum, minimal suture lines, intussuscepted nipple valve with demucosalization and a pouch wall wrap to provide an acceptable continence. This pouch is technically easy to construct, reproducible and minimally time consuming to reconstruct. Small sample size and a short follow-up of our patients were the main limitations of our study.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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