Arab Journal of Urology

ISSN: (Print) 2090-598X (Online) Journal homepage: https://www.tandfonline.com/loi/taju20

Clinical evaluation of patients treated with a detubularised isolated ureterosigmoidostomy diversion after radical cystectomy

Mohammed A. Atta, Tamer M. Abou Youssif & Ahmed F. Kotb

To cite this article: Mohammed A. Atta, Tamer M. Abou Youssif & Ahmed F. Kotb (2014) Clinical evaluation of patients treated with a detubularised isolated ureterosigmoidostomy diversion after radical cystectomy, Arab Journal of Urology, 12:3, 192-196, DOI: 10.1016/j.aju.2014.05.002

To link to this article: https://doi.org/10.1016/j.aju.2014.05.002

Arab Journal of Urology (2014) **12**, 192–196

Arab Journal of Urology
(Official Journal of the Arab Association of Urology)

www.sciencedirect.com

ONCOLOGY/RECONSTRUCTION
ORIGINAL ARTICLE

Clinical evaluation of patients treated with a detubularised isolated ureterosigmoidostomy diversion after radical cystectomy

Mohammed A. Atta, Tamer M. Abou Youssif *, Ahmed F. Kotb

Faculty of Medicine, Alexandria University, Alexandria, Egypt

Received 6 April 2014, Received in revised form 24 April 2014, Accepted 3 May 2014
Available online 3 June 2014

KEYWORDS

Bladder cancer;
Urinary diversion;
Ureterosigmoidostomy;
Patient satisfaction

ABBREVIATIONS

(DI)US, (Detubularised isolated) ureterosigmoidostomy

Abstract ***Objectives:*** To assess the emptying pattern and patient satisfaction after constructing a detubularised isolated ureterosigmoidostomy (DIUS) following a cystectomy, introduced to overcome the poor outcome of conventional ureterosigmoidostomy, to improve the emptying pattern and accordingly patients' quality of life.

Patients and methods: The study included 122 patients who were treated with a DIUS diversion after cystectomy. The minimum follow-up of the patients was 6 months. The frequency of emptying and continence during the day and night were recorded. The ability of the patients to discriminate between urine and stool was assessed. The patients' overall satisfaction with the outcome was categorised as fully satisfied, moderately satisfied or not satisfied.

Results: In all, 95 patients were available for this evaluation; all patients were completely continent during the day and night. The mean emptying frequency was 3.9 during the day and 1.7 during the night. All patients were able to feel the desire to empty and the mean holding time was 35 min. Fifty-two patients (55%) could pass solid stools once per day, with minimal urine at the end of voiding, and the remaining evacuations were of clear urine only. Thirty-two patients (34%) were able to differentiate between urine and stool sensation before emptying. For satisfaction, 82 patients reported full satisfaction, 13 were moderately satisfied, and none regretted the diversion.

* Corresponding author. Tel.: +20 34860029.
E-mail address: tamer.abouyoussif@alexmed.edu.eg (T.M. Abou Youssif).

Peer review under responsibility of Arab Association of Urology.

Production and hosting by Elsevier

http://dx.doi.org/10.1016/j.aju.2014.05.002

Conclusions: The DIUS diversion provides continence during the day and night, with a satisfactory emptying habit. Patients with a DIUS diversion can tolerate a full pouch comfortably, with no leakage, and they can discriminate between urine and stool evacuations.

Introduction

Several techniques have been developed for diverting urine after radical cystectomy in patients with bladder cancer. Ureterosigmoidostomy (US) is the first known continent urinary diversion introduced, and with the longest follow-up [1]. Initial series reported an unacceptable rate of morbidity and mortality due to ascending infection and obstruction, as well as leakage at the uretero-intestinal anastomosis [2]. Modifications of the uretero-intestinal anastomosis, using antireflux techniques as well as detubularisation, precluded any ascending infection. Also, the introduction of antibiotics and alkalinising agents further improved the outcome. However, complications persisted, e.g., hyperchloraemic acidosis and hypokalaemia with nephropathy [3]. Moreover, the quality of life of these patients deteriorated mainly due to frequent emptying and nocturnal wetting with faecal content [4].

Many technical modifications have been introduced to overcome the complications of conventional US, including the sigma rectum pouch (Mainz II) [5], a rectal bladder with terminal colostomy [6], and the dismembered detubularised recto-sigmoid bladder with distal coloproctostomy [7]. One of these modifications is the detubularised isolated US technique (DIUS) described in 1996 by Atta [8]. This technique incorporated several principles and modifications to overcome the complications of conventional US, mainly to improve the emptying pattern and accordingly the patients' quality of life. First, detubularisation was of the whole rectosigmoid colon, thus abolishing the recto-anal inhibitory reflex, together with creating a low-pressure large-volume reservoir. Second, the terminal colon is an intussusception into the pouch and fixed to the posterior rectal wall opposite the anal canal. This curtails the reflux of the pouch contents, mainly urine, into the descending colon, thus minimising the electrolyte imbalance and at the same time directing the faeces directly to the anal canal, consequently isolating urine from stool and improving the emptying pattern. In the present study we assessed the postoperative changes of patients with a DIUS diversion and evaluated their emptying pattern and satisfaction with the outcome.

Patients and methods

The study included 122 patients who had a DIUS diversion after cystectomy for bladder cancer between June 2001 and January 2010, with a mean (range) follow-up of 41 (9–49) months. Poor anal continence was considered as a contraindication to a DIUS diversion, the anal sphincter continence being tested by asking the patient to hold a 400-mL water enema for $\geqslant$30 min.

Surgical technique

The preoperative colonic preparation was mainly mechanical, by saline enema, a low-residue diet and levofloxacin [9]. A radical cystoprostatectomy in men or anterior extenteration in women was performed, followed by the DIUS procedure as previously described [8]. The peritoneum lateral to the left colon was incised to allow maximum mobilisation down to the level of the anterior rectal wall 2.5 cm below the peritoneal reflection. The whole rectosigmoid pouch was then incised anteriorly, and fashioned to form the pouch. The new stoma of the left colon was then fixed to the posterior rectal wall after cauterising the opposing walls to allow better fixation. The uretero-intestinal anastomosis was made to the dome of the rectosigmoid pouch using the nipple technique, as previously described [10]. The nipple technique was especially beneficial in patients with dilated ureters. Fig. 1 illustrates these steps.

The emptying pattern of these patients was assessed at $\geqslant$6 months after surgery, the mean follow-up being 3.4 years. The frequency of emptying and the degree of anal continence during the day and night were recorded. Continence was defined as complete dryness with no use of pads. Patients were asked whether and for how long they could hold urine without wetting after the sensation of a desire to empty. Moreover, the ability to differentiate between urine and stool sensation was reported. The incidence of febrile UTI, manifested by an increased frequency, urgency and diarrhoea-like evacuation, was also reported. Overall satisfaction and psychological acceptance for their type of diversion was categorised as fully satisfied, moderately satisfied or not satisfied.

Ascending pouchography was used after surgery, with a gradual increase of the infused volume to 500 mL, and a film taken after emptying to confirm complete colonic evacuation.

Results

In all, 112 patients with bladder cancer had a radical cystectomy and DIUS diversion. The mean (range) age

at surgery was 62 (52–69) years. The postoperative complications are summarised in Table 1. Twelve patients had a prolonged (>7 days) faeco-urinary leakage, of whom seven responded to conservative measures, and the remaining five were successfully managed with an early temporary ileostomy, which was closed when complete dryness was attained. Uretero-intestinal strictures developed in 12 renal units and were managed initially by endoscopic dilatation and stenting, and one patient required an open surgical revision.

All patients were kept on prophylactic potassium chloride supplementation, and none of them developed metabolic acidosis. Sporadic febrile UTIs developed in 10 patients who had no uretero-intestinal strictures, and were managed using parenteral antibiotics.

In all, 95 patients were available for the final assessments, of whom 62 were men. Their median (SD) age at surgery was 58 (6) years. After a mean follow-up of 41 (9–49) months, all patients were completely continent during the day and night. The mean emptying frequency was 3.9 during the day and 1.7 at night (Table 1). All patients were able to feel the desire to empty and to withhold for a mean time of 35 min. Thirty-two patients (21%) were able to differentiate between urine and stool sensations before emptying. Fifty-two patients (47%) could pass solid stools, with minimal urine at the end of voiding, once per day, and the remaining evacuations consisted of clear urine only (Table 1). The remaining 43 (52%) patients passed various degrees of urine and stool mixtures in most of their evacuations.

Table 1 Postoperative complications and the changes after DIUS diversion.

Variable	Value
Complication, n (%)	
Faeco-urinary leakage	12 (10)
Ureterointestinal strictures	12 (10)
Metabolic acidosis	0
Febrile UTIs	10 (8)
Changes	
Continence, *n* (%)	95 (100)
Mean holding time, min	35
Mean frequency (day)	2.8
Differentiation (stool/urine), *n* (%)	32 (21)
Separation (stool/urine), *n* (%)	52 (47)
Febrile UTI	10 (11)

As shown in Fig. 2, the pouchogram in all patients at 6 months after surgery showed a good capacity of the pouch, with no reflux to the descending colon and no residual urine after voiding.

The assessment of satisfaction showed that 82 patients were fully satisfied, 13 were moderately satisfied, and none of the patients regretted the diversion or considered any form of undiversion.

Discussion

Urinary diversion after radical cystectomy is the main consideration when counselling patients before surgery. Young, well-educated patients with a good performance status prefer a continent diversion rather than a stoma

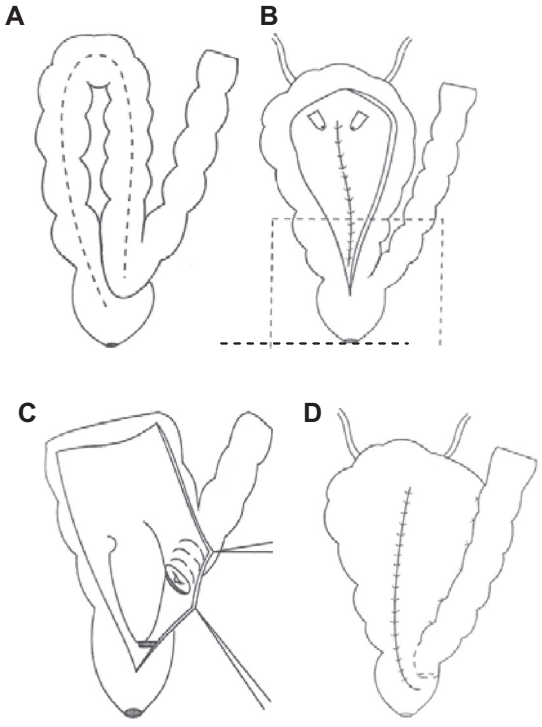

Figure 1 A diagrammatic depiction of the DIUS technique [8]. (A) A suture is placed between the left colon and the lowest point in the anterior surface of the rectum. (B) An inverted U-shaped sigmoid pouch is detubularised and the posterior wall is closed. Both ureters are re-implanted via the nipple technique [10]. (C) A raw area is created in the posterior rectal and in the descending colon. Both are sutured together. (D) The pouch is closed and the serosal surface of the pouch is connected to the left colon with several interrupted sutures.

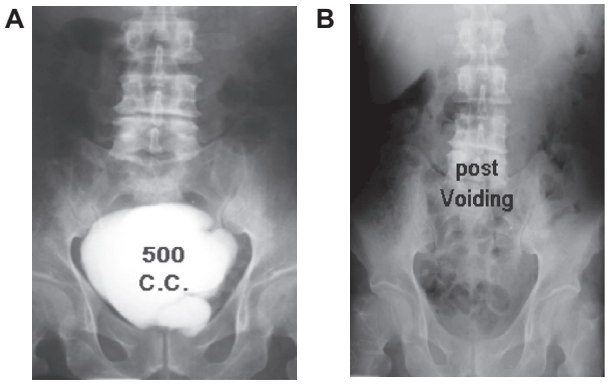

Figure 2 (A) The pouchogram of a patient, showing the good capacity of the pouch. (B) A film taken after emptying in the same patient, showing no residual urine and no reflux to the descending colon.

diversion, mainly for reasons of body image and for continence [11]. However, in the long-term the type of diversion has no effect on the quality of life [12].

The Mainz II US offers the advantage of being stoma-free for patients with bladder cancer who are unfit for orthotopic substitutes. However, ascending infection, upper tract obstruction and incontinence are the main problems [4,13] In the DIUS, urine accumulates in the rectosigmoid pouch with minimal reflux of the pouch contents into the left colon. This minimises the colonic surface area exposed to urine and theoretically will reduce the degree of electrolyte imbalance. This was similarly shown in patients who had a valved rectoplasty, where electrolyte imbalance was minimal due to the limited exposure of the rectosigmoid to urine [14].

The DIUS diversion has many advantages over the Mainz II pouch. It depends on the physiological reflexes for storage and emptying, and accordingly, unlike a neobladder diversion, we do not train our patients in how to empty their pouch. Once the catheters are removed the patient starts to pass urine and stools separately, with no training. In patients with an orthotopic neobladder there is a gradual decline in compliance that leads to omitting bladder emptying, and hence an increased residual urine with subsequent infection, deteriorating bladder function, overflow incontinence and even spontaneous rupture in some cases [15,16].

The present technique was satisfactory for the patients, with emptying 3–4 times during the day and 0–2 times at night. Patients with a DIUS diversion can tolerate a full pouch comfortably, without leakage. Amongst all the modifications of US, a similar improvement in pouch emptying is reported only with the augmented and valved rectum described by Kock et al. [17], and the dismembered detubularised rectosigmoid bladder with distal colorectostomy described by Elabbady et al. [7]. In both procedures the whole anterior rectal wall is incised and, in addition to the earlier technique, the detubularised rectum is augmented with an ileal patch. In the present patients the improved function was attributed to the abolition of the anorectal inhibitory reflex after anterior rectotomy, resulting in a capacious rectosigmoid reservoir that can comfortably accommodate up to 500 mL of urine, with no urge to empty [18]. The loss of the anorectal inhibitory reflex results in the absence of nocturnal wetting, unlike in patients who have a conventional US. Nocturnal enuresis is a consistent finding in all types of orthotopic neobladder, a symptom that had not been treatable to date [19,20]. In the present technique we report only gas passage, a situation which was easily controlled by using antiflatulence drugs.

The whole rectosigmoid segment is detubularised in the DIUS to provide a low-pressure capacious reservoir that can accommodate urine with no reflux into the higher pressure of the left colon [18]. Furthermore, the elimination of the recto-anal reflex allowed the patients to store urine for longer with no defecatory urge. In the conventional US the patient empties the contained urine into the rectum (in small amounts), and the remaining urine fills the left and sometimes the whole colon up to the caecum. This will result in an increased frequency of motions, and in an increased surface area exposed to stored urine [21]. Avoiding this is manifested as a lower diurnal and nocturnal frequency in the present series, and patients can postpone emptying comfortably without urgency or wetting.

The intussusception and fixation of the non-dismembered new left colonic stoma into the posterior rectal wall just above and in line with the anal canal result in regaining the anal sensation required for the sampling reflex, and hence allows the anal canal to sense the arriving contents of the left colon. Motivated patients are able to differentiate between urine and faeces. The prompt emptying of faeces avoids the passage of faecal content into the rectosigmoid pouch. Faeco-urinary separation is obtained in the DIUS technique due to the functional isolation of urine in the low-pressure capacious rectosigmoid pouch.

We consider that the DIUS diversion is a viable option for bladder substitution in women. It has no artificial stoma, no appliances and has a high continence rate.

We conclude that the DIUS diversion provides continence during the day and night, with satisfactory emptying habits. Patients with a DIUS diversion can tolerate a full pouch comfortably, with no leakage, and they can discriminate between urine and stool evacuations.

Conflict of interest

None.

Source of funding

None.

References

[1] Simon J. Ectopia vesicae (absence of the anterior walls of the bladder and pubic abdominal parietes): operation for directing the orifices of the ureters into the rectum. Temporary success: subsequent death: autopsy. *Lancet* 1852;ii:568–70.

[2] Bricker E. Bladder substitution after pelvic evisceration. *Surg. Clin. North Am.* 1950;**30**:1511–21.

[3] Poulsen AL, Steven K. Acid–base metabolism after bladder substitution with. *BJU Int.* 1996;**78**:47–53.

[4] Bastian P, Albers P, Hanitzsch H, Fabrizi G, Casadei R, Haferkamp A, et al. Health-related quality-of-life following modified ureterosigmoidostomy (Mainz Pouch II) as continent urinary diversion. *Eur. Urol.* 2004;**46**:591–7.

[5] Fisch M, Wammack R, Müller SC, Hohenfellner R. The Mainz pouch II. *Eur. Urol.* 1994;**25**:7–15.

[6] Ghoneim MA, Shehab-El-Din AB, Ashamallah AK, Gaballah MA. Evolution of the rectal bladder as a method for urinary diversion. *J. Urol*. 1981;**126**:737–40.
[7] Elabbady AA, Elabbasy WI, Arafa AF, Atta MA, Abdel-Rahman M. A simple technique for urinary diversion: the dismembered detubularized rectosigmoid bladder with distal colorectostomy. *J. Urol*. 1998;**160**:714–7.
[8] Atta MA. Detubularized isolated ureterosigmoidostomy. Description of a new technique and preliminary results. *J. Urol*. 1996;**156**:915–9.
[9] Gerharz EW, Köhl UN, Weingärtner K, Kleinhans BJ, Melekos H, Riedmiller H. Experience with the Mainz modification of ureterosigmoidostomy. *Br. J. Surg*. 1998;**85**:1512–6.
[10] Atta MA. The everting suture: a new technical aid for ureteral nipple construction. *J. Urol*. 1996;**155**:1372–3.
[11] Lowrance WT, Rumohr JA, Clark PE, Chang SS, Smith JA, Cookson MS. Urinary diversion trends at a high volume, single American tertiary care center. *J. Urol*. 2009;**182**:2369–74.
[12] Metcalfe M, Estey E, Jacobsen N-E, Voaklander D, Fairey AS. Association between urinary diversion and quality of life after radical cystectomy. *Can J Urol* 2013;**20**:6626–31.
[13] Rabinovitch HH. Ureterosigmoidostomy in children – revival or demise? *J. Urol*. 1980;**124**:552.
[14] Mahran MR, Kock NG. A comparative study of the effects of a colorectal valve on the oro-anal transit time in patients with an augmented and valved rectum for urinary diversion. *BJU Int*. 1999;**84**:444–8.
[15] Madersbacher S, Möhrle K, Burkhard F, Studer UE. Long-term voiding pattern of patients with ileal orthotopic bladder substitutes. *J. Urol*. 2002;**167**:2052–7.
[16] Nippgen JB, Hakenberg OW, Manseck A, Wirth MP. Spontaneous late rupture of orthotopic detubularized ileal neobladders: report of five cases. *Urology* 2001;**58**:43–6.
[17] Kock NG, Ghoneim MA, Lycke KG, Mahran MR. Urinary diversion to the augmented and valved rectum: preliminary results with a novel surgical procedure. *J. Urol*. 1988;**140**:1375–9.
[18] Atta MA, Youssef TA, Boules GF, Kotb AF. Detubularised isolated ureterosigmoidostomy (Atta pouch). Manometric and radiological studies in a sample of patients. *Arab. J. Urol*. (in press).
[19] Kassouf W, Hautmann RE, Bochner BH, Lerner SP, Colombo R, Zlotta A, et al. A critical analysis of orthotopic bladder substitutes in adult patients with bladder cancer: is there a perfect solution? *Eur. Urol*. 2010;**58**:374–83.
[20] Thulin H, Kreicbergs U, Wijkström H, Steineck G, Henningsohn L. Sleep disturbances decrease self-assessed quality of life in individuals who have undergone cystectomy. *J. Urol*. 2010;**184**:198–202.
[21] El-Mekresh M, El-Din AB, Fayed SM, Brevinge H, Kock NG, Ghoneim MA. Bladder substitutes controlled by the anal sphincter. A comparison of the different absorption potentials. *J. Urol*. 1991;**146**:970–2.