

Quality of life after radical cystectomy for bladder cancer in men with an ileal conduit or continent urinary diversion: A comparative study

M. A. Asgari, M. R. Safarinejad¹, N. Shakhssalim², M. Soleimani, A. Shahabi, E. Amini

Department of Urology, Shahid Modarress Hospital, Shahid Beheshti University of Medical Sciences, ¹Private Practice of Urology and Andrology, ²Department of Urology, Shahid Labbafinejad Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

Aim: To investigate quality of life (QoL) domains with three forms of urinary diversions, including ileal conduit, MAINZ pouch, and orthotopic ileal neobladder after radical cystectomy in men with muscle-invasive bladder cancer.

Materials and Methods: In a prospective study, 149 men underwent radical cystectomy and urinary diversion (70 ileal conduit, 16 MAINZ pouch, and 63 orthotopic ileal neobladder). Different domains of QoL, including general and physical conditions, psychological status, social status, sexual life, diversion-related symptoms, and satisfaction with the treatment were assessed using an author constructed questionnaire. Assessment was performed at three months postoperatively.

Results: In questions addressing psychological status, social status, and sexual life, patients with continent diversion had a more favorable outcome ($P = 0.002$, $P = 0.01$, and $P = 0.002$, respectively). The rate of erectile dysfunction did not differ significantly between the three groups ($P = 0.21$). The rate and global satisfaction was higher with the MAINZ pouch (68.7%) and ileal neobladder (76.2%) as compared with the ileal conduit group (52.8%) ($P = 0.002$).

Conclusion: Continent urinary diversion after radical cystectomy provides better results in terms of QoL as compared with ileal conduit diversion.

Key Words: Bladder cancer, continent diversion, orthotopic bladder substitution, radical cystectomy, quality of life

Address for correspondence:

Dr. Mohammad R. Safarinejad, Professor of Urology, Associate Editor of Urology Journal, P.O. Box 19395-1849, Tehran, Iran. E-mail: info@safarinejad.com

Received: 24.03.2012, Accepted: 12.06.2012

INTRODUCTION

The gold standard care for muscle-invasive bladder cancer in men is radical cystoprostatectomy with urinary reconstruction.

Various methods are used for urinary diversion after radical cystectomy, including ileal conduits, cutaneous continent urinary diversion, and orthotopic neobladder reconstruction. Types of urinary diversion have a great impact on different aspects of quality of life (QoL), including micturition status, physical, sexual, and psychosocial functioning, day life activities, and distress related to body image.^[1,2] A number of studies have addressed these QoL issues following radical cystectomy with various types of urinary diversions. So far, more than 30 articles have made comparisons of the impact of different types of urinary diversion on patient QoL.^[3] A major obstacle is lacking of disease-specific QoL instrument, which universally compares patients after urinary diversion. In addition, the concept of

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/0974-7796.115747

QoL differs significantly between cultures, countries, and races. Apparently, patients with orthotopic neobladders have decreased bother related to urinary leakage, stoma appliance, and better perception of body image.^[4] However, the assumption that continent urinary diversions yield superior QoL than ileal conduit diversion is not demonstrated by the results of most previous studies. In a review article, Gerharz *et al.* concluded that existing literature do not provide adequate evidence that continent urinary diversion is superior to conduit diversion, and they emphasized the importance of conducting further well designed studies.^[2] To our knowledge, no previous studies have addressed QoL in patients with an ileal conduit urinary diversion and patients with a continent urinary diversion in Iranian population, so we performed this comparison.

MATERIALS AND METHODS

During a five year period, between June 2005 and June 2010, a total of 240 patients with muscle-invasive bladder transitional cell carcinoma (TCC) underwent radical cystoprostatectomy in study sites. Of these patients, 149 met study criteria and recruited into analysis. Before proceeding for surgery, a detailed explanation of the aims and potential complications of radical cystectomy and the advantages and disadvantages of each urinary diversion method were provided for the patients. Three different types of urinary diversion were discussed with patients and their families: cutaneous diversion with ileal conduit, MAINZ Pouch II, or lower urinary tract reconstruction using orthotopic ileal neobladder. Seventy patients (47%) had undergone ileal conduit diversion; 16 (10.7%), MAINZ Pouch II; and 63 (42.3%), orthotopic ileal neobladder urinary reservoir. The mean age of these groups were 62.2 ± 8.6 years, 61.6 ± 9.4 years, and 61.9 ± 9.1 years, respectively.

Evaluations

Demographic and clinical characteristics, including age, smoking status, pathologic stage, tumor grade, comorbid conditions, and American Society of Anesthesiologists (ASA) score were obtained from the medical records. Laboratory examination included serum biochemistry, coagulation profile, and liver function tests. All patients underwent chest radiography, computed tomography (CT) of the abdomen and pelvis, and bone scans for tumor staging before surgery. Tumor stage and grade were recorded according to the Tumor-Node-Metastasis (TNM) and World Health Organization (WHO) system, respectively. QoL was evaluated by using the questionnaire, which has been developed by Kitamura *et al.*^[5] [Appendix]. The questionnaire was physician administered.

Statistical analysis

Quantitative data were expressed as means \pm standard deviations (SD). Patient groups were compared according to

treatment using χ^2 and Kruskal–Wallis tests for categorical variables and the Mann–Whitney *U* test for continuous variables. All statistical tests were two-tailed, and $P < 0.05$ was considered as significant. Multivariate logistic regression analysis was done to account for confounding factors. All statistical analyses were conducted by using SPSS ver. 17.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Table 1 demonstrates demographic and clinical characteristics of the study groups. No significant difference emerged in the age, clinical staging, and histopathological grading among subjects in the three groups. The bladder substitution group did not differ significantly from the ileal conduit group for demographic and clinical characteristics such as occupational status, level of education, stage of disease, and smoking history.

Urine leakage and catheterization issue

Table 2 reports the scores of non-psychologic items. Of patients with MAINZ pouch and ileal neobladder, 13 (81.2%) and 54 (85.7%), respectively, had satisfactory continence of urine. Of patients with MAINZ pouch, 2 (12.5%) had difficulty with catheterization, while, 7 (11.1%) of the patients with ileal neobladder required intermittent self-catheterization.

Quality-of-life results

The overall mean score for the bathing, sexual desire, and desire to void like preoperative status had a significant tendency toward a higher value in the patients with bladder substitution as compared with the ileal conduit group [Table 2]. Of patients in ileal conduit, MAINZ pouch, and ileal neobladder groups, 15.7%, 50.0%, and 76.2%, respectively, did not change the way of bathing. The ileal conduit patients used public baths less frequently (11.4%) than the ileal neobladder (58.7%) and MAINZ pouch patients (50.0%) ($P = 0.004$). Regarding desire to void like preoperative status, patients with bladder substitution had significantly strong desire than ileal conduit patients [Table 2]. The percent 'yes' responses to the question whether they wanted to conceal their stoma (question 9) in public places were 88.6% in ileal conduit group and 62.5% in MAINZ pouch patients ($P = 0.01$).

Psychological status

Patients with ileal conduit experienced more psychological problems than patients with bladder substitution [Table 3]. There were statistically significant differences between the three groups in the five categories of tension, irritableness, loneliness, anxiety, and depression. For example, of patients in ileal conduit, MAINZ pouch, and ileal neobladder groups,

Table 1: Distribution of selected demographic and clinical variables among the study groups

Demographic and clinical variables	Types of diversion		
	Ileal conduit (n=70)	Ileal neobladder (n=16)	MAINZ pouch II (n=63)
Age (yrs)	62.2±8.6	61.6±9.4	61.9±9.1
BMI (kg/m ²)	24.8±4.2	24.6±4.4	24.2±4.6
Occupational status, no. (%)			
Employed	17 (24.3)	4 (25.0)	15 (23.8)
Unemployed	14 (20.0)	3 (18.7)	12 (19.1)
Retired	39 (55.7)	9 (56.3)	36 (57.1)
Mean±SD biochemistry			
Blood glucose (mg/dl)	99±16	100±12	100±14
Alanine aminotransferase (IU/l)	30±124	29±12	28±12
Aspartate aminotransferase (IU/l)	29±14	29±12	28±14
Alkaline phosphatase (IU/l)	244±52	250±49	248±61
Total bilirubin (mg/dl)	0.8±0.2	0.9±0.2	0.9±0.2
Blood urea nitrogen (mg/dl)	14.4±4.2	14.8±4.1	14.7±4.2
Creatinine (mg/dl)	0.8±0.2	0.9±0.1	0.8±0.2
Associated comorbidities n (%)			
Arterial hypertension	9 (12.8)	2 (12.5)	8 (12.7)
Dyslipidemia	10 (14.3)	2 (12.5)	9 (14.3)
Smoking status			
Never	18 (25.7)	4 (25.0)	16 (25.4)
Former	17 (24.3)	4 (25.0)	17 (27.0)
Current	35 (50.0)	8 (50.0)	30 (47.6)
Primary tumor stage			
pT ₂	29 (41.4)	6 (37.5)	25 (39.7)
pT ₃	41 (58.6)	10 (62.5)	38 (60.3)
Histopathological grading			
G1	10 (14.3)	3 (18.7)	10 (15.9)
G2	36 (51.4)	9 (56.3)	33 (52.4)
G3	24 (34.3)	4 (25.0)	20 (31.7)

BMI: Body mass index, SD: Standard deviation

Table 2: Comparison of answers from IC, MP, and INB patients: Items having statistically significant difference, no. (%)

Items	Not at all	A little	Much	Very much	P value
Change in way of bathing					
IC	11 (15.7)	22 (31.4)	25 (35.7)	12 (17.2)	0.0001
MP	8 (50.0)	3 (18.7)	3 (18.7)	2 (12.5)	
INB	48 (76.2)	10 (15.9)	1 (1.6)	4 (6.3)	
Use of public bath					
IC	62 (88.6)	4 (5.7)	4 (5.7)	0	0.004
MP	8 (50.0)	2 (12.5)	2 (12.5)	4 (25.0)	
INB	26 (41.3)	12 (19.0)	7 (11.1)	18 (28.6)	
Decreased sexual desire					
IC	5 (7.2)	4 (5.7)	15 (21.4)	46 (65.7)	0.01
MP	3 (18.7)	1 (6.3)	4 (25.0)	8 (50.0)	
INB	11 (17.5)	18 (28.6)	19 (30.1)	15 (23.8)	
Desire to void like preoperative status					
IC	38 (54.3)	23 (32.8)	2 (2.9)	7 (10.0)	0.003
MP	5 (31.3)	6 (37.5)	2 (12.5)	3 (18.7)	
INB	17 (27.0)	21 (33.3)	12 (19.1)	13 (20.6)	

IC: Ileal conduit, MP: MAINZ pouch, INB: Ileal neobladder

40.0%, 56.3%, and 60.3%, respectively, did not experience depression at all [Table 3].

Social status

Three months post operatively, men in ileal conduit, MAINZ pouch, and ileal neobladder groups, experienced 52.9%, 43.7%,

Table 3: Comparison of answers from IC, MP, and INB patients: Items assessing psychological status, no. (%)

Items	Not at all	A little	Much	Very much	P value
Tension					
IC	21 (30.0)	17 (24.3)	20 (28.6)	12 (17.1)	0.02
MP	6 (37.5)	4 (25.0)	4 (25.0)	2 (12.5)	
INB	40 (63.5)	16 (25.4)	1 (1.6)	6 (9.5)	
Irritableness					
IC	22 (31.4)	24 (34.4)	15 (21.4)	9 (12.8)	0.01
MP	6 (37.5)	3 (18.7)	3 (18.7)	4 (25.0)	
INB	30 (47.6)	14 (22.2)	11 (17.5)	8 (12.7)	
Loneliness					
IC	12 (17.1)	10 (14.3)	22 (31.4)	26 (37.1)	0.01
MP	4 (25.0)	1 (6.3)	4 (25.0)	7 (43.7)	
INB	27 (42.8)	16 (25.4)	10 (15.9)	10 (15.9)	
Anxiety					
IC	28 (40.0)	28 (40.0)	4 (5.7)	10 (14.3)	0.004
MP	8 (50.0)	5 (31.3)	3 (18.7)	0 (0.0)	
INB	40 (63.5)	5 (7.9)	10 (15.9)	8 (12.7)	
Depression					
IC	28 (40.0)	28 (40.0)	2 (2.9)	12 (17.1)	0.005
MP	9 (56.3)	4 (25.0)	3 (18.7)	0 (0.0)	
INB	38 (60.3)	8 (12.7)	10 (15.9)	7 (11.1)	

IC: Ileal conduit, MP: MAINZ pouch, INB: Ileal neobladder

and 42.8% decrease in general health domain of questionnaire, respectively.

The rates of patients who reported diminished hobbies were 28.6%, 31.2%, and 31.4% for ileal conduit, MAINZ pouch, and ileal neobladder groups, respectively. There were no statistically significant differences among the three groups

for social status items, except for the desire to travel. Patients with ileal neobladder (52.4%) or MAINZ pouch (56.2%) were more likely to travel than patients with ileal conduit diversion (31.4%) ($P = 0.02$).

Sexual life

Of patients in ileal conduit, MAINZ pouch, and ileal neobladder groups, 7.2%, 18.7%, and 17.5% reported unaltered sexual desire, respectively ($P = 0.01$). The “very much” decrease in sexual desire was highest in ileal conduit patients (65.7%), followed by patients in the MAINZ pouch (50.0%) and ileal neobladder groups (23.8%). The rate of satisfaction from sexual life was 25.7%, 31.3%, and 25.4% in the ileal conduit, MAINZ pouch, and ileal neobladder groups, respectively. The difference did not reach statistical significance. Erectile dysfunction occurred in 88.6%, 87.5%, and 87.3% of sexually active men after Ileal conduit, MAINZ pouch, and ileal neobladder urinary diversion, respectively ($P = 0.21$).

Symptoms related to lower urinary tract reconstruction

Problems with stoma appliances, stomal catheterization, urinary incontinence, daytime and night-time urine leakage differed significantly between the three groups. Of patients in ileal conduit groups, 44.3% managed their stoma easily. But, in the MAINZ pouch group, 68.8% managed catheterization and their stoma easily. Catheterization was difficult in 31.2% and 34.9% of patients in the MAINZ pouch, and ileal neobladder groups, respectively ($P = 0.43$). While 50 patients with ileal neobladder (79.4%) had satisfactory voiding, only 24 (38.1%) reported upsetting to wake up for urination at night. However, global satisfaction was high, with all three forms of diversion, and 81.4% of the ileal conduit, 87.5% of the MAINZ pouch, and 88.9% of the ileal neobladder patients would choose the same diversion again.

Satisfaction with the treatment type

In the ileal conduit patients, satisfaction with the diversion was described as “poor” by 17 (24.3%), “good” by 44 (62.8%), and “very good” by 9 (12.9%). These were, 25.0%, 62.5%, and 12.5%, in the MAINZ pouch group, respectively, and 23.8%, 57.1%, and 19.1% in the ileal neobladder group, respectively. The satisfaction rate was significantly higher in ileal neobladder group as compared with the ileal conduit group ($P = 0.007$).

General life satisfaction was assessed by the question, “If you were to spend the rest of your life with your condition just the way it is now, how would you feel about that?” The global satisfaction was higher with the MAINZ pouch (68.7%) and ileal neobladder (76.2%) compared with the ileal conduit group (52.8%) ($P = 0.002$).

DISCUSSION

This study demonstrated that patients with continent urinary diversions had better outcomes in terms of different domains of QoL, including sexual functioning, psychological status, and global satisfaction rate. The principal goal in selection of urinary diversion method is local cancer control; however, the potential for short-term and long-term complications, and the best QoL are also important factors. The ileal conduit urinary diversion is one of the oldest, simplest, and most commonly performed techniques. Many studies reported that this technique has yielded similar health-related QoL when compared with continent urinary diversions.^[6-8] But, our study demonstrated higher global satisfaction rate with continent diversions. Despite universal popularity of the ileal conduit-type urinary diversion, the reported long-term complications with this technique is considerably high. Madersbacher *et al.* reported that patients who underwent ileal conduit diversion and survived at least five years had an overall complication rate of 66%, with 24% stomal complications, 24% bowel-related complications, 23% urinary tract infection, and 27% renal function deterioration.^[6] In the present study, psychiatric distress was also low in both groups of MAINZ pouch and ileal neobladder patients. They were characterized by having a lack of sexual desire. In line with our finding, several other studies have also shown similar findings.^[9-11] After controlling for confounding factors, type of treatment independently affects sexual function scores. In our study, treatment-related factors have a larger impact on different QoL domains, indicating that they may be more important than comorbidity in affecting QoL scores. Most studies reporting on QoL after radical cystectomy found no difference in overall QoL,^[12-15] which was generally good for all types of diversions.^[16] In our series, global satisfaction rate also differed significantly across study groups.

One major problem in comparing the results of different studies is a lack of universal standard questionnaire for the purpose of addressing different domains of QoL in cystectomized patients. The problems include lack of a standard definition of QoL, and cultural differences in discernment and expression of both physical and emotional health. In addition, sample size, study design, characteristics of the population analyzed, and study site (primary vs. tertiary) are also confounding factors. The potential effects of sociocultural settings on the concept of QoL have also been raised. The cultural pattern of the studied population can affect the study results. Mansson *et al.* investigated possible differences between Italian and Swedish men in health-related quality of life (HRQoL) after cystectomy.^[17] They did not find major differences in HRQoL. Another interesting confounding factor in reporting QoL after radical cystectomy is the role of a third party. Mansson *et al.*^[18] demonstrates a neutral third party evaluation of QoL,

as different findings were achieved when a study was performed and analyzed by a neutral third party as compared with the author or their institution.

There is a wide disparity in practice in the selection of method for urinary diversion worldwide.^[19-21] The rates of ileal conduit diversion and orthotopic bladder replacement differ significantly from centre to centre ranging from less than 20% to more than 75%,^[22] but most European countries favor orthotopic bladder replacements.^[6,23,24] In the present study, 47.0% of recruited patients underwent ileal conduit urinary diversion. A recent consensus conference of experts under the sponsorship of the WHO and Société internationale d'Urologie (SIU) on urinary diversion demonstrated a change in the surgeons' practice, with nearly 50%-90% of their procedures being bladder substitution.^[23] Patient education, describing the pros and cons of the different urinary diversion methods, and active participation of patient in selecting treatment methods appear to be some of the key points to postoperative QoL and satisfaction.

One of the major limitations of the present study is lack of addressing of the short-term and long-term complications with each technique. They were not among our study purposes. Another limitation of this study was a relatively small size of patients in subgroups. Finally, the number of patients in each of the three groups varies significantly because we did not assigned the 1:1 to each group, rather due to ethical reason they chose themselves the type of diversion.

CONCLUSIONS

Although cancer control is always the priority, QoL and patient satisfaction have also become a more accountable endpoint. We need standard QoL measures for assessing QoL after radical cystectomy and urinary diversion. The ability of current questionnaires to identify differences of neobladder and conduit patients is limited.

REFERENCES

1. Stenzl A, Sherif H, Kuczyk M. Radical cystectomy with orthotopic neobladder for invasive bladder cancer: A critical analysis of long term oncological, functional and quality of life results. *Int Braz J Urol* 2010;36:537-47.
2. Gerharz EW, Månsson A, Hunt S, Skinner EC, Månsson W. Quality of life after cystectomy and urinary diversion: An evidence based analysis. *J Urol* 2005;174:1729-36.
3. Park J, Ahn H. Radical cystectomy and orthotopic bladder substitution using ileum. *Korean J Urol* 2011;52:233-40.
4. Porter MP, Penson DF. Health related quality of life after radical cystectomy and urinary diversion for bladder cancer: A systematic review and critical analysis of the literature. *J Urol* 2005;173:1318-22.
5. Kitamura H, Miyao N, Yanase M, Masumori N, Matsukawa M, Takahashi A, *et al.* Quality of life in patients having an ileal conduit, continent reservoir

- or orthotopic neobladder after cystectomy for bladder carcinoma. *Int J Urol* 1999;6:393-9.
6. Madersbacher S, Schmidt J, Eberle JM, Thoeny HC, Burkhard F, Hochreiter W, *et al.* Long-term outcome of ileal conduit diversion. *J Urol* 2003;169:985-900.
7. Philip J, Manikandan R, Venugopal S, Desouza J, Javli PM. Orthotopic neobladder versus ileal conduit urinary diversion after cystectomy: A quality-of-life based comparison. *Ann R Coll Surg Engl.* 2009; 91:565-9.
8. Svare J, Walter S, Kvist Kristensen J, Lund F. Ileal conduit urinary diversion: Early and late complications. *Eur Urol* 1985;11:83-6.
9. Matsuda T, Aptel I, Exbrayat C, Grosclaude P. Determinants of quality of life of bladder cancer survivors five years after treatment in France. *Int J Urol* 2003;10:423-9.
10. Månsson A, Davidsson T, Hunt S, Månsson W. The quality of life in men after radical cystectomy with a continent cutaneous diversion or orthotopic bladder substitution: Is there a difference? *BJU Int* 2002;90:386-90.
11. Nordstrom GM, Nyman CR. Male and female sexual function and activity following ileal conduit urinary diversion. *Br J Urol* 1992;70:33-9.
12. Hardt J, Filipas D, Hohenfellner R, Egle UT. Quality of life in patients with bladder carcinoma after cystectomy: First results of a prospective study. *Qual Life Res* 2000;9:1-12.
13. Månsson A, Colleen S, Hermerén G, Johnson G. Which patients will benefit from psychosocial intervention after cystectomy for bladder cancer? *Br J Urol* 1997;80:50-7.
14. Månsson A, Christensson P, Johnson G, Colleen S. Can preoperative psychological defensive strategies, mood and type of lower urinary tract reconstruction predict psychosocial adjustment after cystectomy in patients with bladder cancer? *Br J Urol* 1998;82:348-56.
15. Månsson A, Al Amin M, Malmström PU, Wijkström H, Abol Enein H, Månsson W. Patient-assessed outcomes in Swedish and Egyptian men undergoing radical cystectomy and orthotopic bladder substitution: A prospective comparative study. *Urology* 2007;70:1086-90.
16. Parekh DJ, Donat SM. Urinary diversion: Options, patient selection, and outcomes. *Semin Oncol* 2007;34:98-109.
17. Månsson A, Caruso A, Capovilla E, Colleen S, Bassi P, Pagano F, *et al.* Quality of life after radical cystectomy and orthotopic bladder substitution: A comparison between Italian and Swedish men *BJU Int* 2000;85:26-31.
18. Månsson A, Henningsohn L, Steineck G, Månsson W. Neutral third party versus treating institution for evaluating quality of life after radical cystectomy. *Eur Urol* 2004;46:195-9.
19. Gore JL, Litwin MS. The Urologic Diseases in America Project. Quality of care in bladder cancer: Trends in urinary diversion following radical cystectomy. *World J Urol* 2009;27:45-50.
20. Gupta NP, Ansari MS, Nabi G. National survey on orthotopic neobladder. *Int Urol Nephrol* 2007;39:143-8.
21. Gore JL, Saigal CS, Hanley JM, Schonlau M, Litwin MS. Urologic diseases in America project. Variations in reconstruction after radical cystectomy. *Cancer* 2006;107:729-37.
22. Somani BK, Gimlin D, Fayers P, N'dow J. Quality of life and body image for bladder cancer patients undergoing radical cystectomy and urinary diversion: A prospective cohort study with a systematic review of literature. *Urology.* 2009; 74:1138-43.
23. World Health Organization (WHO) Consensus Conference on Bladder Cancer, Hautmann RE, Abol-Enein H, Hafez K, Haro I, Mansson W, *et al.* Urinary diversion. *Urology* 2007;69:17-49.
24. Hautmann RE. Urinary diversion: Ileal conduit to neobladder. *J Urol* 2003;169:834-42.

How to cite this article: Asgari MA, Safarinejad MR, Shakhssalim N, Soleimani M, Shahabi A, Amini E. Quality of life after radical cystectomy for bladder cancer in men with an ileal conduit or continent urinary diversion: A comparative study. *Urol Ann* 2013;5:190-6.

Source of Support: Nil, **Conflict of Interest:** None.

APPENDIX

General and physical conditions

1. Do you dress yourself?
2. How often do you bathe a week?
3. Is your frequency of bathing less than before?
4. Has your way of bathing changed?
5. Has your desire to bathe changed?
6. Do you bathe with your family?
7. Do you worry about bathing with your family?
8. Do you use a public bath?
9. Do you conceal a stoma when bathing?*
10. How often do you go out?
11. How often do you lie?
12. Do you take a walk or step upstairs?
13. Do you pick up things?
14. Do you lift something heavy?
15. Has your appetite deteriorated?
16. Have you had nausea?
17. Have you vomited recently?
18. Have you felt physically well?
19. Have you felt tired?
20. Do you sleep well?
21. Do you take care of your health?
22. Do you need to rest?
23. Has your marital status changed?

Psychological status

24. Have you felt tense?
25. Have you felt irritable?
26. Have you felt lonely?
27. Have you felt anxious?
28. Have you felt depressed?

Social status

29. Did you have a job before treatment?
30. Has your job changed after treatment?
31. When did you restart your job?
32. Do you work well?
33. Have you untoward influences on your office or family because of your health status?
34. Have you untoward influences on your office or family because of treatment?
35. Has your relationship to your friends changed?
36. Has your exercising decreased?
37. Have your hobbies decreased?
38. Have you traveled after treatment?
39. How often have you traveled after treatment?
40. How often have you had overnight travels?

Sexual life

41. Are you stimulated by sexual pictures or movies?

42. Do you feel a loss of sexual desire?
43. How often did you have sexual intercourse before treatment?
44. How often do you have sexual intercourse since treatment?
45. Have you felt uneasy about the stoma during sexual intercourse?*
46. Do you conceal the stoma when you have sexual intercourse?*
47. Did you have enough potency before treatment?
48. Have you had a morning erection after treatment?
49. Did you have enough potency after treatment?
50. Do you want a prosthesis implanted?
51. Are you satisfied with your present sexual life?
52. Does your sexual life vivify your life?

Diversion-related symptoms

53. Have you had hematuria?
54. Have you had pain when you urinated or catheterized?
55. Have you had pain in the lower abdomen or wound?
56. Do you need analgesic drugs?
57. Have you had urinary leakage?
58. Do you worry about urinary leakage?
59. Do you feel difficulty in managing the stoma?*
60. Who manages the stoma?*
61. Do you have abnormality of parastomal skin?*
62. Do you need ointment for abnormality of parastomal skin?*
63. Do you have smooth catheterization?†
64. Who catheterizes?†
65. Who irrigates?‡
66. How many times do you catheterize during the day?†
67. How many times do you catheterize at night?†
68. Have you felt troublesome to catheterize at night?†
69. Where do you catheterize at night?†
70. Do you feel disagreeable to handle urine in bedroom?†
71. How many times do you irrigate during the day or a week?‡
72. Do you feel undesirable when the stoma or catheterization is seen by your family?
73. Do you feel undesirable when the stoma or catheterization is seen by another person?
74. Do you sleep with your stoma under you?*
75. Do you turn over freely during sleep?*
76. Do you feel desire to void like preoperative status?
77. Have you smelt urine odor yourself?
78. Has anyone smelt urine odor?
79. Would you choose another urinary diversion next time?
80. Do you manage urinary leakage easily?§
81. Do you worry about putting on the pouch?§
82. Do you wear the pouch when you bathe?§
83. How often do you change the pouch?§
84. Who changes your pouch?§
85. How long does it take to change the pouch?§
86. Do you have a smooth voiding?***

- | | |
|---|---|
| 87. How many times do you urinate during the day?*** | 93. Are you satisfied with your relationship to nurses? |
| 88. Where do you catheterize?*** | 94. Do you visit the outpatient department regularly? |
| 89. How many times do you urinate at night?*** | 95. Have you felt difficulty attending hospital? |
| | 96. Do you think the cost of medical devices or instruments is expensive? |
| Satisfaction of the treatment | 97. Do you feel satisfied with the operation which you underwent? |
| 90. Do you understand what doctors explain to you about your illness? | 98. If you were to spend the rest of your life with your condition just the way it is now, how would you feel about that? |
| 91. Are you satisfied with your treatment? | |
| 92. Are you satisfied with your relationship to doctors? | |

This questionnaire has been developed by Kitamura *et al.*^[5] and was used by permission. *For the MAINZ pouch continent urinary reservoir (CR) and ileal conduit (IC) patients' questionnaire; †For the CR and orthotopic ileal neobladder (NB) patients' questionnaire; ‡Only for the CR patients' questionnaire; §Only for the IC patients' questionnaire; **Only for the NB patients' questionnaire.

