Urinary diversion for patients with inoperable obstetric vesicovaginal fistula: the Jos, Nigeria experience

Article *in* International Urogynecology Journal · November 2015

DOI: 10.1007/s00192-015-2871-x

CITATIONS
4

READS
26

6 authors, including:

Carolyn Kirschner
NorthShore University HealthSystem
17 PUBLICATIONS **485** CITATIONS
SEE PROFILE

George Azubuike Chima
Bingham University
9 PUBLICATIONS **107** CITATIONS
SEE PROFILE

Jonathan A Karshima
University of Jos
11 PUBLICATIONS **304** CITATIONS
SEE PROFILE

Steven Arrowsmith
The Fistula Foundation, San Jose, CA, USA
24 PUBLICATIONS **1,058** CITATIONS
SEE PROFILE

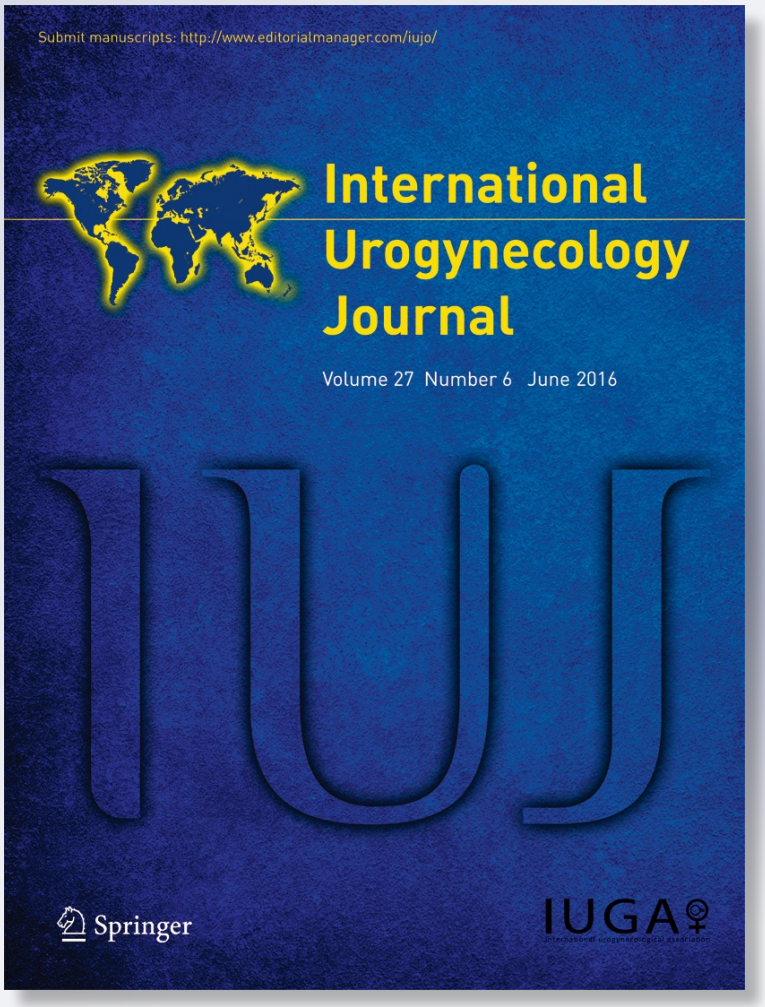
Urinary diversion for patients with inoperable obstetric vesicovaginal fistula: the Jos, Nigeria experience

Carolyn V. Kirschner, Sunday J. Lengmang, Ying Zhou, George A. A. Chima, Jonathan A. Karshima & Steven Arrowsmith

International Urogynecology Journal
Including Pelvic Floor Dysfunction

ISSN 0937-3462
Volume 27
Number 6

Int Urogynecol J (2016) 27:865-870
DOI 10.1007/s00192-015-2871-x



Springer

Int Urogynecol J (2016) 27:865–870
DOI 10.1007/s00192-015-2871-x

ORIGINAL ARTICLE

Urinary diversion for patients with inoperable obstetric vesicovaginal fistula: the Jos, Nigeria experience

Carolyn V. Kirschner[1,2] · **Sunday J. Lengmang**[1,3] · **Ying Zhou**[2] · **George A. A. Chima**[1] · **Jonathan A. Karshima**[1,4] · **Steven Arrowsmith**[1,3]

Received: 29 July 2015 / Accepted: 16 October 2015 / Published online: 2 November 2015

Abstract
Introduction Repair of obstetric urinary fistula may result in successful fistula closure, but often incontinence persists. Our goal was to review our experience with continent urinary diversion in our patients with inoperable vesicovaginal fistula (VVF).
Methods The database of patients who underwent urinary diversion at ECWA Evangel VVF Centre in Jos, Nigeria, between 1996 and 2012, was reviewed. Complications and surgical outcomes were noted. The earlier patients (1996–2002) and the later patients (2003–2012) were compared.
Results Urinary diversions were performed on 118 patients. Compared with the earlier patients, the later patients more often underwent modified Mainz II diversions, had similar complication rates, but had better outcomes. The use of ureteric catheters intraoperatively and the performance of modified Mainz II pouch were associated with a better outcome. Overall perioperative mortality was 2.5 %.
Conclusions Urinary diversion is feasible in a low-resource setting. Use of modified Mainz II pouch diversion and intraoperative ureteric catheters were associated with a better outcome. Urinary diversion should be undertaken only after the careful counseling of each patient, and by an experienced surgeon.

Keywords Diversion · Fistula · Inoperable · Mainz · Urinary

Introduction

Obstetric fistula is a devastating complication of prolonged, obstructed labor. Pressure necrosis leads to sloughing of the anterior vaginal wall and bladder and/or urethra, resulting in a defect (fistula) surrounded by fibrotic tissue. The fistula results in total urinary incontinence.

We have previously reported our experience at the Evangelical Church of West Africa (ECWA) Evangel Hospital in Jos, Nigeria, noting that surgery to repair vesicovaginal fistula (VVF) results in closure of the bladder fistula in 90 % of patients, but actual continence rates are much lower, 70.5 % in our experience [1]. Lack of continence despite successful fistula closure may be due to impaired urethral function, low bladder capacity due to tissue loss at the time of injury, or complete absence of the urethra. Extensive tissue destruction may render a fistula "inoperable." Patients with these issues continue to experience complete urinary incontinence, with its attendant social isolation.

Urinary diversions utilizing stomas require water-tight stoma appliances, which are not readily available in the developing world. Additionally, our patients may be subject to inspection by her local chief before returning to her village; visualization of an obvious stoma may be prohibitive to successful re-integration into society. Continent urinary diversion, therefore, appears to be the best option for our VVF patients with incurable fistulae.

The ECWA Evangel Hospital (now BHUTH, Bingham University Teaching Hospital) has offered urinary diversion

✉ Carolyn V. Kirschner
ckirschner@northshore.org

[1] ECWA Evangel VVF Centre (now Bingham University Teaching Hospital), Jos, Nigeria

[2] North Shore University Health System, 2650 Ridge Avenue, Walgreen Building Suite 1507, Evanston, IL 60201, USA

[3] Fistula Foundation, San Jose, CA, USA

[4] Jos University Teaching Hospital, Jos, Nigeria

to select patients since 1996. Our initial diversions were ureterosigmoidostomies [2]; we later adapted a modification of the Mainz II pouch technique [3]. The goal of this retrospective chart review was to demonstrate the feasibility of urinary diversion in a low resource setting, for VVF patients for whom fistula closure was either impossible, or was unsuccessful at restoring urinary continence.

Materials and methods

Before scheduling a patient for urinary diversion, she was carefully counseled in her native language, whenever possible. Whenever feasible, an authority from the family was brought to the center to explain more fully the ramifications of diversion. This discussion extended over at least 1 month, so that all interested parties could provide input. Staff was then given instructions to confirm that:

1. The patient understood the procedure and expected outcome. Informed consent was documented with a fingerprint.
2. The patient had no rectovaginal fistula (RVF) or anal sphincter insufficiency—this was confirmed by the performance of tap water enemas of increasing volume to a maximum of 250 ml, with instructions to the patient to hold the water for at least 2 h; this rectal training was an attempt to ensure that the diversion would be successful.

A bowel preparation was instituted 3 days before surgery. This consisted of:

1. Diet—full liquids on days 3 and 2 preoperatively, with clear liquids the day before surgery.
2. Bisacodyl orally, the evening of the 2nd preoperative day and the morning of the day before surgery.
3. Tap water enemas until clear, the evening before surgery and the morning of surgery.
4. Oral antibiotics (usually metronidazole 400 mg and neomycin 500 mg three times daily) on the day before surgery, unless unavailable.

Intravenous (IV) antibiotics were initiated at the time of starting the IV line in the theater. Antibiotic choice and duration were dependent upon availability and surgeons' preferences. Typically, IV ampicillin and gentamicin were administered preoperatively, and continued for 24 h postoperatively. During the earlier years, chloroquine was also given empirically preoperatively; this was abandoned in August 2011. After the induction of general anesthesia, if ureteric catheters were to be used, a rectal tube was inserted. Incision choice was based on either surgeon preference or a previous scar.

Surgery consisted of bilateral ureterosigmoidostomy [2] or a modified Mainz II pouch [3] until 2002, after which time the modified Mainz II pouch procedure was utilized exclusively. In the initial modified Mainz II pouches, 10–12 cm of the sigmoid along the antimesenteric border was incised; after 2006, this length was increased to 14–16 cm in an effort to increase the pouch size to decrease the incidence of nocturnal incontinence. Ureteric ends were tunneled along approximately 1 cm of bowel serosa. Mucosa to mucosa anastomoses were secured using interrupted polyglactin (vicryl) sutures and reinforced outside the pouch serosa to serosa. The pouch was then closed transversely, with the midpoints of each side of the colonic incision becoming the apices, rather than the double fold of the original Mainz II pouch. The pouch was closed in two continuous layers, and was secured to the sacrum if excess mobility was a concern. Ureteric catheters were utilized routinely in the later years of the study. The bladder was left in situ. No attempt was made to perform vaginal reconstruction at the time of diversion.

Postoperative care included:

1. Diet—nil orally until bowel sounds returned. Clear liquids on postoperative day (POD) 3 unless distended. General diet on POD 5 if tolerating fluids well.
2. Intravenous fluids for at least 2 days; this was extended if prolonged fasting was required.
3. Ampicillin and metronidazole IV for 24 h; this was frequently extended as deemed necessary by the surgeon.
4. Rectal tube and ureteric catheters were removed on POD 5 if tolerating diet.
5. Skin sutures were removed on the 7th to 10th postoperative day.

Upon discharge, patients were instructed to utilize kanwa, an alkaline lake bed rock salt that contains potassium, at least three times per week. Kanwa is commonly utilized to flavor soups, especially in northern Nigeria. A small piece of the rock salt is chipped off and pounded into a powder. Approximately half a teaspoon is added to a cooking pot of soup for ten people.

Continence and, when possible, serum electrolytes, were assessed at the time of discharge. Data were analyzed from the ECWA Evangel VVF Center database. This retrospective study was approved by the ECWA Evangel Hospital ethics committee.

Continuous variables were reported as mean±standard deviation and were compared using the two-sample t test or Wilcoxon rank-sum test. The normality assumption for continuous variables was assessed using the Shapiro–Wilk test. Categorical variables were reported as frequency (percentage) and were compared using the Chi-squared test or Fisher's exact test. Statistical analyses were performed on SAS 9.3 (Cary, NC, USA). P value<0.05 was considered statistically significant.

Results

One hundred and eighteen urinary diversions were performed from 1996 to 2012. During the early period (1996–2002), a total of 9 ureterosigmoidostomies and 32 modified Mainz II pouches were performed. During the late period (2003–2012), a total of 77 modified Mainz II pouches were performed. In one case, an ectopic kidney with a very short ureter was encountered; in this patient, the procedure was abandoned.

Reasons for diversion included severe urethral incompetence (40; 33.9 %), inoperable VVF (38; 32.2 %), complete absence of urethra (11; 9.3 %), failed pubovesical sling—also essentially resulting in urethral incompetence (4; 3.4 %), and unknown (25; 21.2 %). Patients had endured up to ten previous repairs, although in some patients repair had never been attempted, because of extensive tissue destruction.

Patient characteristics are listed in Table 1. The use of tap water enemas to assist the patients in training their lower colon to retain fluid before diversion was documented in 52 patients. Duration of rectal training, when documented, was at least 14 days and up to 30 days.

Antibiotics were used in 97.3 % of cases; only three patients did not receive perioperative antibiotics.

Intraoperative findings included hydronephrosis (13; 11.0 %), a duplicated collecting system (4; 3.4 %), ectopic kidney (1—in addition to the 1 patient in whom the procedure was terminated; 0.9 %), tubal disease (4; 3.4 %), large incisional hernia (2; 1.7 %), and splenomegaly (1; 0.9 %). Ureteric catheters were utilized in 44 % of the early cases, and in 100 % of the later cases.

Surgical complications before discharge are noted in Table 2. There were no known cases of postoperative pyocystis. The overall complication rate was higher in the early cases, although this was not statistically significant (51 % vs 39 %; P=0.2006). The complication rate was not influenced by age, duration of VVF, duration of labor at the time of the initial injury, or by preoperative hematocrit. Retroviral disease status was positive in 8 patients (6.8 %), negative in 84 (83.1 %), and unknown in 9 (8.9 %). Retroviral status did not have an impact on complication rate. Transfusion was uncommon, occurring in 6 patients (5.1 %).

Major complications included death (3; 2.5 %) and reoperation (5; 4.2 %). Additional poor outcomes included unsuspected rectovaginal fistula (RVF; 2; 1.7 %), and persistent rectal leakage at night (8; 6.8 %). Tables 2 and 3 compare major complications and outcomes in the early and late periods. Two of the three deaths occurred in the early years. The two women with unsuspected RVF were eventually dry after additional vaginal surgery to repair the RVF. A higher percentage of patients in the early years remained wet at night.

Successful outcome, as defined by full restoration of urinary continence, was achieved in 106 patients (89.8 %). The use of ureteric catheters intraoperatively was sporadic in the early years, but routine in the later time period. Use of ureteric catheters was associated with better outcome (Table 3). Performance of modified Mainz II pouch was also associated with a better outcome.

Postoperative serum electrolyte values were available in 14 patients (Table 4). All serum was collected before discharge after performance of the diversion. A decrease in serum bicarbonate and a high level of chloride were observed.

Discussion

This study represents the world's largest series of urinary diversions performed as treatment for VVF. Our complete continence rate of 89.8 % is encouraging for these patients, in whom less radical surgery was either not feasible or had been previously unsuccessful.

Urinary diversion in any setting carries significant risks and complications. These have been reported to include metabolic alterations, particularly hyperchloremic acidosis, altered sensorium, infections such as wound and urosepsis, pouch stones, cancer, and osteomalacia [4, 5].

Table 1 Patient characteristics

		All (n=118)	1996–2002 (n=41)	2003–2012 (n=77)	P value*
Age at surgery (mean ± SD)		29.86±9.11	28.59±9.21	30.63±9.04	0.1761
Age at VVF (mean ± SD)		19.09±5.88	19.09±6.05	19.00±1.41	0.7608
Duration of VVF years (mean ± SD)		9.70±8.27	9.47±7.32	9.87±9.00	0.7732
Duration of labor days (mean ± SD)		2.65±1.58	2.51±1.44	2.83±1.68	0.5753
Living children: ≥1		14 (12.61)	8 (19.51)	6 (8.82)	0.1062
Diversion type	Mainz	109 (92.37)	32 (78.05)	77 (100)	<0.0001
	Ureterosigmoidostomy	9 (7.63)	9 (21.95)	0 (0)	
Ureteric catheters	No	25 (20.83)	23 (56.1)	0 (0)	<0.0001
	Yes	95 (79.17)	18 (43.9)	77 (100)	

*P value<0.05 indicates statistically significant results

Table 2 Surgical complications

Complication	All	1996–2002	2003–2012	*P* value
Reoperation	5 (4.17)	2 (4.88)	3 (3.9)	0.4401
Other[a]	46 (38.33)	19 (46.34)	27 (35.06)	
None	69 (57.50)	20 (48.78)	47 (61.04)	

[a] Other complications: wound infection (10; 8.5 %), malaria (6; 5.1 %), fever of unknown cause (4; 3.4 %), oliguria (4; 3.4 %), severe postoperative depression (3; 2.5 %), pyelonephritis (2; 1.7 %), prolonged ileus (2; 1.7 %), and pneumonia (1; 0.9 %).

Table 4 Postoperative laboratory values in 14 patients

Laboratory values	Mean ± SD	Normal
Sodium	141.00±5.87	137–145
Potassium	4.39±0.78	3.5–5.0
Chloride	107.75±10.59	98–107
Bicarbonate	18.67±3.44	22–31
Blood urea nitrogen	11.08±5.88	2.5–6.1
Creatinine	1.16±0.49	0.5–1.4

Urinary diversion is not to be taken lightly. It is important that patients and surgeons understand, as far as possible, the risks and rationale for the surgery. The surgeon must be diligent intra-operatively in assessing the anatomy. Anomalies of the urinary tract are not rare (5 % of our patients) and must be dealt with accordingly.

Our death rate of 2.5 % is significant. The three deaths occurred in 2001, 2002, and 2003. Two of the three patients who died had received ureteric catheters and modified Mainz II pouches; one had ureterosigmoidostomy without catheters. The reasons for the deaths were not obvious upon review of each individual's chart; however, one patient had a prolonged ileus, and two had severe postoperative depression.

Five of our patients (4.2 %) required reoperation in the first 2 weeks after surgery. Three of these patients experienced wound evisceration, one had a leak of a ureteric anastomosis, and one had prolonged oliguria with presumed anastomotic stenosis. All of these patients survived; 4 were dry, and the patient with prolonged oliguria had nighttime incontinence.

Nighttime incontinence is believed to be a result of relaxation of the anal sphincter with sleep. We attempted preoperatively to assess anal sphincter tone by performing rectal training. The numbers of women in our study in whom rectal training was documented (52) is too low to determine statistical significance. We believe, however, that diligent rectal training should help prevent anal incontinence and also identify patients with residual RVF. In addition, it is possible that the larger pouch created in the later years may have contributed to a lower rate of night-time incontinence in this group.

Our day- and night-time continence rates are comparable with those undergoing urinary diversion after radical cystectomy for bladder cancer (75–93 % and 72–84 % respectively) [6]. Morgan et al. [7] reported a nighttime incontinence rate of 31 % in 35 women who underwent Mainz pouch diversion in Eritrea. Our more favorable night-time incontinence rate of 11 % may be due to our aggressive preoperative rectal training.

We routinely removed rectal tube and ureteric catheters on POD 5. This was sooner than in the Eritrea study (POD 10) [7], but there were no apparent adverse sequelae.

The few patients on whom we were able to collect postoperative serum electrolytes demonstrated hyperchloremic acidosis, which is a known sequela of urinary diversion, presumably because of the reabsorption of urine by the colonic pouch. Others [8] have suggested that the metabolic acidosis seen with continent urinary diversion may resolve or at least improve with time. Our patients are instructed to alkalinize their food. Over-alkalinizing would seem unlikely, as the addition of large quantities of kanwa to soup would "out taste" other ingredients and make for a bad soup. We hope that future studies will focus on this issue.

Our complication rate of 42.5 % is comparable with that of a large study, which reported on urinary diversion at the time of pelvic exenteration for gynecological malignancies [9]. That study indicated that the most common postoperative complication was pyelonephritis (32 %), which again was difficult to diagnose in our patient population, given the lack of access to urine cultures, and the poor reliability of testing, as any urine would be mixed with fecal material.

Experience in the Nigerian state of Akwa Ibom suggested a low rate of urinary diversion in the treatment of VVF, with only 15 of the 2,484 patients (0.6 %) undergoing diversion [10]. We believe that our significant experience with urinary diversion is due in part to the extensive referral network we have developed with other VVF centers in northern Nigeria, where either no general anesthesia is given or no abdominal surgeries are performed. In fact, we are the only fistula center in Nigeria that currently performs urinary diversions.

A strength of our study was the large number of patients included for review. In the later years, priority was given to the standardization of preoperative, intraoperative, and postoperative care. We feel that standardization resulted in fewer chances for staff to misinterpret orders and resulted in better care. There are several weaknesses, however, and these include the lack of long-term follow-up. In addition, each of the seven surgeons who performed the diversions was given

Table 3 Surgical outcomes

Outcome	All	1996–2002	2003–2012	*P* value
Dry	106 (89.08)	30 (73.17)	74 (97.37)	0.0004
Persistent RVF	2 (1.68)	1 (2.44)	1 (1.32)	
Wet night	8 (6.72)	8 (19.51)	0 (0)	
Death	3 (2.52)	2 (4.88)	1 (1.32)	

the freedom to perform the surgery as he or she saw fit; there was no attempt to standardize surgical techniques. Chart review also provided limited retrospective data.

We had limited access to laboratory testing. Especially in the early years, electrolyte testing was sent to an outside laboratory, which usually meant a delay of several days before receipt of the laboratory results. We performed only hematocrit testing and retroviral disease screening before diversion. Additionally, limited imaging studies were available at our center; we did not perform routine imaging before diversion. We had no objective assessment of quality of life changes after the performance of urinary diversion. Finally, this study was a retrospective chart review, and as such is subject to the limitations inherent to this type of study.

The ethical issues of diversion for women with incurable urinary fistulae have been discussed [11, 12]. Our practice is to encourage each patient to take her time in deciding whether diversion is an appropriate option for her. At times, communication is difficult, given the large number of dialects which are utilized in Nigeria. Our previous studies [13] have also shown that most VVF patients may not be experienced consumers of medical care, and it may be difficult for them to grasp the serious nature of the surgery itself and its long-term sequelae. Furthermore, at present our capabilities in diagnosing and treating long-term complications such as metabolic abnormalities, bowel cancer, urinary calculi, and urinary tract infections are limited. We are concerned about the feasibility of diversion patients simply committing to purchasing alkalinizing agents and returning for regular follow-up [14].

Diversion represents a significant shift in paradigm from standard fistula repair. It is the beginning of a lifetime commitment to the patient, as the potential for long-term complications is so significant. Ideally, each woman should receive continuity of care, with routine surveillance of electrolytes and renal function, and even perhaps screening for colon cancer years after surgery. This is a significant challenge to fistula centers that practice on a "camp" or "pooled" model, where a woman may receive little or no postoperative care from the visiting surgeon, who leaves sometime soon after the operation. Additionally, fistula centers may receive financial support for fistula surgery through outside grants, but not for lifetime care. Even maintaining consistent capability for routine laboratory studies can be challenging in resource-poor environments.

Finally, it is our opinion that diversion should not be performed by visiting surgeons. As this study shows, the potential for complications is significant, and the complications can be varied and life-threatening. A local surgeon who might not feel comfortable with complex abdominal surgery may be unprepared to care for all possible complications that might arise after a visitor leaves. Almost universally, visiting surgeons do not understand the local language or culture that may have such a significant impact on a woman's ability to truly give consent to such a theoretically complex operation. Finally, visiting surgeons often have no experience in dealing with complex fistula, and are therefore not competent in declaring an individual case of fistula as "inoperable."

It is our hope that by publishing our experience with urinary diversions as treatment for vesicovaginal fistula, we will encourage dialogue among fistula surgeons, and thereby enhance the care of the patients with VVF.

We are currently compiling long-term data on our patients who have undergone urinary diversion, and hope to address long-term outcomes in a future publication. Norman et al. [15] has reported separately on two of our diversion patient, who subsequently delivered live-born infants via Cesarean section at our institution.

Additionally, we hope to further refine the diagnostic criteria for "inoperable" urinary fistulae.

Conclusion

Urinary diversion is feasible in a low-resource setting. Use of ureteric catheters in the performance of modified Mainz II pouch urinary diversion is associated with improved outcomes. Urinary diversion should be undertaken only after comprehensive counseling and preparation of the patient, and only by surgeons with appropriate training and experience.

Compliance with ethical standards

Financial disclaimers/conflict of interest None.

References

1. Kirschner C, Yost K, Du H, Karshima J, Arrowsmith S, Wall L (2010) Obstetric fistula: the ECWA Evangel VVF Center surgical experience from Jos, Nigeria. Int Urogynecol J 21:1525–1533
2. Pannek J, Senge T (1998) History of urinary diversion. Urol Int 60: 1–10
3. Fisch M, Wammack R, Muller SC, Hohenfellner R (1993) The Mainz pouch II (sigma rectum pouch). J Urol 149:258–263
4. Vasdev N, Moon A, Thorpe AC (2013) Metabolic complications of urinary intestinal diversion. Indian J Urol 29(4):310–315
5. Gutman RE, Dodson JL, Mostwin JL (2007) Complications of treatment of obstetric fistula in the developing world: gynatresia, urinary incontinence, and urinary diversion. Int J Gynecol Obstet 99:S57–S64
6. Lee RK, Abol-Enein H, Artibani W, Bochner B et al (2014) Urinary diversion after radical cystectomy for bladder cancer: options, patient selection, and outcomes. BJU Int 113:11–23
7. Morgan MA, Polan ML, Melecot HH et al (2009) Experience with a low-pressure colonic pouch (Mainz II) urinary diversion for irreparable vesicovaginal fistula and bladder extrophy in East Africa. Int Urogynecol J 20:1163–1168
8. Mills RD, Studer UE (1999) Metabolic consequences of continent urinary diversion. J Urol 161:1057–1066
9. Urh A, Soliman PT, Schmeler KM, Westin S et al (2013) Postoperative outcomes after continent versus incontinent urinary

diversion at the time of pelvic exenteration for gynecologic malignancies. Gynecol Oncol 129:580–585
10. Hilton P, Ward A (1998) Epidemiological and surgical aspects of urogenital fistulae: a review of 25 years' experience in southeast Nigeria. Int Urogynecol J 9:189–194
11. Wall LL, Arrowsmith SD, Hancock BD (2008) Ethical aspects of urinary diversion for women with irreparable obstetric fistulas in developing countries. Int Urogynecol J 19:1027–1030
12. Morgan MA, Husain A (2009) Comment on Wall et al.: Ethical aspects of urinary diversion for women with irreparable obstetric fistulas in developing countries. Int Urogynecol J 20:611–612
13. Wall LL, Karshima JA, Kirschner C, Arrowsmith SD (2004) The obstetric vesicovaginal fistula: characteristics of 899 patients from Jos, Nigeria. Am J Obstet Gynecol 190(4):1011–1019
14. Arrowsmith SD (2007) Urinary diversion in the vesico-vaginal fistula patient: general considerations regarding feasibility, safety, and follow-up. Int J Gynecol Obstet 99:565–568
15. Norman AM, Gerten KA, Ibrahim J, Richter HE (2008) A modified Mainz I pouch technique for management of refractory vesicovaginal fistulas: patient focused outcomes. Int J Gynecol Obstet 101:35–38