

The urological care and outcome of pregnancy after urinary tract reconstruction

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OBJECTIVE

To assess the obstetric and urological outcomes during and after pregnancy following urinary tract reconstruction, as pregnancies after such surgery can have a significant effect on the function of the reconstructed urinary tract, and the reconstruction can significantly affect the delivery of the fetus.

PATIENTS AND METHODS

We retrospectively reviewed the obstetric and urological history of 11 patients (12 pregnancies; 10 singletons and one twin) with previous urinary reconstruction, delivered

between 1989 and 2003. Antepartum and postpartum urological function and obstetric outcomes were investigated.

RESULTS

All the patients had some difficulty with clean intermittent catheterization (CIC) during pregnancy, and four needed continuous indwelling catheters. During pregnancy 10 women had several bladder infections and all received antibiotic suppression. There were eight Caesarean sections, two vaginal deliveries and one combined delivery. Six Caesareans were elective and three were emergent. The use of CIC returned to normal in all patients after delivery.

CONCLUSIONS

Women with a urinary reconstruction can have successful pregnancies. The complexity of the surgery and the concern for possible emergency Caesarean section resulted in most patients having an elective Caesarean delivery before term. Antibiotic prophylaxis is recommended and patients may require indwelling catheters while pregnant but normal CIC can be resumed after delivery.

KEYWORDS

bladder augmentation, urinary tract reconstruction, pregnancy, Caesarean section

INTRODUCTION

Over the last two decades urinary tract reconstruction has become commonplace in children and young adults born with various congenital abnormalities of the genitourinary system. Many of the young women in this group of patients will have relatively normal reproductive capability. The pregnancies that occur after urinary tract reconstruction can have a significant effect on the function of the reconstructed urinary tract, and the reconstruction can significantly affect the delivery of the fetus. Thus we have assessed the obstetric and urological outcomes during and after pregnancy in women after urinary tract reconstruction.

PATIENTS AND METHODS

We retrospectively reviewed the obstetric and urological history of 11 patients (12 pregnancies; 10 singletons and one twin) all of whom had previously undergone some form of urinary tract reconstruction. The

deliveries were between 1989 and 2003, and the urological function and obstetric outcomes before and after delivery were recorded. The investigation was by a retrospective chart review between 1985 and 2003 in a two tertiary-care referral centres.

The patients were aged 3–18 years at the time of reconstruction and at the time of the delivery the mean (range) age was 25.5 (19–38) years. The initial underlying abnormality included bladder exstrophy in five patients, sacral agenesis in four, meningomyelocele in one and bilateral ectopic ureters in one. Seven of the 11 patients had undergone continent urinary diversion with a catheterizable stoma, and four had had a bladder augmentation. Five of seven patients who had a continent urinary diversion had had previous diversion with an ileal or colon conduit. Nine of the 11 patients had a catheterizable perineal stoma or urethra and two had an abdominal stoma. Nine of the patients conceived spontaneously while two required assisted reproductive technology. All of the patients were on clean intermittent catheterization (CIC) before conception.

RESULTS

The urological and obstetric outcome for each patient is shown in Table 1. All patients had some difficulty with CIC during pregnancy, the greatest being in patients with a catheterizable perineal stoma, especially those who had undergone orthotopic Indiana pouch diversion with a catheterizable perineal ileal limb. However, the two patients who had a right lower quadrant Mitrofanoff stoma also had some difficulty with CIC during the last trimester of pregnancy.

Two women had severe bladder spasms requiring hospitalization and treatment with anticholinergic drugs during pregnancy, and four of the 11 women required continuous indwelling catheters during the last trimester of their pregnancy. All of the women returned to normal catheterizable function after the pregnancy.

During pregnancy 10 of the 11 women had several UTIs and all the patients were on prophylactic antibiotic suppression. The only patient who did not have a urine infection

TABLE 1 The urological and obstetric outcome for each patient

Patient	Year of delivery	Urological diagnosis	Reconstruction	CIC	Gestational age, weeks	Delivery	N of UTIs in pregnancy	Indwelling catheter	Weight, g, and Apgar scores
A	1989	BE	OI + V	Yes	38	EC	2	No	3300, 9/9
B	1989	BE	OI + V	Yes	38	EC	4	Yes	2470, 8/9
C	1990	BE	OI + V	Yes	28	Preterm labour to EmC	3	No	1180, 7/8
D	1991	BE	OI	Yes	36	EC	3	Yes	3600, 9/10
E	1999	BE	AC + sling	Yes	36	EC	2	Yes	2425, 8/9
F	2000	SA	AC + sling	Yes	37	EC	>5	No	2050, 9/9
G	2000	SA	AC	Yes	Term	Vaginal	>1	No	3320, 7/9
H	2001	SA	AC	Yes	Term	Breech to EmC	>1	No	4430, 2/6
	IVF	SA	OI + V	Yes	24	A: vertex to vaginal B: Breech to EmC	3	Yes	A: 640, 6/7 B: 690, 5/7
I	2001	SB	G + M	Yes	38	EC	0	No	2970, 2/6
J	2003	BEU	BA + M	Yes	38	Vaginal	3	No	2555, 9/9

IVF, *in vitro* fertilisation; BE, bladder exstrophy; SA, sacral agenesis; BEU, bilateral ectopic ureterocele; OI + V, orthotopic Indiana and vaginoplasty; AC, augmentation cystoplasty; G, gastrocystoplasty; M, Mitrofanoff; BA, bladder augmentation; EC, elective Caesarean; EmC, emergency Caesarean.

during pregnancy had had a previous gastric cystoplasty.

Only two women carried their pregnancy to term; eight patients were delivered by Caesarean section, six electively and three as an emergency. There were two vaginal deliveries and the one patient with a twin pregnancy had a combined vaginal delivery and Caesarean section. The twins were delivered at 24 weeks because of pre-term labour resulting in two neonatal deaths.

The birth weights for the 10 singletons were 1.180–4.4 kg and the twins were <700 g each. The Apgar scores were excellent in eight of the 12 infants and slightly low in four. There were two perinatal deaths (in the twin pregnancy) delivered at 24 weeks gestation, and one of the other infants born at 28 weeks with a birth weight of 1180 g required 3 days of endotracheal intubation and hospitalization for 41 days.

The nine patients having a Caesarean section had a classical midline incision, and in each the urinary reservoir or augmented bladder was easy to move away from the gravid uterus. Postpartum bleeding was unremarkable in any of the patients. Three of the 11 had a simultaneous tubal ligation at the time of delivery.

DISCUSSION

One of the standard questions asked by the patient or by parents is about the future child-bearing ability of the young female undergoing urinary tract reconstruction. To give a more precise and authoritative answer we assessed the urological care and obstetric and urological outcome of pregnancy in women who have had a urinary tract reconstruction. The issue of pregnancy in patients with bladder exstrophy has been well documented, including our early series of 14 pregnancies in 40 such patients of child-bearing age [1]. That report included patients who became pregnant either after successful reconstructive surgery or super-vesical diversion. In that early group of patients gestational complications included uterine prolapse, UTI and temporary incontinence in most patients who had had successful bladder reconstruction at birth, and who had a vaginal delivery. More recently Matthews *et al.* [2] reported on 11 pregnancies in 83 women with bladder exstrophy. There have also been other occasional reports of successful pregnancy in patients with exstrophy [3–7].

Successful pregnancy after urinary diversion with an ileal conduit or ureterosigmoidostomy has also been reported [8–10]. Most investigators reported a significant increase in gestational UTIs in patients with ileal conduit diversion,

especially when the expanding uterus compresses the conduit. In the case of ureterosigmoidostomy, the expanding uterus also compresses the ureters and can cause significant hydronephrosis. A very similar high incidence of urine infection including pyelonephritis, especially in the late second trimester, is substantiated in data that we collected in women during pregnancy after urinary tract reconstruction [11]. Similar findings were reported in pregnancy after augmentation cystoplasty [12–14].

All of the patients in our previous evaluation had bladder exstrophy and in the present study, although five of the patients had bilateral exstrophy, another five had some variant of spinal dysraphism and one had ureteric ectopia.

There are several recurrent themes that become clear in assessing this group of patients. All of them were using CIC before pregnancy and all had some difficulty with it during the pregnancy. Clearly those who had the most difficulty were the patients with a continent urinary diversion using an orthotopic Indiana pouch with a catheterizable ileal stoma in the perineum. In these patients the catheterizable tube routinely elongated and became very difficult to catheterize. Indeed, three of the five patients who had this form of continent urinary diversion had to have an indwelling

Foley catheter for the last part of their pregnancy. Even in the two patients who had right lower quadrant Mitrofanoff stoma, catheterization became more problematic as pregnancy progressed. In these two patients conversion to a Coudé catheter was necessary for them to successfully use CIC.

Nine of the 11 patients had a Caesarean section and only two had a vaginal delivery, six of the former being elective and three an emergency. We consider that the elective scheduling of a Caesarean delivery before the onset of labour is the preferred method in this group of patients, in particular those with orthotopic continent urinary diversion. In the three patients requiring emergency section, two were caused by pre-term labour and one by conversion of an elective vaginal delivery to a section because of breech presentation. An increased incidence of both pre-term labour and fetal malpresentation in women with bladder exstrophy was reported previously [6,15].

All of the patients in this series except one had several UTIs and two had clinical pyelonephritis. The only patient not developing a UTI during pregnancy had had a previous gastric cystoplasty. Interestingly, contributing factors to UTI in these women were similar despite the different forms of reconstruction, and included urinary stasis, difficulty with CIC and ureteric compression. We consider it advisable to keep all these women on antibiotic prophylaxis through pregnancy.

All of the patients who had a Caesarean section had the usual midline incision and the urinary reservoir or augmented bladder was usually pushed to the area from which the bowel segment was taken. Nine of the 11 patients had right colon reservoirs or ileal augmentations and therefore the bowel segments were moved up and to the right in the one who had a gastric cystoplasty brought down on the right gastro-epiploic artery; the segment was also pushed up and to the right. In the one patient who had an augmentation using left colon the bowel

segment was pushed up and to the left. In all instances the reservoir or augmented bladder was easily moved away from the gravid uterus. This has been reported previously [13].

In 10 of the patients the fetal outcome was excellent; unfortunately, the patient with the failed twin pregnancy was an older primigravida who had used artificial reproductive technology for pregnancy and spent 10 of the 24 weeks of her pregnancy in hospital with an indwelling catheter.

We consider that women with a previous urinary tract reconstruction for whatever reason can have a good obstetric outcome; antibiotic prophylaxis should be used during pregnancy because of the high incidence of UTI in these women; all women using CIC will have difficulty with it during pregnancy but all should return to normal CIC after delivery. Most often the reconstructed reservoir or augmented bladder is pushed to the side of the bowel segment used, and most often the reconstructed bladder reservoir is easy to remove from the gravid uterus. It is very important that the reconstructive surgeon be available at the time of elective delivery to better facilitate the coordinated care of both mother and fetus.

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Abbreviation: CIC, clean intermittent catheterization.