

Postpartum Urinary Retention

John W. Saultz, M.D., William L. Toffler, M.D., and Janette Y. Shackles, M.D.

Abstract: *Background:* Urinary retention is a common and frustrating complication in women during the immediate postpartum period. Physiologic changes in the bladder that occur during pregnancy predispose patients to develop symptomatic retention of urine during the first hours to days after delivery.

Methods: The incidence and characteristics of postpartum urinary retention were researched through a literature review and are illustrated by a case report.

Results and Conclusions: Postpartum urinary retention has a reported incidence ranging from 1.7 to 17.9 percent. Factors associated with postpartum urinary retention include (1) first vaginal delivery, (2) epidural anesthesia, and (3) Cesarean section. Treatment begins with supportive measures to enhance the likelihood of micturition, such as ambulation, privacy, and a warm bath. If these measures are not successful, catheterization can be performed. If the bladder contains more than 700 mL of urine, prophylactic antibiotics may be warranted, because prolonged or repeated catheterization may be necessary. (J Am Board Fam Pract 1991; 4:341-4.)

Case Report

A 26-year-old woman, gravida 3, para 2, was followed through an unremarkable prenatal course in the Family Practice Center. Six years earlier she had had a low-transverse Cesarean section because of cephalopelvic disproportion and a failed attempt at forceps delivery. She presented at term several hours after spontaneous onset of labor and ruptured membranes. On initial examination, uterine contractions were occurring at 3-to-4-minute intervals, and the cervix was dilated 4 to 5 cm. Epidural anesthesia was administered, and cervical dilation was complete 1 hour and 45 minutes later. During the second stage of labor, straight catheterization of the bladder yielded 350 mL of urine. After 2 hours of pushing, a pattern of variable fetal heart rate decelerations worsened, and fetal scalp blood sampling showed a pH of 7.08. Simpson forceps were applied with the fetal head in right occiput anterior position and 2+ station. A living infant was delivered without further difficulty, and a 3rd-degree perineal laceration was repaired.

In the immediate postpartum period, a moderate degree of perineal swelling, extending halfway

up the right labia, was treated with an ice pack. Five hours after delivery, the patient was unable to void, and bladder catheterization yielded 600 mL of urine. The swelling of the labia and perineal area was unchanged. Approximately 14 hours postpartum, a Foley catheter was placed yielding 200 mL of urine. The catheter was removed after 19 hours (33 hours postpartum). The patient was again unable to void after 5 more hours (38 hours postpartum), and another Foley catheter was placed yielding 900 mL of urine. The Foley catheter was removed after approximately 19 hours (57 hours postpartum), but 6 hours later the patient was still unable to void. A third Foley catheter was inserted yielding 1750 mL of urine, and nitrofurantoin was begun prophylactically. After 18 hours (80 hours postpartum), the patient insisted that the catheter be removed and within several hours was able to void. She was subsequently discharged from the hospital, completed a 5-day course of nitrofurantoin, and had no further trouble urinating.

The case generated a great deal of discussion and some controversy about optimal management among the family practice residents and staff, which led to our review of postpartum urinary retention.

Pathophysiology

Characteristic changes in urinary bladder function during pregnancy were first described in 1939 by Muellner,¹ and numerous subsequent

Submitted, revised, 30 April 1991.

From the Department of Family Medicine, The Oregon Health Sciences University. Address reprint requests to John W. Saultz, M.D., Department of Family Medicine, Oregon Health Sciences University, 3181 S.W. Sam Jackson Park Road, Portland, OR 97201.

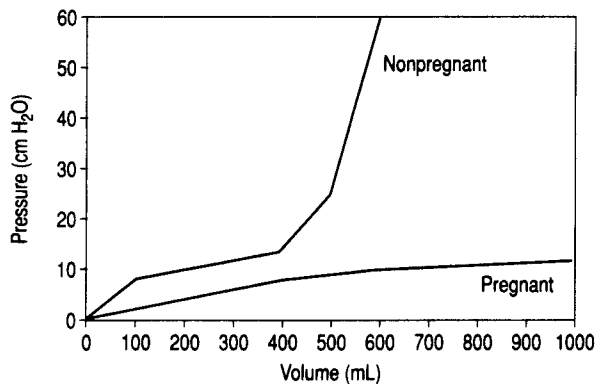


Figure 1. The urge to void is first noticed by the nonpregnant woman when the bladder contains 150–200 mL of urine at a pressure of about 10 cm H₂O. Maximum urge to void occurs at a bladder volume of 450 mL and pressure of 20 cm H₂O. The pregnant woman's bladder has a larger capacity with a lower pressure at any given volume. Adapted from Bennetts, et al.² and Youssef.³

studies have contributed knowledge of normal bladder function, as well as changes associated with pregnancy.^{2,3} The normal nonpregnant woman has a bladder capacity between 350 to 450 mL. The desire to urinate is usually experienced first when the bladder contains 150 to 200 mL of fluid (Figure 1). The maximum urge to urinate occurs when the bladder contains 450 to 550 mL of fluid, and the intravesical pressure is approximately 20 cm of water. During urination, the bladder pressure increases to 60 to 70 cm of water until the bladder is empty.

Beginning in the 3rd month of pregnancy, the muscles of the bladder lose tone, and bladder capacity slowly increases. The causes of these changes are poorly understood, but they may be related to the hormonal changes of pregnancy. Progesterone is known to have an inhibitory effect on smooth muscle, and the administration of progesterone to rabbits brings about an increase in capacity and a decrease in tone of their bladders.³ In any case, there is a significant change in the pressure-volume curve of the bladder by the 38th week of pregnancy (Figure 1). As a result, pregnant women ordinarily have the first desire to void when the bladder contains 250 to 400 mL of fluid (intravesicular pressure of only 4 to 8 cm of water). Maximum urinary urge often is not reached until 1000 to 1200 mL of fluid accumulate (intravesicular pressure of 12 to 15 cm of water). These pressures and volumes pertain to persons in the supine position; when they stand or

sit, the weight of the gravid uterus exerts pressure on the urinary bladder and has a mitigating effect on this increased functional bladder capacity. For this reason, urinary stress incontinence can occur in as many as 67 percent of pregnant women.⁴ Physiologic changes in the bladder persist for days to weeks into the postpartum period. The postpartum bladder therefore tends to be hypotonic, but without the weight of the gravid uterus to limit bladder capacity. These phenomena may contribute to postpartum urinary retention.

Diagnosis

Postpartum urinary retention is defined as the absence of spontaneous micturition within 6 hours of vaginal delivery; in case of Cesarean section, it is defined as no spontaneous micturition within 6 hours after the removal of an indwelling catheter (more than 24 hours after delivery). Using this definition, Kermans and colleagues⁵ reported postpartum urinary retention in 17 (2.1 percent) of 789 vaginal deliveries and in 2 (3.2 percent) of 62 patients delivered by Cesarean section. Burkhart and colleagues⁶ studied 1000 postpartum women in a US Air Force hospital and performed bladder catheterization only when patients complained of discomfort and the urge to void with inability to do so. Using these criteria, 4.9 percent of patients required at least one catheterization during the postpartum period. From these data, it might be anticipated that the family physician will encounter a patient with postpartum urinary retention once for every 20 to 50 vaginal deliveries.

No consistent difference has been reported in the incidence of urinary retention based on the age of the patient, the gestational duration, the method of vaginal delivery, or the newborn birth weight. Three factors that have been associated with an increased incidence of postpartum urinary retention are (1) first vaginal delivery, (2) the use of epidural anesthesia, and (3) Cesarean section performed because of delay in the first stage of labor.⁵ The role of Cesarean section in postpartum urinary retention is difficult to discern. After a Cesarean section delivery, patients generally have an indwelling bladder catheter for at least the first 24 hours postoperatively, and the effects of surgery and anesthesia complicate postpartum bladder changes in these patients. When use of anesthesia and primiparity are controlled in

a multivariate analysis, patients with Cesarean sections do not have an increased incidence of postpartum urinary retention.⁵

An increased incidence of urinary retention can occur in patients who require bladder catheterization at the time of vaginal delivery (9.8 percent in patients catheterized at delivery versus 3.7 percent in those not catheterized).⁶ While patients administered lumbar epidural anesthesia can have a significantly higher incidence of hypotonic bladders and asymptomatic urinary retention,⁷ at least one investigator has actually found a decreased incidence of urinary retention in these patients.⁸ All studies addressing the effect of epidural anesthesia on the bladder have identified an increased rate of antepartum catheterization. The most available information suggests an increased incidence of postpartum urinary retention in patients who receive epidural anesthesia. Table 1 summarizes factors that have been associated with an increased incidence of postpartum urinary retention and lists relative risks that have been calculated from published data.^{5,6}

Treatment

Many different strategies have been suggested to manage patients with postpartum urinary retention. Whereas it is generally accepted that urine retention and overdistention of the bladder can result in irreversible damage to the detrusor muscle, hypotonia of the detrusor muscle can have a protective effect in postpartum patients. All authors agree that patients who develop discomfort and an urge to void should be given relief by catheterization of the bladder. In patients with postoperative urinary retention after general surgical procedures, Stallard and Prescott⁹ reported that 57 percent of patients who expressed difficulty in urinating in the presence of an urge to void were successfully able to urinate after "helping measures" by the nursing staff. These measures included the administration of oral analgesia, helping the patient to stand and walk, providing privacy, and assisting the patient into a warm bath. These measures present little risk to the patient and represent reasonable options prior to catheterization for some postpartum patients.

If bladder catheterization is necessary, the volume of urine obtained may predict the need for

Table 1. Factors Associated with an Increased Incidence of Postpartum Urinary Retention.

Risk Factor	Relative Risk*
First vaginal delivery	7.4
Epidural anesthesia	3
Catheterization before delivery	2.6

*Calculated from data in Kermans, et al.⁵ and Burkhart, et al.⁶

repeat catheterization. Burkhart, et al.⁶ found that none of 10 patients with the urine volume of 699 mL or less required repeat catheterization, but it was necessary for 2 of 14 patients with 700 to 999 mL of residual urine and 5 of 25 patients with more than 1000 mL of residual urine. Some authors recommend that bladder catheterization be repeated every 4 hours in patients who require an initial postpartum catheterization until spontaneous voiding occurs. Others recommend that the initial catheterization be repeated only after the patient again is unable to void. There are few data to indicate whether repeated bladder catheterization is preferred to the insertion of an indwelling Foley catheter in patients who are persistently unable to void for more than 24 hours.

When women are catheterized for longer than 24 hours in the postpartum period, approximately 40 percent will develop bacteriuria.^{10,11} The incidence of urinary tract infection increases in patients who require multiple catheterizations or who have an indwelling Foley catheter placed. The likelihood of urinary tract infection can be substantially decreased by prophylactic antibiotic treatment. Although the patient who requires only one catheterization should do well without prophylactic antibiotics, microscopic examinations of urine and urine culture might be considered in these patients to detect early signs of infection. Some authors argue that because of the increased bladder capacity and predisposition for urinary tract infection, any patient who is catheterized at any time in the postpartum period should receive a course of prophylactic antibiotics.^{10,11} Appropriate antibiotics for this purpose include nitrofurantoin, ampicillin, and trimethoprim-sulfamethoxazole. Trimethoprim-sulfamethoxazole is contraindicated in breastfeeding mothers, but ampicillin and nitrofurantoin can be safely used in these patients. If suppressive antimicrobial therapy is used, it should be administered throughout the period of catheterization and for 48 hours following catheter removal.

The use of α -adrenergic blocking drugs to decrease bladder outflow resistance or parasympathetic agents to stimulate detrusor contraction has been investigated in patients with postoperative urinary retention. Tammela¹² reported 40 percent fewer cases of postoperative urinary retention in patients who received a 3-day course of phenoxybenzamine (10 mg twice daily for 3 days beginning at the time of initial catheterization) compared with those who took a placebo. Although this study found phenoxybenzamine (an α -blocker) to be superior to carbachol (a parasympathetic agent), postoperative patients have a markedly different detrusor function than do postpartum patients. Neither of these medications has been studied in postpartum patients, and their use in breast-feeding mothers is problematic because of potential effects on the infant. These medications can be considered for selected, non-breast-feeding patients with refractory urinary retention.

Conclusions

The following suggestions outline an appropriate clinical approach to urinary retention in postpartum women:

1. Physiologic changes in the bladder during pregnancy and the postpartum period predispose to urinary retention. Primigravid patients who had epidural anesthesia or who were catheterized during labor appear to be at increased risk for this problem.
2. Women who have the urge to void, but are unable to do so or who have not urinated within 6 hours postpartum in the face of adequate hydration should be assisted by "helping measures," such as ambulation, privacy, and a warm bath.
3. If helping measures are not successful in promoting urination, catheterization should be performed. The volume of urine in the bladder should be measured, and a specimen of urine should be examined for evidence of bacteriuria. If bacteriuria is noted, or if the

bladder contains more than 700 mL of urine, a course of prophylactic antibiotic therapy may be warranted. Appropriate antibiotic agents include trimethoprim-sulphamethoxazole, ampicillin, and nitrofurantoin and should be continued for 48 hours after catheterization.

4. If repeat bladder catheterization is necessary, a prophylactic antibiotic is indicated. There are no data to suggest whether intermittent catheterization or insertion of an indwelling catheter is preferred in these patients.

References

1. Muellner SR. Physiological bladder changes during pregnancy and the puerperium. *J Urol* 1939; 41:691-5.
2. Bennetts FA, Judd GE. Studies of the postpartum bladder. *Am J Obstet Gynecol* 1941; 42:419-27.
3. Youssef AF. Cystometric studies in gynecology and obstetrics. *Obstet Gynecol* 1956; 8:181-8.
4. Isoif S, Ingemarsson I, Ulmsten U. Urodynamic studies in normal pregnancy and in puerperium. *Am J Obstet Gynecol* 1980; 137:696-700.
5. Kermans G, Wyndaele JJ, Thiery M, DeSy W. Puerperal urinary retention. *Acta Urol Belg* 1986; 54:376-85.
6. Burkhart FL, Porges RF, Gibbs CE. Bladder capacity postpartum and catheterization. *Obstet Gynecol* 1965; 26:176-9.
7. Weil A, Reyes H, Rottenberg RD, Beguin F, Herrmann WL. Effect of lumbar epidural analgesia on lower urinary tract function in the immediate postpartum period. *Br J Obstet Gynaecol* 1983; 90:428-32.
8. Crawford JS. Lumbar epidural block in labour: a clinical analysis. *Br J Anaesth* 1972; 44:66-74.
9. Stallard S, Prescott S. Postoperative urinary retention in general surgical patients. *Br J Surg* 1988; 75:1141-3.
10. Brumfitt W, Davies BI, Rosser EI. Urethral catheter as a cause of urinary tract infection in pregnancy and puerperium. *Lancet* 1961; 2:1059-62.
11. Harris RE. Postpartum, urinary retention: role of antimicrobial therapy. *Am J Obstet Gynecol* 1979; 133:174-5.
12. Tammela T. Prevention of prolonged voiding problems after unexpected postoperative urinary retention: comparison of phenoxybenzamine and carbachol. *J Urol* 1986; 136:1254-7.