There is a risk of altered perception of bladder fullness during the postoperative period. This can lead to high intravesical pressure and overdistension, difficulty in emptying the bladder, and recurrent urinary tract infections (Gönülü et al., 1993; Kemp & Tabaka, 1990; Lapides, Diokno, Lowe, & Kalish, 1973; Tammela, Kontturi, & Lukkarinen, 1986a; Wein, 2002). Postoperative voiding problems may also lead to prolonged and repeated hospital stays (Johansson, Athlin, Frykholm, Bolinder, & Larsson, 2002; Kemp & Tabaka, 1990; Lau, Patil, Yuen, & Lee, 2002; Tammela, Kontturi, & Lukkarinen, 1986b). Nevertheless, despite making it easier to monitor urinary output, an indwelling catheter is generally not recommended during minor surgery due to an increased risk of urinary tract infections and traumatic injury to the urethra (Davey, 1994; Fuselier, 1993; Johansson et al., 2002; Summit, Stovall, & Bran, 1994). To avoid complications connected with postoperative urination difficulties, it is important to investigate factors that may influence patients’ ability to urinate postoperatively.

A prospective study was conducted to investigate factors that might influence first postoperative urination. In 174 patients, 39% were not able to void spontaneously after surgery and required catheterization. Identified factors included males over 55 years of age, extended time in surgery, extended anesthesia time, and previous history of voiding problems. It is important for nurses to take a more active role in pre-screening for voiding problems as well as be knowledgeable about the pharmacologic action of drugs causing bladder overdistention.

**Purpose**

The study was designed to explore incidence and factors that may influence patients’ first postoperative urination.

**Method**

A prospective study was conducted. A questionnaire, developed by the investigators was used for data collection. The sample consisted of 174 patients; 105 females and 69 males. Patients were followed until the first postoperative spontaneous urination occurred.

**Results**

In 174 patients, 39% were not able to void spontaneously after surgery and required catheterization. Identified factors influencing spontaneous postoperative urination included males over 55 years, extended time in surgery, extended anesthesia time, and prior history of voiding problems.

**Conclusion**

It is essential that the nurse be proactive in assessing for predisposing factors that may influence postoperative urination. A thorough history and attention to possible predisposing factors, especially anesthesia and medications affecting the bladder, can avoid or minimize postoperative voiding problems for the patient.

Literature Review

The literature cites various factors which may influence patients’ ability to urinate postoperatively: (a) age, (b) gender, (c) a previous history of bladder problems, (d) type and duration of surgery and anesthesia, (e) drugs, and (f) intravenous fluids.
Postoperative urinary retention is a common complication of any surgery, even in patients with no pre-existing urinary symptoms (Gönülü et al., 1993). Incidence of postoperative urinary retention has been documented between 4% to 25% (Wein, 2002). Studies have also shown that patients who required an indwelling catheter or who had a single catheterization postoperatively had significantly longer operation times, compared to those who could pass urine spontaneously after surgery (Gönülü et al., 1993; Petros, Rimm, & Robillard, 1992).

Several studies have shown a connection between increased age and urinary retention (Boulis, Mian, Rodriquez, Cho, & Hoff, 2001; Gönülü et al., 1993; Petros, Mallen, Howe, Rimm, & Robillard, 1993; Petros, Rimm, & Robillard, 1992; Tammela et al., 1986b). Postoperative urinary retention occurs in both male and female patients of all ages, but elderly patients are at a higher risk due to their lower functional bladder capacity (Marieb, 2001). The glomerular filtration rate decreases with age, prolonging the metabolism of many drugs (Bjålie, Haug, Sand, Sjaastad, & Toverud, 1998). Elderly patients may also have decreased perception of bladder distension, which can predispose them to nerve fiber damage when distension occurs (Kemp & Tabaka, 1991). Petros et al. (1992) found a significantly higher frequency of urinary retention in men compared to women. Previous history of bladder problems can result in urinary retention (Tammela et al., 1986b).

Inhaled anesthetic and narcotic medications can lead to relaxation of the smooth muscle of the bladder, decreased contractile force, and decreased awareness of bladder fullness (Petros et al., 1992). During spinal anesthesia, both sympathetic and parasympathetic nerves are blocked, causing paralysis of both the detrusor muscle and the sphincter. These autonomic effects considerably outlast motor and sensory blockade, leading to difficulties in emptying the bladder (Kamphuis et al., 1998). Opiates decrease parasympathetic tone in the bladder, depressing the voiding reflex and the ability to empty the bladder. In general, heavily sedated patients have difficulty with the perception of bladder fullness (Kemp & Tabaka, 1991). Other studies have cited only small differences in the incidence of urinary retention between groups of patients receiving spinal anesthesia versus general anesthesia (Jensen, Mikkelsen, & Kehlet, 2002; Tammela et al., 1986b).

Various drugs also have an influence on the ability of patients to urinate postoperatively. Anticholinergic drugs decrease intravesical pressure by antagonizing parasympathetic control of the bladder (Fuselier, 1993; Kemp & Tabaka, 1991; Meigs et al., 1999). Beta blockers inhibit the relaxing effect of beta-receptors in the bladder, which can lead to alpha-adrenergic dominance. However, alpha-adrenergic drugs may cause urinary retention by stimulating the sympathetic innervation and contraction of the internal sphincter (Boulis et al., 2001; Fuselier, 1993; Meigs et al., 1999). Calcium channel blockers may decrease the contractile ability of the bladder (Meigs et al., 1999) since calcium is important for the contraction force (Guyton & Hall, 2000).

Several studies have shown that a larger volume of intravenous fluids given perioperatively resulted in a higher risk of postoperative urinary retention (Kemp & Tabaka, 1990; Kulaşoğlu, Dener & Kama, 2001; Tammela et al., 1986b). In Tammela et al. (1986a), a correlation was shown between large amounts of fluids intravenously and a need for recatheterization. However, Petros et al. (1993), found no correlation between perioperatively intravenous fluid and urinary retention.

**Purpose**

To avoid complications connected with postoperative urination difficulties, it is important to investigate potential causative factors. Therefore, the purpose of this prospective study was to explore incidence and factors that may influence patients’ first postoperative urination.

**Methodology**

**Ethical consideration.** The research-ethic committee of Goteborg University gave permission for the study. The setting was a general postoperative ward at a university hospital. The patients were informed and verbal consent was obtained. Patients were asked to participate the day before surgery. Anonymity of participants was guaranteed.

**Sample.** Patients were consecutively included during a 2-week-period. There were 286 patients who fulfilled the criteria to participate in the study. All patients agreed to participate and missing data were negligible. Of these 286 patients, 112 were treated with indwelling catheters preoperatively and were thereby excluded from this part of the study. Of the remaining 174, 60% (n=105) were female and 40% (n=69) male. The mean age for males was 45.1 (SD=19.42) and for females 51.1 (SD=18.69).

The patients had undergone various types of operations, from minor surgical procedures to major operations. Exclusion criteria were any patient under the age of 16 years and/or those patients who underwent surgical procedures to the urinary tract.

**Tool.** A questionnaire, developed by the investigators, was used for data collection. The questionnaire was pretested by the investigators and five nurses, resulting in some minor modifications to the tool. The form included 20 questions and was designed to explore age and gender, type and duration of surgery and anesthesia, associated medication, intravenous fluid, blood loss, history of previous voiding problems, and recatheterization. The investigators filled in the questionnaires before the patient
left the postoperative ward. Data were collected from the patients and/or staff and medical records. There was always one investigator in the postoperative ward, from 7 am to 9 pm. During the night shift, the nursing staff filled in the questionnaire. The nursing staff received verbal instructions on how to complete the questionnaire.

Procedure. The patients were followed until the first spontaneous urination occurred, either in the postoperative ward or in the surgery ward. In cases where the patient had a catheterization in the postoperative ward and then was transferred to the surgery ward, a followup visit was made to the surgery ward. During the study, no changes were made in usual ward routines. The decision to perform catheterization was made by the nurse in charge and was based on the indication for single-use catheterization (SUC) according to the ward protocol. The indications for catheterization were the following: (a) patient is not able to urinate when desired, or (b) time limit of 5 hours was reached, and/or, (c) the bladder scan measurement showed greater than 400 ml. A low-friction LoFric® catheter was used for all SUCs.

Data analysis. The patients were divided into two groups. Group A patients were able to void spontaneously for the first postoperative urination and Group B patients needed SUC. The variables compared between these two groups were: (a) gender, (b) age, (c) type and duration of surgery, (d) type and duration of anesthesia, (e) associated medication, (f) blood loss, (g) intravenous fluid, (h) history of previous voiding problems, and (i) recatheterization. The data were analyzed using Statistical Package for Social Sciences (SPSS). T-tests were used to compare the two groups regarding age, Wilcoxon Rank-Sum Test for operation and anesthesia time, and Fisher’s exact test for associated medication, type of anesthesia, IV fluid given, and previous voiding problems.

Results

Age and gender. Of the 106 patients in Group A, 61 voided spontaneously during their stay in the postoperative ward and 45 after they arrived to the surgery ward. The mean time between preoperative urination and first spontaneous postoperative urination was 404 minutes (range=150-1,110). In Group A, 42% (n=45) were male and 58% (n=61) female. The mean age for the males was 39.0 (SD=16.03), and for females 49.6 (SD=18.90).

The patients in Group B
(n=68) could not spontaneously urinate after their operation. In this group 35% (n=24) were male and 65% (n=44) female. The mean age for males was 56.0 (SD=20.42), and for females 53.2 (SD=18.38). The difference in gender between Groups A and B was not statistically significant, but the males in Group B had a higher mean age (p<0.001), whereas the difference in females age was not significant. Three of the patients in Group B were given indwelling catheters and 65 received SUC. In 61 patients, SUC was done on the postoperative ward, while four patients had SUC on the surgery ward. Thirteen patients were catheterized twice or more before they were able to urinate spontaneously.

**Type and duration of surgery.** Patients (N=174) underwent a variety of surgical procedures (see Figure 1). Two types of surgery were found more frequently: (a) minor orthopedic surgery (for example, hallux valgus surgery, knee, and hand surgery) (n=49), (b) and breast surgery (n=35, all females). Thirty-one percent (n=15) of patients with minor orthopedic surgery and 37% (n=13) of patients with breast surgery needed SUC. Forty-five percent (n=40) of the patients with other types of surgery needed SUC.

Group B had more patients who needed SUC and had a longer average time in surgery as compared with Group A patients (p<0.001).

**Type and duration of anesthesia.** A greater number of patients in Group A had mixed general anesthesia compared with Group B...
Significantly more patients in Group B had spinal anesthesia as compared to Group A (22%, n=15 vs. 3%, n=3; p<0.001). In both groups, most patients received opiate analgesics preoperatively (see Figure 2). Patients in Group B had longer average anesthesia time, 125 minutes (range 20-300) compared with 84 minutes (range 20-210) in Group A (p<0.001).

Associated medication. Patients also received other drugs both pre and intraoperatively. Patients in Group B received more alpha-adrenergic agents/stimulants and cholinesterase-inhibitors medications than did Group A (p<0.01). There were no other significant differences in the frequency with which nonanesthetic drugs were given (see Figure 3).

A higher percentage of patients in Group B (47%, n=32) versus Group A (31%, n=33) received opiate analgesics postoperatively before first urination (p<0.01).

Intravenous fluids. The average IV fluid intake from preoperative to postoperative voiding was approximately 1,000 ml in both groups. Significantly more patients in Group B received greater than 1,000 ml fluid compared to Group A (44% n=30 vs. 13% n=14; p<0.001).

Blood loss. Eleven patients had measured blood loss greater than 300 ml. Only five of these patients, two in Group B and 3 in Group A, needed colloid infusions.

History of previous voiding problems. Significantly more patients in Group B had a history of previous voiding problems as compared to patients in Group A (41% n=28 vs. 23% n=24; p<0.05) (see Figure 4).

Recatheterization. Twenty percent (n=13) of the patients in Group B had SUC more than once or recatheterization (RC). The first time catheterization averaged 400 ml (range 200-710). On subsequent RC occasions, the average was 330 ml (range 75-760). Of these 13 patients, 10 were female and 3 male. Six of the patients had a RC volume of 600 ml or more. Four patients were catheterized three times, two patients four times, and one patient six times. Most RC were done at the surgery ward. The mean age of the patients who needed RC was 49 years (range 27-74). Nine of the 13 patients had various kinds of orthopedic surgery.

Four of the patients who received RC had spinal anesthesia, while six had inhalation anesthesia and opiates in combination with barbiturates and muscle relaxants. Three patients had inhalation anesthesia and opiates in combination with propofol. Intravenous fluid intake on average was 1,127 ml (range 500-1,900).
Discussion

Thirty-nine percent of the patients in our study (n=68) were not able to urinate spontaneously after surgery. This figure seems to be high especially since most of the patients, with a presumptive problem such as major operations and spinal anesthesia, had an indwelling catheter inserted preoperatively. However, Gönüllü et al. (1993) reported incidence of urinary retention ranging from 2% to 70% depending on the nature of the operation. Most of the patients who required SUC had orthopedic or breast surgery. With the other types of surgery performed, the groups were too small to make any comparisons. The mean age was higher among patients who needed catheterization postoperatively. As described earlier, males over age 50 often have more difficulty urinating postoperatively due to an enlarged prostate gland (Jacobsen et al., 1997). Males in our study were not overrepresented in the group with problems. However, the mean age among those who had difficulty urinating spontaneously was higher compared to those who had no problem.

General anesthesia appeared to be a factor influencing postoperative urination. Approximately one-third of the patients (n=52) were not able to urinate spontaneously. Many of these patients had a combination of barbiturates and muscle relaxants. Of note was that many of the Group A patients, who could urinate spontaneously, had inhalation anesthesia and opiates postoperatively in our study population. Orthopedic surgery and patients receiving inhalation anesthesia in combination with barbiturates and muscle relaxants were also seen as factors inhibiting postoperative urination.

Conclusions and Implications for Nursing Care

This study points out several factors that may affect spontaneous urination postoperatively and a role for nursing interventions. It is essential that the nurse be proactive in assessing predisposing factors that may influence postoperative urination (see Table 1). A thorough screening history with attention to possible predisposing factors can avoid or minimize postoperative voiding problems for the patient. This study also highlights the importance of nurses’ pharmacological knowledge as a key factor in preventing bladder overdistention. Additionally, clinical practice guidelines on the prevention and management of postoperative voiding problems should be established in the future.

Postoperative voiding problems are a complication that deserves more attention. Further investigations are recommended especially regarding postoperative pain management, anesthesia and medications which affect the bladder, and nursing interventions facilitating early bladder emptying in the postoperative period.

References


functions of the urinary bladder after spinal anesthesia with lidocaine and with bupivacaine in men. Anesthesiology, 88(2), 310-316


