

## Management of urinary retention after surgical repair of hip fracture

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**Objective:** To compare the use of indwelling catheters and intermittent catheterization in the management of urinary retention after surgical repair of hip fractures.

**Design:** Randomized open trial.

**Setting:** Orthopedic unit in a general hospital.

**Patients:** Patients 60 years or more admitted to hospital for surgical repair of a hip fracture between November 1986 and December 1987. Of the 76 who were eligible and agreed to participate 5 became medically unstable, 2 died before surgery, and 2 did not have urinary retention after surgery. The remaining 55 women and 12 men were randomly assigned to one of two treatment groups.

**Intervention:** An indwelling catheter inserted preoperatively was removed 48 hours after surgery (group 1); the procedure was repeated if necessary after 24 hours. Intermittent catheterization was performed every 6 to 8 hours (group 2); the frequency was adjusted to avoid bladder distension.

**Main outcome measure:** Pattern of return to satisfactory voiding within 5 postoperative days.

**Results:** Of the patients in group 1, 37% resumed voiding within the 5-day postoperative period, as compared with 66% in group 2 ( $p < 0.025$ ). The mean numbers of days for return to satisfactory voiding were 9.4 and 5.1 respectively (difference 4.3 days,  $p < 0.01$ ; 95% confidence interval 0.7 to 8.0 days). Urinary tract infections developed in 31% of those in group 1 and 38% of those in group 2; the difference was not significant.

**Conclusion:** Satisfactory voiding resumes earlier with the use of intermittent catheterization, if begun at the onset of urinary retention and repeated at regular intervals, than with the use of an indwelling catheter in elderly patients who have undergone surgical repair of hip fractures.

**Objectif:** Comparer l'utilisation d'une sonde à demeure à celle du cathétérisme intermittent dans le traitement de la rétention d'urine après une réparation chirurgicale d'une fracture de la hanche.

**Conception:** Essai ouvert randomisé.

**Contexte:** Unité d'orthopédie d'un hôpital général.

**Patients:** Patients de 60 ans ou plus hospitalisés pour réparation chirurgicale d'une fracture de la hanche entre novembre 1986 et décembre 1987. Parmi les 76 admissibles à l'étude qui ont consenti à y participer, 5 sont devenus médicalement instables, 2 sont décédés avant l'intervention chirurgicale et 2 n'ont pas souffert de rétention d'urine après l'intervention. Les 55 femmes et 12 hommes restants ont été répartis au hasard entre deux groupes.

**Intervention:** Une sonde à demeure mise en place avant l'intervention a été retirée 48 heures après celle-ci (groupe 1); la procédure a été répétée au besoin après 24 heures. On

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a procédé à un cathétérisme intermittent aux 6 à 8 heures (groupe 2); la fréquence a été modifiée pour éviter une distension de la vessie.

**Principale mesure du résultat :** Retour à une miction satisfaisante dans les 5 jours suivant l'intervention.

**Résultats :** La miction a repris dans les 5 jours suivant l'intervention chez 37 % des patients du groupe 1 et chez 66 % des patients du groupe 2 ( $p < 0,025$ ). Il a fallu en moyenne, pour que la miction satisfaisante reprenne, 9,4 et 5,1 jours respectivement (écart de 4,3 jours,  $p < 0,01$ , intervalle de confiance de 95 %, 0,7 à 8,0 jours). Trente et un pour cent des patients du groupe 1 et 38 % de ceux du groupe 2 ont été victimes d'une infection des voies urinaires; l'écart n'était pas important.

**Conclusion :** Une miction satisfaisante reprend plus rapidement à la suite d'un cathétérisme intermittent amorcé dès le début de la rétention d'urine et répété à intervalles réguliers, que lorsqu'on met en place une sonde à demeure chez des patients âgés qui ont subi une réparation chirurgicale d'une fracture de la hanche.

Urinary retention is an important problem for patients with fractured hips.<sup>1</sup> The reported incidence rate has been as high as 87%.<sup>2</sup> If undetected the condition can result in overflow incontinence, urinary tract infection and functional decline. Urinary dysfunction can become a debilitating problem and may necessitate admission to a nursing home.<sup>3</sup>

Several factors, including immobility, acute confusion, use of analgesics and opiates, increased intravenous fluid intake and anesthesia, are thought to contribute to the development of urinary retention.<sup>1,2,4</sup> One or more of these factors could result in a decreased awareness of bladder fullness, bladder overdistension or an inability to void. The first indication of retention may be overflow incontinence or frequent voiding of very small amounts. If these symptoms are not recognized the underlying retention may go undetected for days or weeks, or even months.

Urinary retention can be managed either with the use of an indwelling catheter or by means of emptying the bladder at regular intervals through intermittent catheterization. Standard practice has been to use an indwelling catheter to treat postoperative retention. However, as the principles of intermittent catheterization become better understood the procedure is proving to be a popular alternative.<sup>5</sup>

The purpose of this study was to compare the use of indwelling catheters and intermittent catheterization in managing urinary retention after surgical repair of hip fractures.

## Methods

### *Patient selection*

All patients 60 years of age or more admitted with a hip fracture to St. Joseph's Hospital, Hamilton, Ont., between November 1986 and December 1987 were screened for inclusion in the study. Patients with a history of intractable incontinence, those admitted with an indwelling catheter in place

and those unable to provide informed consent were excluded. Eligible patients had to be identified to the study team preoperatively to ensure that none had prolonged bladder distension. The study design was reviewed and approved by the hospital's Ethics Review Committee.

Patients were seen preoperatively within 8 hours after admission, and consent to participate in the study was obtained. The amount of residual urine was determined after the next voiding. If the patient was unable to void after 8 hours, in-and-out catheterization was done. Patients with a residual amount of urine of more than 150 mL were randomly assigned to undergo either insertion of an indwelling catheter (group 1) or intermittent catheterization (group 2).

Patients whose preoperative residual amount was less than 150 mL were monitored; the amount was measured again or in-and-out catheterization was done within 8 hours after surgery. If the residual amount was more than 150 mL the patients were included in the study.

Patients were stratified by age (60 to 74 years and 75 years or more) and sex. Allocation to treatment group was then determined by means of selecting a sequentially numbered sealed envelope that had been prepared with the use of a randomization technique involving block sizes of four.

Five postoperative days were chosen as sufficient time for the return of voiding without further intervention. Any patient who was still not voiding after the 5 days was assessed by a urologist and followed up by the study team until voiding returned. Resumption of voiding was defined as voiding of more than 100 mL of urine with less than 150 mL of residual urine on two consecutive occasions.

### *Catheterization*

In group 1 indwelling catheters were inserted preoperatively and left in place until 48 hours after the surgery. After the catheter was removed each patient's voiding was closely monitored for the next

24 hours. If the patient could not void in-and-out catheterization was done at 8-hour intervals during the 24 hours to avoid bladder overdistension. If voiding was still not possible an indwelling catheter was inserted for another 48 hours. If the patient was able to void, the residual amount of urine after voiding was measured on two occasions; if the amount was more than 150 mL retention was considered to be unresolved and an indwelling catheter was inserted for another 48 hours. At the end of the 5-day study period all patients who were not yet voiding underwent intermittent catheterization and were followed up until voiding resumed.

In group 2 intermittent catheterization was done at regular intervals (usually every 6 or 8 hours); volumes of 400 to 600 mL of urine were removed. The intervals were adjusted by the nursing staff depending on the intake and output volumes in order to avoid overdistension of the bladder (e.g., by volumes of more than 600 mL). This procedure was followed before and after surgery, the frequency of catheterization being reduced as the patient's ability to void returned. Catheterization was stopped when the residual amount of urine after voiding was less than 150 mL on two consecutive occasions.

In all cases a urine specimen obtained with the use of a sterile catheter was sent for culture and sensitivity analysis at admission and at completion of the study. The mental status of the patients was measured before and after surgery with the use of the short mental status questionnaire.<sup>6</sup> General anesthesia was used for all patients.

### Statistical analysis

Survival analysis was used to determine the significance of the intervention's impact on the length of time to resume voiding during the 5-day period after surgery. A Cox regression model was used in which the variables included age, sex and preoperative mental status. Differences in the mean volume of urine voided before surgery, the residual volume after voiding, the number of days until voiding resumed and the mental status scores were compared with the use of an unpaired *t*-test. Differences in the proportion of patients with underlying medical problems, the medications taken, the type of hip fracture and the presence of urinary tract infection were analysed with the use of a  $\chi^2$  test. Confidence intervals (CIs) around all differences were calculated.

### Results

During the 13-month study period 153 patients were admitted with fractured hips. A total of 77 patients (50 women) were excluded. The mean age of these patients was 80 (standard deviation [SD] 9.3) years. The reasons for exclusion were as follows: patient not identified to the study team preoperatively (27 patients), intractable incontinence (23), age less than 60 years (16) and unstable medical condition (11).

All of the remaining 76 patients agreed to participate in the study. However, five were re-

Table 1: Baseline characteristics of 67 elderly patients who underwent catheterization to manage urinary retention after surgical repair of a hip fracture, by treatment group

Characteristic	Group;* no. of patients	
	1 (n = 35)	2 (n = 32)
Sex		
Female	29	26
Male	6	6
Medical history		
Diabetes mellitus	3	3
Arthritis	12	7
Osteoporosis	6	5
Cardiovascular disease	18	19
Medications		
Analgesics	30	30
Diuretics	12	8
Antidepressants	2	1
Type of fracture		
Intratrochanteric (stable)	15	11
Intratrochanteric (unstable)	6	7
Subcapital (prosthesis)	7	4
Subcapital (pin)	7	10

\*Group 1 patients had an indwelling catheter, and group 2 patients underwent intermittent catheterization.

moved at their physician's request because they became medically unstable, two died before surgery, and two did not have urinary retention. This left 67 patients (55 women). The mean age was 78 (SD 8.2) years in group 1 and 78 (SD 8.6) years in group 2. The other characteristics are presented in Table 1.

The patients were mobilized within 24 to 48 hours after surgery, and the staff were encouraged to take the patients to the bathroom rather than use a bedpan. None of the patients had a history of urologic problems.

Urinary retention was present in 55 (82%) of the patients before surgery and in the remaining 12 (18%, 6 in each group) 8 hours after surgery. The mean amount of urine voided for the first time after surgery was 95 (SD 123) mL in group 1 and 72 (SD 118) mL in group 2. The mean residual volumes were 402 (SD 197) mL and 397 (SD 160) mL respectively.

Intermittent catheterization (in group 2) resulted in an earlier return of voiding than the use of an indwelling catheter (Fig. 1) ( $p < 0.025$ ). On postoperative day 5, 13 (37%) of the patients in group 1 were voiding, as compared with 21 (66%) of those in group 2 ( $\chi^2 = 5.43$ ,  $p < 0.01$ ). The mean numbers of days for the return of voiding were 9.4 and 5.1 respectively (difference 4.3 days,  $p < 0.01$ , 95% CI 0.7 to 8.0 days).

Culture of the urine samples collected on admission revealed that four patients in each group had a urinary tract infection (identified as  $10^5$  or more colony-forming units per millilitre of urine); the infection was treated and did not recur. Culture of

the specimens collected on postoperative day 5 showed that 11 (31%) of the patients in group 1 and 12 (38%) of those in group 2 had a urinary tract infection; the difference was not significant. All of the urinary tract infections identified were treated.

The mental status before surgery was comparable between the two groups: the mean score was 8.8 (SD 2.6) for the patients in group 1 and 8.6 (SD 2.7) for those in group 2. A score of 7 to 11 is considered a normal result.<sup>6</sup>

In all, 60 (90%) of the patients resumed voiding and were continent. The remaining seven patients (five in group 1 and two in group 2) were incontinent after postoperative day 5 but died before voiding could resume.

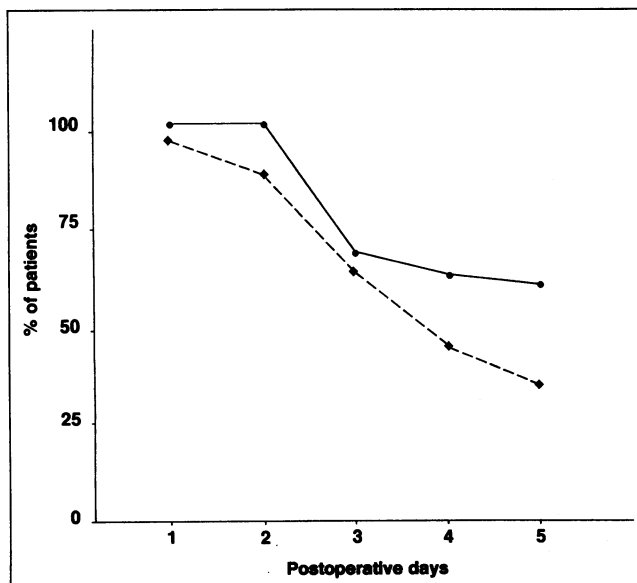
## Discussion

The results of this study differ dramatically from those of two previous randomized trials.<sup>7,8</sup> In those two studies patients were randomly assigned to have an indwelling catheter inserted for 24 hours postoperatively or undergo intermittent catheterization as needed. Return of voiding was determined on the first postoperative day. The investigators in the two studies concluded that the use of an indwelling catheter after surgery reduced the incidence of urinary retention and bladder overdistension and recommended this approach to patient management.<sup>7,8</sup>

These conflicting results can be reconciled primarily through examination of the regimens of intermittent catheterization and secondarily through a review of how the outcomes were measured. In our study the intermittent catheterization was done at regular intervals (i.e., every 8 hours), the frequency of catheterization was adjusted as needed to avoid overdistension of the bladder (e.g., from every 8 hours to every 6 hours), and the procedure was continued after voiding returned until the residual amount was less than 150 mL on two consecutive occasions. In the other two studies<sup>7,8</sup> intermittent catheterization was done only if the patients were unable to void, and the bladder volumes varied from 800 to 1000 mL.

The consequence of the different approaches is that overdistension occurred frequently in the two previous studies<sup>7,8</sup> but did not occur in ours. A correlation is known to exist between large residual volumes of urine and impaired detrusor contractile function.<sup>9</sup> Lapidus and associates<sup>5</sup> pointed out the importance of catheterization at regular intervals to avoid overdistension of the bladder; the failure to achieve this goal was probably responsible for the poor results reported in the two other studies.<sup>7,8</sup>

Variations in the measurement of outcome provide a second explanation for the difference in results. Our use of survival analysis, with return to



**Fig. 1: Proportion of patients who regained normal voiding after surgical repair of fractured hip, by postoperative day. Solid line represents patients who had indwelling catheter, and broken line represents those who underwent intermittent catheterization.**

voiding as the primary end point, took into account all the results in the first 5 postoperative days rather than the results at one single time.

A third explanation is differing patient populations. The previous studies dealt with patients who had urinary retention after total replacement of the hip joint<sup>7</sup> or cesarean section.<sup>8</sup> If the principles of intermittent catheterization are followed, however, there is no reason why the outcomes should vary substantially between these different populations.

Our study had several limitations. First, the results may not be generalizable to all patients with hip fractures, since we did not include patients who were demented or had a long history of incontinence. Second, collection of more specific data on the type of organisms cultured would have provided more information to explain the incidence of infection.

The implications for optimum bladder management in elderly patients undergoing major surgery is clear. First, overdistension must be avoided. Second, intermittent catheterization to achieve this goal will result in an earlier return to normal voiding and perhaps earlier mobilization and discharge of patients.

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## BECONASE® Metered dose aerosol (intranasal beclomethasone dipropionate) BECONASE Aq® Nasal Spray

### Anti-inflammatory Corticosteroid

**INDICATIONS:** Treatment of perennial and seasonal allergic rhinitis poorly responsive to conventional treatment. To delay recurrence of nasal polyps following polypectomy. Prevention of increase in size of recurring polyps.

**CONTRAINDICATIONS:** Patients with active or quiescent tuberculosis or untreated fungal, bacterial, and viral infections.

**WARNINGS:** In patients previously on high doses of systemic steroids, transfer to BECONASE may cause withdrawal symptoms such as tiredness, aches and pains, and depression. In severe cases, adrenal insufficiency may occur, necessitating the temporary resumption of systemic steroids. Safety of use in pregnancy has not been established. Administration of drugs during pregnancy should only be considered if the expected benefit to the mother is greater than any possible risk to the fetus.

**PRECAUTIONS:** Replacing a systemic steroid with BECONASE has to be gradual and carefully supervised. Guidelines under "Administration" should be followed. Corticosteroids may mask some signs of infection and new infections may appear. Decreased resistance to localized infection has been observed during corticosteroid therapy. During long-term therapy, pituitary-adrenal function and hematological status should be periodically assessed. There is an enhanced effect of corticosteroids on patients with hypothyroidism and in those with cirrhosis. ASA should be used cautiously in conjunction with corticosteroids in hypoprothrombinemia. Advise patients to inform subsequent physicians of prior corticosteroid use. During BECONASE therapy, the possibility of atrophic rhinitis and/or pharyngeal candidiasis should be kept in mind. Fluorocarbon propellants may be hazardous if deliberately abused. Inhalation of high concentrations of aerosol sprays has brought about cardiovascular toxic effects, and even death, especially under conditions of hypoxia. However, evidence attests to the relative safety of aerosols when used intranasally with adequate ventilation.

**ADVERSE REACTIONS:** Side effects have been primarily associated with the nasal mucous membranes and are consistent with what one would expect from applying a topical medication to an already inflamed membrane. Other less frequent adverse effects include sore throat, cough, headache, dizziness, nausea, lethargy, and stomach pains. When patients are transferred to BECONASE from a systemic steroid, allergic conditions such as asthma, conjunctivitis, or eczema may be unmasked.

**DOSAGE AND ADMINISTRATION:** Patients with no previous systemic steroid use - Two applications (100mcg) in each nostril twice daily. Maximum - Adults: 12 applications/day; children: 8 applications/day. When used concurrently with BECLOVENT, combined total daily dose should not exceed maximum daily recommended dose of beclomethasone dipropionate (1000mcg). Safety and efficacy of BECONASE in children under 6 years of age has not been established. Since the effect of BECONASE depends on regular use, patients may be instructed to take inhalations at regular intervals and not, as with other nasal sprays, as they feel necessary. They should also be instructed in the method which is to blow nose, insert nozzle firmly into nostril, compress opposite nostril and actuate aerosol or spray while inspiring through nose, with mouth closed. In the presence of excessive nasal mucus secretion or edema of the nasal mucosa, the drug may fail to reach the site of action. In such cases, use a vasoconstrictor for 2 to 3 days prior to BECONASE. Careful attention must be given to patients previously treated for prolonged periods with systemic corticosteroids when transferred to BECONASE. Initially, BECONASE and the systemic corticosteroid must be given concomitantly, while the dose of the latter is gradually decreased. Usual rate of withdrawal of systemic steroid in adults is 1.0 mg of prednisone (or equivalent) at no less than weekly intervals if patient is under close supervision. In children over 6 years of age, the rate of withdrawal is 1.0 mg of prednisone (or equivalent) every 8 days under close supervision. If continuous supervision is not feasible, withdrawal of the systemic steroid should be slower, approximately 1.0 mg of prednisone (or equivalent) every 10 days in adults and every 20 days in children. If withdrawal symptoms appear, the previous dose of the systemic steroid should be resumed for a week before further decrease is attempted.

**AVAILABILITY:** BECONASE - Metered-dose aerosol delivering 50 mcg beclomethasone dipropionate with each depression of valve. 200 doses/container. BECONASE Aq - Suspension in amber glass bottle fitted with a metered atomizing pump and nasal applicator delivering 50 mcg beclomethasone dipropionate per spray. 200 doses/bottle.

Product Monograph available to physicians and pharmacists on request. For additional information on BECONASE Aq Nasal Spray, call Glaxo Medical Information at 1-800-668-6051, Monday to Friday between 8:30 a.m. and 4:30 p.m. EST.

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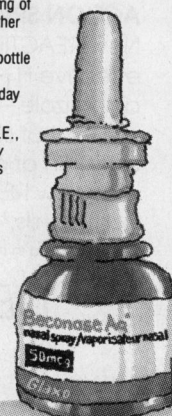
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