History of Nocturia May Guide Urinary Catheterization for Total Joint Arthroplasty

SUMIT RANA, MD; STEVEN T. WOOLSON, MD; NICHOLAS J. GIORI, MD, PHD

abstract

Urinary tract infection is a common complication after total knee arthroplasty (TKA) and can be related to urethral catheterization. This study attempted to determine whether nocturia could be used as an indicator of risk for postoperative urinary retention to limit the need for prophylactic catheterization in men undergoing TKA. A retrospective study was performed in a consecutive series of men undergoing TKA at a single Veterans Affairs medical center. Patients reporting 0 episodes or 1 episode of nocturia per night were not catheterized prophylactically, and patients reporting 2 or more episodes of nocturia each night were catheterized preoperatively. Of 100 consecutive patients, 51 reported no more than 1 episode of nocturia and did not undergo preoperative catheterization. Of these patients, 10 required 1 postoperative straight catheterization for urinary retention. In the 49 patients who were catheterized prophylactically, all catheters were removed on postoperative day 1. Only 1 of these patients required reinsertion of a catheter. No patient in either group was discharged with a catheter or had a urinary tract infection. Previously, the authors’ standard protocol was to use a prophylactic urinary catheter for all men after TKA. In this 100-patient cohort, with this new protocol, 41 patients were not catheterized at all and 10 patients had only 1 straight catheterization. In this study, the frequency of nocturia in men undergoing TKA was an effective screening tool that safely reduced the need for an indwelling catheter in 51% of patients. [Orthopedics. 2016;39(4):e749-e752.]

Postoperative urinary retention can complicate any surgical procedure and is not limited to patients with pre-existing urinary symptoms.¹ There is considerable variability in the clinical management of urethral catheters in patients undergoing arthroplasty.² The reported incidence of urinary retention after total joint arthroplasty varies widely from 0% to 84%.³⁻⁶ Urethral catheterization is not a benign procedure. In addition to causing patient discomfort,⁶ there is a risk of urethral damage causing stricture and bleeding¹¹ as well as a risk of urinary tract infection.¹² Further, urinary tract infection has been correlated with an increased incidence of periprosthetic joint infection after total joint arthroplasty.¹²⁻¹⁵ Because of the risk of urinary retention after total joint arthroplasty, many total joint surgeons routinely place an indwelling urethral catheter before surgery.¹⁶ However, because of increasing pressure to shorten hospital stay and decrease costs after total joint arthroplasty, some surgeons question the need for routine catheterization.

Two randomized clinical trials compared routine catheterization with no catheter in patients undergoing primary total joint arthroplasty.¹⁷,¹⁸ One study of patients who had general anesthesia

The authors are from the VA Palo Alto Health Care System, Palo Alto; and Stanford University, Stanford, California.

The authors have no relevant financial relationships to disclose.

Correspondence should be addressed to: Nicholas J. Giori, MD, PhD, VA Palo Alto Health Care System, 3801 Miranda Ave, Palo Alto, CA 94304 (ngiori@stanford.edu).

Received: November 27, 2015; Accepted: March 8, 2016.

doi: 10.3928/01477447-20160421-06
reported a 6% recatheterization rate in those who were randomized to receive a urethral catheter and a 6% catheterization rate in those who did not receive a catheter preoperatively.\textsuperscript{17} Another study looked at patients undergoing total hip arthroplasty and receiving spinal anesthesia without intrathecal opioids and reported similar catheterization rates.\textsuperscript{18} There is more evidence that routine urethral catheterization is not needed in patients who have spinal anesthesia without opioids.\textsuperscript{19,20} However, a recent multicenter study of patients undergoing fast-track total joint arthroplasty reported a 40% rate of urinary retention.\textsuperscript{9} In addition, male sex and a history of benign prostatic hypertrophy are associated with an increased risk of retention.\textsuperscript{17}

At the authors’ hospital, until May 2014, all patients undergoing total joint arthroplasty had routine preoperative urinary catheterization. At that time, a new protocol was initiated. All patients were asked whether they had nocturia and, if so, its frequency. The protocol eliminated the use of a prophylactic indwelling urinary catheter in patients who reported having no more than 1 episode of nocturia; however, patients with 2 or more episodes of nocturia were routinely catheterized. A retrospective study was conducted to determine the results of this protocol and to determine whether the frequency of nocturia could be used as a screening tool to reduce the need for an indwelling urinary catheter in men undergoing TKA.

**Materials and Methods**

This retrospective chart review included 100 consecutive male patients undergoing TKA at one Veterans Affairs hospital. This study was approved by the institutional review board and was not externally funded. All men who underwent primary TKA between May 2014 and December 2014 were included. In the preoperative holding area, patients were asked whether they had nocturia. Patients who reported 2 or more episodes of nocturia preoperatively had an indwelling catheter inserted. The catheter was routinely removed on the morning of postoperative day 1. Patients who reported no episodes or 1 episode of nocturia per night were not catheterized before the procedure. These patients were monitored in the recovery room. Patients who had not voided had a bladder scan before they returned to the ward. If the bladder scan showed more than 450 mL of urine, then the patient was catheterized (straight catheterization only) before returning to the ward. Those who had less than 450 mL of urine were not catheterized and were allowed to leave the recovery room. Further straight catheterizations were done on the hospital ward for retention, if necessary.

A single-shot spinal anesthetic and a saphenous nerve block were routinely administered for all patients undergoing TKA unless there were contraindications. However, general anesthesia was used for 26 patients because of either a contraindication to spinal anesthesia or inability to perform spinal anesthesia. Four patients had a contraindication to the nerve block and had a spinal anesthetic only. Saphenous nerve blocks used ropivacaine and were continued postoperatively for 1 to 3 days with the use of an On-Q pump (On-Q, Irvine, California). All patients received local infiltration anesthesia with ropivacaine, ketorolac, and epinephrine intraoperatively. All patients had multimodal oral medications postoperatively that included oral short-acting opioids on a scheduled basis, acetaminophen, and diclofenac.

A chart review was performed to ensure that all prophylactic catheters were removed on day 1 and to determine whether an indwelling catheter or straight catheterization was needed postoperatively, whether patients were discharged with a catheter, and whether they had a postoperative urinary tract infection. Charts were reviewed for a 3-month period to ensure that all postoperative urinary tract infections were included. Patient demographics, including age, type of anesthesia, and documented history of benign prostatic hyperplasia, were recorded.

**Results**

Mean age of the 100 patients in this study was 64.9 years (range, 51-87 years). Of these patients, 22 had a history of benign prostatic hypertrophy. Forty-nine patients reported 2 or more episodes of nocturia preoperatively and received an indwelling urinary catheter at the time of surgery. The remaining 51 patients had no more than 1 episode of nocturia and did not receive an indwelling catheter. There was no significant difference between mean age in the 2 groups (63.7 years and 65.9 years, respectively; $P=.13$).

Paradoxically, among the 22 patients who had a chart-documented history of benign prostatic hypertrophy, 7 (32%) had received a catheter and 15 (68%) had not received a catheter. No statistically significant relationship was found between a history of benign prostatic hypertrophy and more frequent nocturia, although there was a trend in the opposite direction ($P=.07$, chi-square). Of the 78 patients without a history of benign prostatic hypertrophy, 42 (54%) had received a catheter and 36 (46%) had not received a catheter. Of the 26 patients who had general anesthesia and a saphenous nerve block, 15 (58%) had received a catheter and 11 (42%) had not received a catheter. Of the 74 patients who had spinal anesthesia, 34 (46%) had received a catheter and 40 (54%) had not received a catheter.

Of the 51 patients who did not receive a catheter preoperatively, 10 (20%) required a single straight catheterization postoperatively for retention. Another patient had an unsuccessful attempted straight catheterization and then voided on his own. Average age of the 10 patients who had postoperative retention was 69.0 years (range, 59-87 years), higher than the average age of the other 41 patients who did not receive a preoperative catheter (65.2 years). This difference was not statistically significant ($P=.19$). Of the 10...
patients who had retention, all had had a nerve block and spinal anesthetic, but only 2 of these 10 were given intrathecal opioids and 4 of these 10 patients had a history of benign prostatic hypertrophy.

In the 49 patients who were prophylactically catheterized at the time of surgery, all catheters were removed on postoperative day 1. Only 1 patient required recatheterization (twice) for retention. This patient was 55 years old, had had spinal anesthesia with opioids but no nerve block, and had no history of benign prostatic hypertrophy.

No patient in either group was discharged with an indwelling urethral catheter, and no patient had a urinary tract infection. The results of this study are summarized in the Table.

**DISCUSSION**

Earlier studies investigated risk factors for postoperative urinary retention in patients undergoing total joint arthroplasty. A recent study found that advanced age, male sex, higher American Society of Anesthesiologists grade, a history of benign prostatic hypertrophy, larger volume of intravenous fluid administered, and longer surgical time were associated with retention in patients who had spinal anesthesia and underwent TKA. Another study of patients undergoing TKA with spinal anesthesia found a relationship between urinary retention and benign prostatic hypertrophy, renal disease, advanced age, and longer operative time. The finding that frequent nocturia did not correlate with a history of benign prostatic hypertrophy was unexpected, and the authors have no theory to explain it. However, the diagnosis of prostatic disease or benign prostatic hypertrophy is not always straightforward. A study by Redfern et al found that trying to establish the diagnosis of prostatic disease based on history or the findings of rectal examination alone was unreliable. Those authors found that the use of preoperative urodynamic testing and a peak urinary flow rate of less than 17 mL/s were indicative of lower urinary tract obstruction and predictive of urinary retention. Although preoperative urodynamic testing may be predictive of retention, it is not practical to use this testing preoperatively in patients undergoing TKA. The International Prostate Symptom Score is an 8-question written screening tool. A score of 1 to 7 indicates mild symptoms of benign prostatic hypertrophy, a score of 8 to 19 indicates moderate symptoms, and a score of 20 to 35 indicates severe symptoms. One study found that the International Prostate Symptom Score was predictive of urinary retention after total joint arthroplasty, whereas 2 other prospective studies did not confirm the same results. Interestingly, in both of these reports, age older than 70 years was the only useful parameter to determine which patients should be catheterized before total joint arthroplasty. In this current study, however, of the 11 patients in both groups who had retention postoperatively and required insertion or reinsertion of a catheter, only 3 were 70 years or older. No significant difference was found in the age of patients who did not receive a catheter preoperatively and were able to void postoperatively and those who had retention (65.5 vs 69 years, respectively).

This study attempted to determine the incidence of urinary retention in men undergoing TKA who were not catheterized prophylactically based on their history of infrequent nocturia. In this cohort of 100 consecutive patients at a Veterans Affairs hospital, urethral catheterization was avoided in 41 patients. In this study, 10 patients required only 1 straight catheterization, 48 patients had an indwelling catheter overnight only, and 1 patient was catheterized 3 times for retention. No urinary tract infections occurred. If further studies corroborate these findings in other populations, the use of frequency of nocturia as a screening question to reduce the need for urethral catheterization could be 80% effective. Consequently, the risk of postoperative urinary tract infection and periprostatic joint infection should be reduced.

Although studies advocating the abandonment of routine indwelling urinary catheterization have reported an approximately 6% catheterization rate in general arthroplasty candidates, this result is unlikely in the male veteran population. The current study found a 20% catheterization rate in patients who reported no episodes or 1 episode of nocturia per night. If self-reported nocturia did not affect recatheterization rates, then withholding urinary catheters in all patients in the current study would have led to a recatheterization rate of approximately 20%, more than 3 times the reported rate in other studies.

The current study protocol used the frequency of nocturia as the only criterion for avoiding routine prophylactic catheterization. This was easy to do, and the authors believed that frequent nocturia may indicate prostatism and a higher

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**Table**

**Summary of Results**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Preoperative Catheter</th>
<th>No Preoperative Catheter</th>
<th>Statistical Significance</th>
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</thead>
<tbody>
<tr>
<td>Patients, No.</td>
<td>49</td>
<td>51</td>
<td></td>
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<tr>
<td>Age, mean, y</td>
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<td>66.0</td>
<td>P=.12</td>
</tr>
<tr>
<td>Retention/no retention, No.</td>
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<td>10/41</td>
<td></td>
</tr>
<tr>
<td>Age, patients with retention/patients with no retention, mean, y</td>
<td>55/63.9</td>
<td>69.0/65.2</td>
<td>P=.19</td>
</tr>
</tbody>
</table>
risk of retention. Although nocturia may be affected by multiple variables, such as fluid intake and sleep patterns, the authors believed that it would be more reflective of a risk of retention than other voiding characteristics, such as hesitancy or stream strength. Until another indicator of the risk of urinary retention becomes available as a screening question that correlates with a higher risk of postoperative urinary retention, the authors will continue to use nocturia to screen patients.

CONCLUSION

Prior to initiating their current protocol, the authors had been placing indwelling urinary catheters in all patients undergoing primary total joint arthroplasty. The authors found that the frequency of nocturia in men undergoing TKA was an effective screening tool that safely eliminated the need for an indwelling catheter in 51% of patients.

REFERENCES