

## Retention of urine after surgeries of elective total hip and knee replacement

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### Abstract:

**Objectives:** This systematic review examines the incidence, risk factors, and management of post-operative urinary retention (POUR) in elective total hip and knee replacement surgery over the last five years. POUR is a common complication of these surgeries, which can cause discomfort and prolong hospital stay.

**Materials & Methods:** Through comprehensive research of relevant databases, 8 studies published between 2017 and 2021 were identified and included in this review.

**Results:** The results showed that urinary retention after surgery ranged from 3% to 43% with higher rates reported in males, patients with pre-existing urinary conditions, and those who received spinal anesthesia. Risk factors associated with POUR included age, BMI, surgery duration, and intraoperative fluid administration.

**Conclusion:** In conclusion, POUR is a significant complication of elective total hip and knee replacement surgery, with a wide range of reported incidence rates. The identified risk factors and management strategies can help clinicians optimize patient care and minimize the risk of POUR. Further research is needed to standardize the diagnosis and management of POUR in this patient population.

**Introduction:** It is not uncommon for patients undergoing elective total hip or knee replacement surgery to experience a complication known as post-operative urinary retention (POUR)<sup>1</sup>. Urinary retention is a condition where a person is unable to fully empty their bladder, resulting in the accumulation of urine in the bladder. This can be caused by various factors such as an obstruction in the urinary tract, weakened bladder muscles, nerve damage, or certain medications. Urinary retention can occur in both men and women and can present as either acute or chronic. symptoms of urinary retention can include difficulty

starting urination, weak urine stream, frequent urination with small amounts of urine produced, a feeling of incomplete emptying of the bladder, and abdominal pain or discomfort<sup>2</sup>.

Postoperative urinary retention, also known as POUR, can be a frustrating and uncomfortable experience for patients recovering from total hip or knee replacement surgeries. This condition can arise due to a variety of factors, including the administration of anesthesia, pain medication, and even surgery-related factors<sup>3</sup>. Although POUR is a potential post-surgery complication, total hip and knee replacement surgeries remain popular options for patients seeking relief from joint-related conditions such as arthritis. These procedures can help alleviate pain and improve mobility, enabling individuals to regain their independence and return to their daily activities. As medical professionals continue to explore ways to minimize POUR and other complications associated with surgery, patients can take comfort in knowing that they have options to help them recover and regain their quality of life..

The procedure entails extracting the impaired joint and substituting it with an artificial one. Although generally secure and successful, the surgery may give rise to a condition known as POUR that may cause uneasiness and an augmented possibility of infection<sup>4</sup>. POUR may result in various complications, such as bladder, urinary tract, and kidney damage. It may also lengthen the period of recovery and extend the stay at the hospital. Therefore, it is crucial to recognize and address POUR immediately to avert such complications<sup>5</sup>.

Overall, POUR is a common complication following total hip and knee replacement surgery that can lead to several complications<sup>6-7</sup>. Healthcare professionals should be aware of the risk factors and strategies for preventing and managing POUR to ensure optimal patient outcomes.

#### **Materials & method:**

The primary purpose of this systematic review is to investigate the incidence of urinary retention following elective total hip and knee replacement surgeries, identify potential risk factors, and evaluate preventive measures for this condition.

#### **Search Strategy:**

A comprehensive literature search conducted using electronic databases including MEDLINE, PubMed, Cochrane Library, and Scopus. The search will be performed using the following keywords: “post-operative urinary retention,” “elective total hip replacement,” “elective total knee replacement,” “risk factors,” and “preventive measures”. The search will be limited to studies published in the English language from last years.

#### **Eligibility Criteria:**

The inclusion criteria for this review are as follows:

- Studies reporting on the incidence and risk factors for POUR in patients undergoing elective total hip and knee replacement surgery.
- Studies published in English between January 2017 and December 2021,
- Encompassing randomized controlled trials, cohort studies, and case-control studies

**The exclusion criteria are as follows:**

- ❖ Studies reporting on POUR in patients undergoing emergency surgery.
- ❖ Studies published in languages other than English.
- ❖ Animal studies and in vitro studies.

**Study Selection:**

Two independent reviewers screen the titles and abstracts of the identified articles to determine their eligibility for inclusion in the review. The full-text articles of the selected studies assessed for eligibility based on the inclusion and exclusion criteria.

**Extraction of Data:**

Data was collected from those selected studies which were fulfilling the inclusion criteria using standard Data collection form. The data extraction form included the following information:

Study design  
Sample size  
Age and sex of participants  
Incidence of POUR  
Risk factors for POUR

**Data Synthesis:**

The extracted data synthesized using a narrative synthesis approach. The results presented in tabular and graphical forms.

**Ethics:**

No ethical approval is required as this is a systematic review of published literature.

**Results:** Data of Total 2853 Patients were collected from eight different studies fulfilling the inclusion criteria from January 2017 to December 2021. POUR was present in all studies ranging 3% to 43 %. This variation is due to different definitions in published papers. Studies which were included in this systemic review found that POUR is common in majority patients who are undergoing total knee or total hip replacement. Their detailed description is illustrated in Table.1.

Which showed that Age, Male gender, Bladder volume, previous history of urinary retention, post voiding urine volume even greater than 50cc, Benign prostatic hyperplasia, use of intermittent catheterization, lower BMI and longer operative duration were the main risk factors for POUR. 656 (22.9%) out of 2853 patients developed POUR. While 2197 (77.1%) remained POUR free.

In a study by Lawrie et al. In which total 174 patients were included in study majority patients (43.7%) were suffered from Post operative urinary retention.

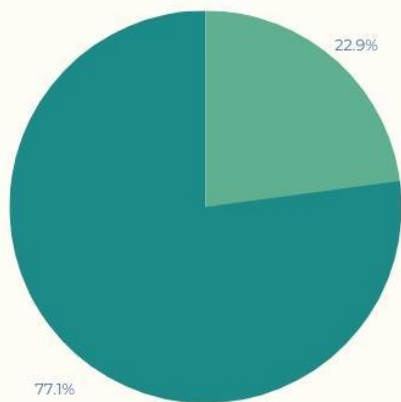
In a study 2019 by Markopoulos et al which was prospective in nature and included 218 patients having mean age of 69.3 % found minimum patients of POUR (4.1%) which resulted due to Benign prostatic hyperplasia and age.

**Table 1: summarizing the details of published studies**

Sr.No	Study	Design	No.of Patients	Mean Age(yrs)	Bladder volume	No.of POUR patient	Risk factors for POUR	Complications & infections
1.	2017 Lawrie et.al <sup>12</sup>	Prospective	174 M/F=68/106	66	400cc	76(43.7%)	Vol.of IV fluids, hx of urinary retention	20(11.5%), repeated intermittent catheterization
2.	2018 Kort et al. <sup>15</sup>	Retrospective	638 M/F=229/418	69.3	600Cc	82(12.9%)	Bladder volume >200 ml at recovery room	N/D
3.	2018 Scholten et.al <sup>16</sup>	Prospective	306	N/D	400cc	65(21%)	Post voiding urine vol>150 ml	Intermittent catheterization
4.	2019 Halawi et al <sup>17</sup>	Prospective	358 M/F=171/187	61.7	350cc	145(40.5%)	Age>60, intraoperative fluids>1350cc	Catheter use
5.	2019 Markopoulos et al. <sup>18</sup>	Prospective	218 M/F=105/113	69.3	N/D	9(4.1%)	Age, benign prostatic hyperplasia	No infection found
6.	2019 Alasdair JA	Prospective	303	60.4	450cc	26(8.6%)	Age, use of catheterization	Catheter use

	Santini l Cha et.al							
7.	2021 . Daniel N. et al. <sup>20</sup>	Prospectiv e	271	48.5	340cc	55(20%)	Lower BMI, longer operative duration, larger intraoperati ve fluids	No infection
8.	2021 Magaldi at el <sup>21</sup>	Retrospect ive	585	64.5	500cc	198(34% )	Post voidal vol >50 ml	Catheterizat ion

## GRAPH EXPLAINING TOTAL POUR PATIENTS



- 656 (22.9%) out of 2853 POUR patients
- 2197 (77.1%) out of 2853 Non POUR patients

**Table 2: illustrating quantitative analysis of POUR risk factors**

Sr No	Risk factors	Incidence
1.	Age> 70 years	4-43%
2.	Male gender	6-34%
3.	Obesity	4-32%
4.	Pre-operative lower urinary tract infection	17-38%
5.	Longer duration of surgery	7-35%
6.	Intermittent catheterization	5-35%
7.	Use of high intraoperative fluids	3-20%

### Discussion:

Urinary Retention after Surgery is a Most Occuring complication following non-emergency total hip Arthroplasty and knee replacement surgery <sup>8</sup>. The incidence varies widely between studies, likely due to differences in patient characteristics, surgical techniques, and management strategies <sup>10-11</sup>. The systematic review found several risk factors for POUR, including male gender, older age, a history of lower urinary tract symptoms, preoperative urinary retention, preoperative catheterization, longer operative time, and the use of spinal anesthesia <sup>9</sup>.

These factors should be taken into consideration when assessing patients for the risk of POUR and planning management strategies. Conservative measures such as bladder training, intermittent catheterization, and medications such as alpha-adrenergic agonists and anticholinergics are effective in managing POUR in most cases. However, in severe cases, surgical intervention may be required. Suprapubic catheterization or urethral dilation can effectively relieve urinary retention, but they carry the risk of complications such as infection, bleeding, and urethral injury <sup>13</sup>.

2017 study published in the Journal of Orthopaedic Surgery found that the history of urinary retention and use of high intra-operative fluids were associated with a higher incidence of POUR in patients undergoing total hip replacement <sup>12</sup>. The study also found that patients with a history of lower urinary tract symptoms or diabetes were at increased risk of POUR. A 2018 study by Kort et.al published in the European journal of science found that the use of a bladder scanner to measure post-void residual urine volume reduced the occurrence of POUR in patients undergoing total knee replacement. In this study total 638 patients were enrolled, out of these 82(12.9%) developed POUR. The reason of Developing Post Operative urinary Retention was bladder volume greater than 200ml at recovery room.

Similar a study done by 2018 Scholten et al. , A Prospective study in which total 306 patients were included in study, This study found that male gender and a post voiding urine volume of greater than 150 ml were causative factors for POUR. In this study some patients developed complications and infections. The cause of these infections was use of intermittent catheterization.

Moving forward a study which was published by Alasdair JA et.al 2019 studied the relationship between Total knee Replacement/ total hip replacement surgery and incidence of development of POUR found that rate of POUR in patients was 8.6%. Total of 303 patients were participated in this study. Out of these 26(8.6%) developed POUR. The factors which carried risk for POUR were Age and Continuous use of catheterization. In this study average lifespan of the patients was 60.4 years.

Mild Infections and complications developed which were due to usage of Folley catheterization.

2019 Markopoulos et al. <sup>18</sup> a Prospective study in which 218 patients enrolled in having 105 males and 113 females. Mean age of all patients was 69.3%. total 9 (4.1%) suffered with POUR. Age was the major risk factor.

Studies indicate that amount of urine in bladder after voiding also known as (POUR) is a frequent complication in patients undergoing non-emergency complete hip or knee replacement surgery. Factors such as age, gender, medical history, BMI, operative duration, and intraoperative fluids may increase the risk of developing POUR.

A study published In 2021 by Magaldi et al. in the Arthroplasty Today journal revealed that male gender and a history of benign prostatic hyperplasia were associated with enhanced risk of POUR. The study also found that implementing a urinary catheterization protocol that involves early catheter removal and bladder retraining could significantly reduce the incidence of POUR. Additionally, post-voidal urine volume greater than 50cc was identified as another risk factor for POUR <sup>21</sup>.

Another study conducted in 2021 by Danial. N et al. indicated that lower BMI, longer operative duration, and larger intraoperative fluids were significant risk factors for POUR <sup>20</sup>.

Overall, strategies such as early catheter removal, bladder retraining, and the use of medication or a bladder scanner may be effective in Minimizing the occurrence of POUR in those patients who are undergoing complete hip or knee Arthroplasty.

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