



# Prolonged Indwelling Foley Catheter Use in Post-operative Gynecology Patient Associated with an Increased Incidence of Urinary Tract Infections

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## Abstract

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**BACKGROUND:** Urinary tract infection (UTI) is one of the common conditions and significantly contributes to expensive health treatment and associated with gynecological surgery which increases the cases up to 50% in women undergoing specific reconstructive procedures. Besides that, one indicator of surgical quality was post-operative UTI occurrence.

**AIM:** This study aims to assess the relationship between Foley catheter usage and UTIs after gynecological surgery with a urinary catheter.

**METHODS:** A total of 48 subjects examined at the Department of Obstetrics and Gynecology, Universitas Sumatera Utara Hospital, and Haji Adam Malik General Hospital, Medan, from June to September 2020. Subjects were performed urinalysis 8 days after surgery, or earlier if UTI symptoms occur. Personal data and illness data were taken from medical records. Statistical analysis was done using the Chi-square-based test.

**RESULTS:** There was a significant difference of urine leukocytes in subjects with indwelled catheter for 24–36 h compared to subjects with 36–48 h of catheterization ( $p = 0.01$ ). The 36–48 h group has a 2.15 odds of developing UTI compared to 24–36 h group ( $p = 0.01$ ).

**CONCLUSION:** This study found that prolonged indwelling Foley catheter usage may increase the risk of UTI after gynecology surgery.

## Introduction

One of the common conditions and significantly contributes to expensive health treatment was urinary tract infection (UTI), costing more than 5 billion dollars in 2010. Women were more susceptible than man because of anatomical and physiological differences. Half of all women experience at least one UTI in their lifetime, and more than 10% of postmenopausal women experience recurrent UTIs. Risk of UTI was increased up to 50% because of history of gynecology surgery. Therefore, it is important to assess possibility of UTI in women after gynecological surgery to predict and choose outpatient care and inpatient care in a health facility. For example, health-care cost was significantly decrease after reduction of post-operative UTI after pelvic surgery [1], [2], [3].

One of the best indicators for surgical quality was UTI occurrence. In 2012, both the Center for Health Services and the Joint Commission on Health Organization Accreditation recommend all health-care providers to report rates of surgical site infection including UTIs in a public registry [4], [5], [6], [7]. Marker qualities for gynecological surgery must include

assessment of post-operative UTI which is needed to be more evaluated by various reports of post-operative UTI incidence. But for now, study that discusses this matter was limited, and it cannot describe post-operative UTI as one of the best predictors for gynecology surgery and assess the risk factor about it [5], [8], [9], [10], [11]. Hence, this research was aimed to show proportion of women whom developed a UTI within 8 days of gynecological surgery. We hypothesize that there are independent risk factors associated with UTI after gynecological surgery.

## Methods

This research is an observational study with a prospective cohort design. The research subjects were all patients that underwent gynecologic surgery at the Department of Obstetrics and Gynecology in Universitas Sumatera Utara Hospital and Adam Malik General Hospital, Medan, from June to September 2020 which was met the inclusion and exclusion criteria. Candidates have signed informed consent as evidence of their willingness to be research subjects.

Patients who came to the obstetric gynecology clinic at Universitas Sumatera Utara Hospital and Adam Malik General Hospital were interviewed about the history of the disease, basic examinations, body weight, height, previous medical history, physical examination, supporting examinations, and admission diagnosis were obtained. Before surgery, urine and blood samples were taken for examination of complete blood, blood sugar levels, kidney function, and urinalysis. The duration of indwelled urinary catheter usage during hospitalization was recorded. On the 8<sup>th</sup> day post-surgery, urinalysis was performed or sooner if the patient reported UTI symptoms. Data were analyzed using the Chi-square test, with  $p < 0.05$  considered significant (95% confidence interval [CI]). This study was approved by Health Research Ethical Committee, Medical Faculty, Universitas Sumatera Utara.

## Results

The results of the study in the period of June 2020 to September 2020, 63 patients underwent post-gynecological surgery catheters at the Universitas Sumatera Utara Hospital and Haji Adam Malik General Hospital. The data obtained were entered into a computer, then compiled and tabulated and presented in tabular and narrative form. Of the 33 research subjects, it was obtained catheter installation for 24–36 h for the results (-) as many as 15 people or 62.5% and (+) as many as 9 people or 37.5%. Catheter placement for 36–48 h where the results (-) were 5 people or 20.8%, (+) were 15 people or 62.5%, and (++) were 4 people or 16.7%. There is a significant or statistically significant difference. Thus, it can be explained that there is a statistically significant difference between the variable insertion of 24–36 h catheter insertion group compared with the 36–48 h group.

**Table 1: Characteristics of subjects in research**

Variable	Variable, n (48)
Age (Mean ± SD)	40.9 (12.6)
Duration of surgery (n, %)	
<4 h	43 (79.2%)
>4 h	5 (20.8%)

**Table 2: Results of urine leukocytes with catheter insertion group 24–36 h and 36–48 h**

Variable	Group		p-value*
	24–36 h	36–48 h	
Leukocytes urine			0.01
-	15 (62.5%)	5 (20.8%)	
+	9 (37.5%)	15 (62.5%)	
++	0	4 (16.7%)	

\*Chi-square test

Characteristics of the overall subjects of the study patients according to age with mean  $40.9 \pm 12.6$ . Most of the operation time was <4 h as many as 26 people or by 79.2% and more than hours as many as 7 people (20.8%) (Table 1). After analyze with Chi-square test, the results obtained  $p = 0.01$  ( $p < 0.05$ ) which indicated a significant relationship between urine leukocyte and catheter placement for 24–36 h and 36–48 h (Table 2).

Then, Chi-square tested was also done to assess the association of UTI incidence with catheter placement for 24–36 h and 36–48 h using and the results obtained  $p = 0.01$  ( $p < 0.05$ ) which indicated a significant relationship (Table 3).

**Table 3: Results of UTI with catheter insertion group 24–36 h and 36–48 h**

UTI	Group		OR	p-value*
	24–36 h	36–48 h		
No	15 (62.5%)	5 (20.8%)	2.15	0.01
Yes	9 (37.5%)	19 (79.2%)		

\*Chi-square test, UTI: Urinary tract infection

## Discussion

The data in Table 1 described the characteristics of the overall study patients according to age and duration of the surgery. For age of subjects, the average is  $40.9 \pm 12.6$ . For the duration of surgery, the majority of subjects (43 subjects or 79.2%) underwent surgery for 4 h or less. From Table 2, 15 subjects (62.5%) from 24–36 h group had negative results for urine leukocyte, and 9 subjects (37.5%) had a positive result of urine leukocyte. While from 36–48 h group, 5 subjects (20.8%) had a negative result for urine leukocyte and 19 subjects (79.2%) had a positive result for urine leukocyte. There is a significant or statistically significant difference between the two groups ( $p < 0.01$ ). These findings reinforce previous research which states that the highest incidence rate of UTIs occurs on the 2<sup>nd</sup> day of catheter usage [4], [5], [6]. From Table 3, 15 subjects (62.5%) from 24–36 h group had negative results for urinary tract infection, and 9 subjects (37.5%) had positive result of urinary tract infection. While from 36–48 h group, 5 subjects (20.8%) had a negative result urinary infection and 19 subjects (79.2%) had a positive result for urine tract infection. From the analysis, we found that there is 2.15 times risk for UTIs occurs on the 2<sup>nd</sup> day of catheter usage ( $p < 0.01$ ).

A study by Qin et al. demonstrated that surgical procedures of longer duration were independently associated with an increased risk of UTIs (OR, 1.156 [95% CI 1.104–1.21]; OR, 1.758 [95% CI 1.682–1.838]) while procedures of shorter duration were associated with a reduced risk (OR, 0.928 (95% CI 0.873–0.987); OR, 0.955 (95% CI 0.906– 1.007) [14]. Choudury's study of women after urogenital prolapse surgery showed that urine culture was positivity which was found in 16% in the long-term catheterization group (> 5 days) compared with 6% in the short-term (1 day) group ( $p = 0.02$ ). The duration of hospitalization was 6.98 days in the long-term catheterization group and 4.68 days in the short-term catheterization group ( $p < 0.01$ ). The residual volume was more than 200 ml and the need for recatheterization occurred in 3% of the

group while in 10% group of cases ( $p = 0.04$ ) [15]. Critical appraisal of clinical trial articles to assess about 24 h post-operative urinary catheter removal found that subjects in earlier removal (<24 h) groups were 3–4 times more likely to have recatheterization (OR = 3.10–4.0) compared to later removal groups, while they who have it removed on the 5<sup>th</sup> day were 14 times more likely to develop UTI compared with immediate group (OR = 14.786, 95% CI 3.187–68.595) [16]. When compared with >6 h indwelling urinary catheter removal group, the incidence of urinary infection was significantly reduced at the <6 h removal group (RR = 0.66, 95% CI 0.48–0.89,  $p = 0.007$ ). The urinary catheter removal time at <6 h also significantly reduced the incidence of urinary retention (RR = 5.06, 95% CI 1.74–14.69,  $p = 0.003$ ) and did not statistically increase the incidence of urinary infection (RR = 0.30, 95% CI 0.08–1.20,  $p = 0.09$ ), compared with immediate urinary catheter removal after surgery [17].

Kranz *et al.* reported that the catheter-associated UTI rate was 65% lower when catheters were regularly changed (monthly and/or when medically indicated vs. only when medically indicated) (RR: 0.35; [0.13; 0.95]). The incidence of bacteriuria in medical facilities rises by 3–8% per day for each day after catheter insertion; nearly, all patients have bacteriuria after 30 days of catheterization. Overall, catheter-associated bacteremia accounts for 15% of nosocomial bloodstream infections and is associated with 10% mortality [18]. The limitation of this study is the subjectivity factor in determining urine leukocytes on the dipstick because it is determined based on quality, not quantity. For advice, it is best if the urine leukocyte results are confirmed quantitatively in the laboratory.

## Conclusion

In the group of subjects with catheter insertion for 36–48 h, there was an increased incidence of increased urinary leukocytes compared to the group of subjects with 24–36 h post-operative catheter placement.

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