



Removal time of postoperative vesical catheter in utero-vaginal prolapse surgery: a comparative study

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ABSTRACT

Objective: To assess the efficacy and complications of early, intermediate, or late removal of the urinary catheter after vaginal hysterectomy, pelvic floor repair and anterior colporrhaphy.

Materials and Methods: Seventy-three Women with primary uterine or vaginal prolapse \geq stage II according to Pelvic Organ Prolapse Quantifications System without stress urinary incontinence and without recurrent urinary tract infections, candidates for vaginal repair surgery were included. A urinary catheter (Foley 16) was inserted at the time of the intervention and it was removed at random in three groups, 24 (27 patients), 48 (23 patients) and 72 hours (23 patients) after surgery. Prophylactic intravenous antibiotics were administered for 72 hours. Urinary tract infection (UTI) was diagnosed by urine culture after surgery and acute urinary retention (AUR) during hospitalization. Percentage frequencies were calculated, and the chi-square test (χ^2) was used to search for differences.

Results: UTI was observed in 7.4%, 17.4% and 13% in groups 1, 2 and 3 respectively. No statistically significant association was found between the presence of UTI and urinary catheterization time ($\chi^2=1.3$ $p=0.512$). AUR was found in 4.1% of all patients, most of them from group 2.

Conclusion: Early removal of the urinary catheter in the first 24 hours after vaginal surgery decreased catheterization time, hospital stay and urinary tract infection. Extended catheterization does not offer benefits to patients and prolongs hospital stay unnecessarily.

Keywords: Urinary catheter; prolapse; vaginal surgery; urinary tract infection; post-operative urinary retention; urine culture

INTRODUCTION

Vaginal reconstruction surgery in pelvic organ prolapse (POP) has its own intra-operative complications, such as bleeding, vaginal infection, bladder, ureteral, or intestinal injury; and postoperative complications, such as febrile morbidity, urinary retention, and urinary tract infections.^{1,2} In vaginal prolapse surgery, transurethral bladder catheterization is used to control urinary output, reduce the possibility of bladder injury, and prevent post-operative urinary retention.

Traditionally, two types of urinary catheters are used. Transurethral catheters, that would remain in place for at least 24 hours to avoid acute post-operative urinary retention (AUR), and suprapubic catheters, placed through the abdomen to reduce the risk of urinary tract infection (UTI).

The duration of the catheter stay in the bladder has been reduced over the years. Generally, it is based on personalized knowledge rather than evidence-based knowledge. All this leads to the fact that the catheter durations in the bladder vary considerably.³ It

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Received: 08 April 2021 **Accepted:** 16 April 2021

is common to use routine bladder catheterization for up to three days after vaginal hysterectomy.

Prolonged catheterization increases the possibility of UTI, avoids early ambulation, prolongs hospital stay, and also has negative effects on postoperative well-being.³⁻⁷ In contrast, short-term catheterization reduces hospital stay, costs, and allows early mobilization after the operation.⁸⁻¹⁰ The duration of bladder drainage to avoid urinary retention after gynecological surgery varies considerably.¹¹ Early catheter removal can lead to AUR due to reflex pain at the operation site and overfilling of the bladder after prolapse surgery could have a negative effect on the surgical outcome.⁶ The duration of the catheter stay after the operation is based on custom rather than evidence. A Cochrane review of catheter policies after urogenital surgery was unable to make any consistent recommendations.¹² Therefore, the objective of the present study was to evaluate the effectiveness and compare the postoperative complications of early, intermediate or late removal of the urinary catheter after vaginal cystocele repair surgery (with or without vaginal hysterectomy) and to determine the prevalence of asymptomatic UTI and AUR.

MATERIALS AND METHODS

A prospective, randomized study was designed. Women assisted by the medical team of the Pelvic Floor Unit were selected during the period from March 1st, 2019 to March 1st, 2020. The study was approved by the Ethics Committee from the University of the Republic School of Medicine, Clinical Hospital from Montevideo, Uruguay (no: 81, date: November 29th, 2017). All included patients signed a consent, after being informed about the study.

The inclusion criteria were uterine or vaginal prolapse with asymptomatic primary cystocele \geq stage II according to POP-Q with indication for site-specific vaginal repair surgery such as isolated anterior colporrhaphy or associated with vaginal hysterectomy or with Fothergill-Manchester and Richter procedures. Asymptomatic cystocele is the term referred to if there was no urinary incontinence.

Women with stage I prolapse, stress urinary incontinence, history of previous urinary retention, preoperative urinary tract infection, renal function compromise parameters (blood urea >40 mg/dl, serum creatinine > 1 mg/dl), diabetics, those with intra-operative bladder injury and patients who did not give their consent, were excluded from the study.

The included patients were admitted to the hospital where a medical history and detailed physical examination were documented. Data on age, menopausal status, stage of prolapse (POP-Q) and type of intervention performed were recorded.

At the time of the intervention, a urinary catheter (Foley 16) was inserted in all patients. 71% of the patients underwent spinal anesthesia. After the intervention, a liquid diet was started followed by a normal diet. All patients received intravenous antibiotics for 3 days.

This randomized clinical trial included three groups of patients who underwent vaginal repair surgery with native tissues. All the patients were operated on by the same surgical team.

Randomization was performed with sequentially numbered, sealed envelopes prepared by an independent investigator.

After surgery, the urinary catheter was removed according to randomization in three groups, 24, 48, and 72 hours postoperatively, that is, groups 1, 2, and 3, respectively. After catheter removal, if the patient failed to spontaneously void, a re-catheterization was performed.

On the third day after the operation, a microscopic examination of urine and urine culture was systematically performed. Postoperative bacteriuria was defined as a positive urine culture of $>100,000$ CFU/ml.

Length of stay was defined as the time interval between surgery and discharge from hospital.

The variables analyzed were the re-catheterization rate to assess the risk of AUR during hospitalization, the risk of asymptomatic UTI by performing urine culture and the duration of hospital stay.

From the statistical analysis, the calculation of the percentage frequencies was considered, and the chi-square test (χ^2) was used to search for association.

RESULTS

In total, 73 women were recruited for this study. They were assigned to three groups with the following distribution, 27 in group 1, 23 in group 2 and 23 in group 3.

All patients had similar indications for vaginal surgery. The age and menopausal status are shown in Table 1.

There were no major intraoperative complications requiring a patient to be removed from the study protocol. Patients were divided into four age groups: less than 51 years, 51 to 60 years, 61 to 70 years and over 71 years old. The mean age was 66.55 (standard deviation ± 10.97). Forty-seven patients (64.4%) underwent vaginal hysterectomy with pelvic floor repair, 22 surgeries (30.1%) with anterior colporrhaphy, two surgeries for repair of apical prolapse by Richter's operation (2.7%) and two Manchester-Fothergill operations (2.7%).

Most vaginal hysterectomies with pelvic floor repair were performed in the group of women 60 to 69 years of age. 95.9% of cases are postmenopausal women.

Preoperatively, the degree of prolapse according to the POP-Q quantification system was 20.5% with POP-Q II, 60.3% with POP-Q III and 19.2% with POP-Q IV.

Postoperatively, UTI was observed in 7.4%, 17.4%, and 13% in groups 1, 2, and 3, respectively (Figure 1). No statistically significant association was found between the presence of UTI and bladder catheterization time ($\chi^2=1.3$, $p=0.512$). It was observed that 4.1% of total patients presented with AUR, the majority was from group 2 (Table 2)

Of twenty-seven patients in group 1, 3.7% had AUR and required re-catheterization (Figure 2). Of group 2, 8.3% required re-catheterization due to retention. No retention was observed in any of the patients in group 3 (Table 1).

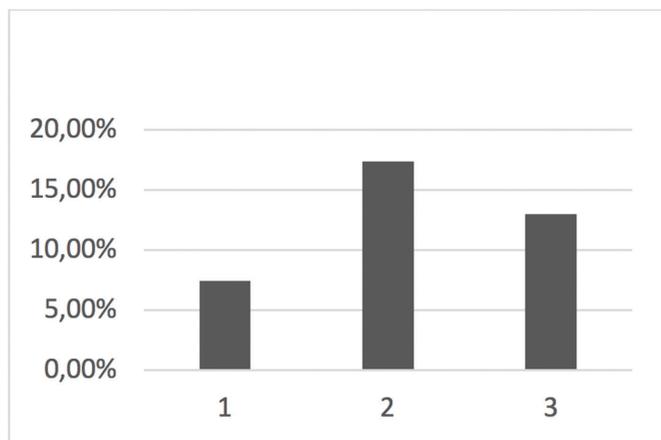


Figure 1. UTI by assigned groups
UTI: Urinary tract infection

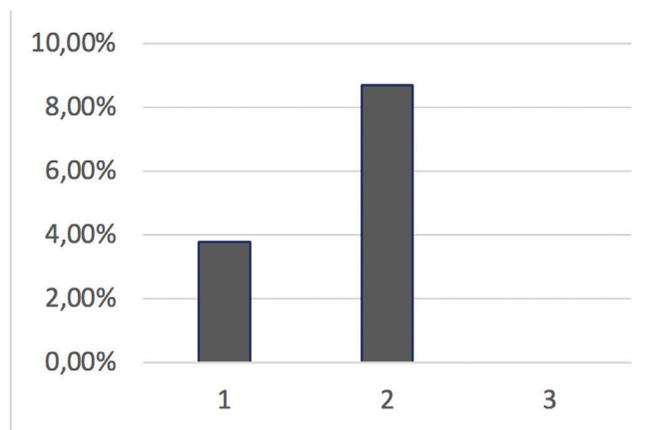


Figure 2. AUR by assigned groups
AUR: Acute urinary retention

There were no differences between the groups as the difference between UTI was not statistically significant. The hospital stay was three days for most patients, except for one patient in group 2 who had a five-day stay due to urinary retention.

Positive bacterial culture was found in 7.4% of patients in group 1, 17.4% in group 2, and 13% in group 3 (Table 2). The most common bacteria was *E. coli* (67%), followed by *Klebsiella pneumoniae* (22%) and *Proteus mirabilis* (11%).

Table 1. Participant characteristics

Groups	1 (24 Hs) (n=27)	2 (48 Hs) (n=23)	3 (72 Hs) (n=23)	Total (n=73)
Premenopausal	11.10%	0	0	4.10%
Postmenopausal	88.90%	100%	100%	95.90%
Age ≤50	11.10%	0	0	4.10%
Age 51–60	14.80%	21.70%	13.00%	16.40%
Age 61–70	51.80%	26%	47.80%	42.50%
Age ≥71	22.20%	52%	39.10%	37%
POP Q II	23%	16.70%	21.70%	20.50%
POP Q III	61.50%	66.70%	52.20%	60.30%
POP Q IV	15.50%	16.70%	26.10%	19.20%
Regional anesthesia	26%	23%	22%	71%
General anesthesia	11%	8%	10%	29%

Values are given as number (percentage) unless otherwise indicated
POP-Q: Pelvic Organ Prolapse Quantifications System; Hs: Hours; n: Number

Table 2. A comparison of the rates of UTI, AUR and hospital stay in the different groups

Groups	1 (24 Hs) (n=27)	2 (48 Hs) (n=23)	3 (72 Hs) (n=23)	Total (n=73)
UTI	7.4%	17.4%	13.00%	12.3%*
AUR	3.8%	8.3%	0%	4.1%
Hospital stay 3 days	100%	95.8%	100%	98.6%

$p=0.512$

*: The percentage frequencies and the value of p were calculated
UTI: Urinary tract infection; AUR: Acute urinary retention; Hs: Hour; n: Number

DISCUSSION

Maintaining a urinary catheter in the bladder for an extended period of time during the postoperative period has changed over the years. Evidence and experience have shown that prolonging the duration of a urinary catheter had no additional benefit.

The urinary catheter is commonly used to assess urinary output and to prevent postoperative urinary retention. Bladder catheterization is not a harmless procedure. Hospital-acquired UTI is associated with the use of urinary catheters. UTI increases hospital stay, is expensive to treat, and causes discomfort to patients.

A previous study compared catheter removal after one day and three days;¹³ the authors of that study discussed perioperative considerations to prevent acute urine retention. Another study reported a group of patients who had their urinary catheters removed immediately after surgery.¹⁰ The authors recommended removing urinary catheter after three hours with careful monitoring of the patient's voiding.

The immediate removal of the catheter may cause difficulty in early ambulation and the recovery of bladder function due to the residual effect of regional anesthesia after using intra-spinal opioids.

In our study, these aspects were considered, and it was decided to remove the catheter 24 hours after the operation.

There are studies that show that the retention rate was higher in the prolonged catheterization group.^{14,15} However, other studies showed that retention rates were more common in the early removal group compared to the late removal group.^{6,10,13,14,16-19} Hakvoort et al.⁶ reported that in women with anterior colporrhaphy, if the catheter was removed within 24 hours, 40% required a new catheterization. Similarly, Alessandri et al.⁸, in a randomized clinical study in patients undergoing vaginal hysterectomy, found a relatively high rate of re-catheterization (18.8%) in the immediate removal group.

In our study, re-catheterization due to urine retention was found in 4.1%, being higher in group 2 (8.7%).

Most studies report a higher incidence of UTI when the urinary catheter remains for longer.^{6,10,16} A reduction in UTIs is important since they represent 40% of all hospital-acquired infections and 80% of these are associated with the use of urinary catheters.¹⁹ Our study found a high incidence of UTI in all groups (7.4%, 17.4% and 13%), but there were no statistically significant differences.

In 2004, a randomized clinical trial determined the benefits of prolonged urinary catheterization after prolapse surgery.⁶ One hundred patients were assigned into two groups. One group (n=50) where the catheter was removed on the fifth day after the operation and the other (n=50) where the removal was on the day after the operation. Positive urine cultures were found in 40% of cases in the prolonged catheterization group compared to 4% in the non-prolonged group (odds ratio: 15, 95% confidence interval: 3.2–68.6). The authors concluded that removal of the urinary catheter is preferable in the morning after surgery and prolonged catheterization should only be performed when there are specific indications.

A systematic Cochrane review in 2006 of urinary catheter management after urogenital surgery in adults showed a lower rate of UTI when the catheter was removed early.¹² The authors concluded that the use or not of a particular policy is generally

based on the balance between the risks of morbidity (especially infection) and the risks of repositioning a catheter.¹²

Bacteriuria from a single bladder catheterization was observed in 3% to 4%, while if catheterization was not required, there was a 1% risk of acquiring bacteriuria during hospitalization.²⁰ Permanent catheters are particularly vulnerable to colonization by bacterial biofilms.^{21,22} Receiving prophylactic antibiotics reduces the rate of bacteriuria and other signs of infection in surgical patients who undergo bladder drainage for at least 24 hours after surgery.¹⁹ In 2010, a study compared intermittent and suprapubic catheterization after anterior or posterior colporrhaphy.²¹ The length of hospital stay and total length of catheterization were significantly shorter for the intermittent group.²¹ In 2011, a randomized clinical trial assessed the management of abnormal residual volume after prolapse surgery, comparing the use of intermittent and transurethral catheterization. A twenty-fold reduction in the risk of urinary infection with intermittent catheterization was demonstrated.²³ Furthermore, it was found that patients preferred intermittent catheterization.²³

In 2017, a randomized controlled trial,²⁴ compared immediate removal of the urinary catheter versus a suprapubic catheter after vaginal prolapse surgery. It was observed that a permanent catheter is not necessary in the postoperative period for many women.

Reduction in length of stay and early mobilization are consequent to avoiding a permanent catheter.^{25,8}

The present randomized controlled trial was performed to compare immediate 24-hour removal versus use of a permanent catheter with removal at 48 and 72 hours.

The strengths of the study are being a prospective randomized study with defined inclusion and exclusion criteria, and that all the patients were operated on by the same surgical team. In addition, a study protocol with a similar length of hospital stay was followed in each group to reduce the chances of bias. The limitations were that various types of surgery were included, the sample size and the use of general anesthesia in some cases. Another limitation of the study was that groups 2 and 3 did not include premenopausal patients.

Our research has shown that it is not necessary to use a permanent urinary catheter for longer than 24 hours after vaginal surgery for pelvic organ prolapse. A short duration of catheterization with removal at 24 hours is safe and does not cause an increase in retention or urinary infection. Prolonged catheterization does not offer benefits to patients and unnecessarily lengthens hospital stay.

CONCLUSION

Removal of the urinary catheter after 24 hours following vaginal hysterectomy with anterior colporrhaphy decreased hospital stay and UTI rates.

Contributions

Surgical and Medical Practices: E.C.P., N.B., Va.A., V.A., Concept: E.C.P., Design: E.C.P., N.B., Data Collection or Processing: E.C.P., N.B., Va.A., V.A., Analysis or Interpretation: E.C.P., N.B., Literature Search: V.A., Writing: E.C.P.

Ethics

Ethics Committee Approval: Ethics Committee from the University of the Republic School of Medicine, Clinical Hospital from Montevideo, Uruguay (no: 81, date: November 29th, 2017)

Informed Consent: All included patients signed a consent, after being informed about the study.

Peer-review: Externally peer-reviewed.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support

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