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Research Article

## Effect of routine pre-operative urethral catheterization of women undergoing minor gynaecological surgeries on urinary symptoms and urinary infections: a randomized control study

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### ABSTRACT

**Background:** The prevalence of urinary tract infection increases in young sexually active women, and women with previous UTI. Routine urethral catheterization performed for bladder evacuation before minor gynecological procedures and it is not clear whether this routine urethral catheterization associated with increased incidence of bacteriuria or UTIs or not. This study designed to detect the effect of routine urethral catheterization for women undergoing minor gynecological surgeries on urinary symptoms and urinary infections.

**Methods:** Two hundred and forty women infertile women scheduled for uterine assessment by diagnostic hysteroscopy before in-vitro fertilization in assisted reproduction unit of Ahmadi Hospital, Kuwait Oil Company were included in this study. Participants were randomized into; group I (catheterized group) and group II (non-catheterized group). Participants' urine samples compared pre-operatively and post-operatively and they asked to complete about their pre and post-operative urinary symptoms.

**Results:** Post-operative dysuria, frequency and urgency were significantly higher in catheterized group (22 (18.33%), 26 (21.66%) and 18 (15%); respectively) compared to non-catheterized group [5 (4.16%), 7 (5.83%) and 4 (3.33%); respectively]. Relative risk of dysuria, frequency and urgency after catheterization were 4.4, 3.7 and 4.5; respectively (95% CI; 1.7-11.2, 1.67-8.22 and 1.56-12.9; respectively). Asymptomatic bacteriuria, UTIs and subsequent need for antimicrobial therapy were also significantly high in catheterized group [15 (12.5%), 18 (15%) and 18 (15%); respectively] compared to non-catheterized group (3 (2.5%), 2 (1.96%) and 2 (1.96%); respectively). Relative risk of asymptomatic bacteriuria and UTIs after catheterization in women undergoing minor gynecological procedures were 5 and 9; respectively (95% CI; 1.48-16.8 and 2.1-37.9).

**Conclusions:** Catheterization in women undergoing minor gynecological surgery was associated with increased risk of dysuria, frequency, urgency, ASB, UTIs and subsequent antimicrobial therapy. Surgeons should revise the practice of routine preoperative catheterization for women undergoing minor gynecological procedures.

**Keywords:** Urethral, Catheterization, Gynecological, Urinary, Complications

### INTRODUCTION

Urinary tract infections (UTIs) increases in young sexually active women, and women with previous UTI.<sup>1-3</sup> UTIs is the most common indication for antimicrobial use in hospitals.<sup>1</sup> approximately 80% of UTIs are catheter-

associated.<sup>4,5</sup> Urine cultures usually done when a significant suspicion for a UTIs, based on patient symptoms and presence of leukocyte esterase and nitrites that suggest the presence of leucocytes and gram-negative organism's respectively.<sup>6-8</sup>

Urine Cultures are only recommended with symptoms of UTIs or change in urine color, odor or turbidity, and in urologic surgery, when a urinary catheter is placed or changed.<sup>8,9</sup>

Presence of bacteria in the urine may indicate; specimen contamination; UTIs or asymptomatic bacteriuria (ASB).<sup>10,11</sup> Specimen contamination should always be considered, particularly in female patients with high numbers of squamous cells on the urinalysis.<sup>10-12</sup>

The diagnosis of ASB and UTIs should be based on culture of a urine specimen collected in a manner that minimizes contamination.<sup>13</sup> ASB diagnosed with one bacterial species isolated in a quantitative count 105/ml in urine sample.<sup>14</sup> UTIs diagnosed with one bacterial species isolated in quantitative count  $\geq 10^5$  bacteria per ml of voided urine in women with symptoms of UTIs.<sup>13-15</sup>

Preventive guidelines published by the United States centers for disease control and prevention suggest that avoiding catheterization is not often possible but should be considered.<sup>4,5</sup>

Routine catheterization performed for bladder evacuation before minor gynecological procedures because it is difficult to bimanually evaluate the uterus or to catch uterine cervix with full bladder.<sup>6</sup> It is not clear whether this routine urethral catheterization associated with increased incidence of bacteriuria or UTIs or not.<sup>16</sup>

In addition; women can be informed to void urine normally and evacuate their bladders before minor gynaecological surgery to avoid routine catheterization.<sup>13</sup>

This randomized controlled study designed to detect the effect of routine urethral catheterization for women undergoing minor gynaecological surgeries on urinary symptoms and urinary infections.

## METHODS

This randomized study conducted during the period between February 2014 and February 2015. The study protocol approved by the local ethical research committee of Ahmadi Hospital, Kuwait Oil Company (KOC), Kuwait. All participating women signed informed written consent after thorough explanation of the purpose and procedure of the study.

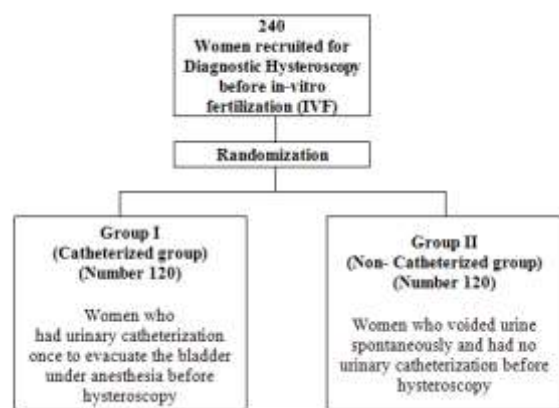
Two hundred and forty women infertile women scheduled for uterine cavity assessment by diagnostic hysteroscopy before in-vitro fertilization in assisted reproduction unit of Ahmadi hospital. Diagnostic hysteroscopy scheduled for studied women post-menstrual in the early-mid follicular phase of the menstrual cycle, 1-3 months before starting the in-vitro fertilization (IVF) treatment.

Recruited eligible women randomized into; group I (catheterized group), including women who had urinary catheterization once to evacuate the bladder and group II (non-catheterized group), including women who voided

urine spontaneously and had no urinary catheterization before hysteroscopy (Figure 1).

Urinary catheterization was done by the surgeon himself, under general anesthesia after sterilization and toweling, the vulva was separated and the external urethral opening was cleaned by piece of cotton soaked with plain water, then Nelaton's catheter size 12-14 Fg was passed to the urinary bladder under aseptic condition to evacuate the bladder once and removed.

According to hospital protocol diagnostic hysteroscopy is usually done by the registrar who has master degree in obstetrics and gynaecology supervised by consultant who has master and MD degree in obstetrics and gynaecology.



**Figure 1: Flow diagram of the studied women.**

Women with urinary tract known anomalies or stones and women with positive urinary symptoms (dysuria, frequency, lower abdominal tenderness or urgency) or positive UTIs with in last 6 months before inclusion excluded from this study.

Randomization performed using a computer-generated randomization system. A plan of interventions sealed in closed envelopes, numbered in accordance with the randomization tables and opened the senior nurse officer (SNO) of the gynaecological ward before transfer of the studied women to operative room. Packing, sealing and numbering performed by two independent doctors other than the investigator.

Routine pre-operative cultures urine samples taken from studied women compared with post-operative urine cultures of women with positive urinary symptoms and studied women were asked about their pre and post-operative urinary symptoms (dysuria, frequency, lower abdominal tenderness or urgency).

Urine cultures were done for all studied women pre-operatively and post-operatively and antimicrobial therapy were prescribed based on positive urinary symptoms and positive cultures. No antimicrobial therapy for women with ASB.<sup>2,17</sup>

ASB diagnosed with one bacterial species isolated in a quantitative count 105/ml in urine sample. UTIs diagnosed with one bacterial species isolated in quantitative count  $\geq 10^5$  bacteria per ml of voided urine in women with symptoms of UTIs.<sup>13-15</sup> The midstream, clean-catch urine collection technique remains the most used method of specimen collection. Women instructed to separate their legs apart, to clean the inner folds of the labia and urethral opening by plain water, then start to void and catch midstream urine for culture to decrease contamination of the specimen by introitus bacteria.<sup>2,17</sup>

Primary outcome measures; symptoms suggestive of UTIs, and post-operative diagnosed by urine cultures.

**Sample size justification**

Sample size was calculated using G\* power software version 3.17 for sample size calculation (\*Heinrich Heine Universität; Düsseldorf; Germany), setting the  $\alpha$ -error probability at 0.05, power (1-  $\beta$  error probability) at 0.95 % and effective sample size (w) at 0.3. The effective size (w) was calculated as follows:

$$W = \sqrt{x^2 + N}$$

Where  $x^2$  is the Chi-square test and N is the total sample size.

240 women were studied (220 women to produce statistically accepted figure and 20 women as calculated 5% drop rate).

**Statistical analysis**

Data were collected, tabulated then statistically analysed using the Statistical Package for Social Science (SPSS) (Chicago, IL, USA). Numerical variables were presented as mean and standard deviation ( $\pm$ SD), while categorical

variables were presented as number and percentage. Student's t-test, used for numeric parametric variables, and Chi-square ( $\chi^2$ ) test for categorical variables analysis. P value <0.05 was considered significant.

**RESULTS**

There was no significant difference between group I (catheterized group) and group II (non- catheterized group) regarding; mean age (27.12 $\pm$ 5.2 versus 28.88 $\pm$ 5.9 years; respectively), mean BMI (21.81 $\pm$ 4.2 versus 22.1 $\pm$ 5.1; respectively) and duration of diagnostic hysteroscopic (8.3 $\pm$ 2.7 versus 7.5 $\pm$ 1.5 minutes; respectively) (Table 1).

**Table 1: Demographic data of two studied groups.**

Variables	Group I catheterized group (number 120)	Group II non-catheterized group (number 120)	P value (95% confidence interval)
Age (years)	27.12 $\pm$ 5.2	28.88 $\pm$ 5.9	0.9 (3.16, -1.76, -0.35)
BMI (kg/m <sup>2</sup> )	21.81 $\pm$ 4.2	22.1 $\pm$ 5.1	0.98 (-1.47, -0.29, 0.89)
Duration of the diagnostic hysteroscopy (minutes)	8.3 $\pm$ 2.7	7.5 $\pm$ 1.5	0.0 (0.270, 0.8, 1.32)

Analysis done using independent student's t-test; BMI: body mass index [calculated as weight (kg) divided by squared height (m<sup>2</sup>)]; Data presented as mean $\pm$ SD (standard deviation); P value >0.05 considered insignificant difference.

**Table 2: Postoperative urinary symptoms, asymptomatic bacteriuria and urine cultures in studied women.**

Variable	Group I catheterized group (number 120)	Group II non- catheterized group (number 120)	P value; relative risk 95% confidence interval
Dysuria	22 (18.33%)	5 (4.16%)	0.001; 4.4 (1.7-11.2)
Frequency	26 (21.66%)	7 (5.83%)	0.001; 3.7 (1.67-8.22)
Lower abdominal tenderness	22 (18.33%)	12 (10%)	0.1; 1.8 (0.9-3.5)
Urgency	18 (15%)	4 (3.33%)	0.004; 4.5 (1.56-12.9)
Asymptomatic bacteriuria (quantitative count 10 <sup>2</sup> ml/ml of one bacterial species)	15 (12.5%)	3 (2.5%)	0.006; 5 (1.48-16.8)
UTIs (10 <sup>5</sup> bacteria/ml of voided urine in women with symptoms of UTIs)	18 (15%)	2 (1.96%)	0.0005; 9 (2.1-37.9)
Antimicrobial therapy	18 (15%)	2 (1.96%)	0.0005; 9 (2.1-37.9)

Analysis done using Chi-square test (X<sup>2</sup>); data presented as number and percentage; P value <0.05 considered significant difference; UTIs: urinary tract infections.

Post-operative dysuria, frequency and urgency were significantly high in catheterized group [22 (18.33%), 26 (21.66%) and 18 (15%); respectively] compared to non-catheterized group [5 (4.16%), 7 (5.83%) and 4 (3.33%); respectively].

Relative risk of dysuria, frequency and urgency after catheterization were 4.4, 3.7 and 4.5; respectively (95% CI; 1.7-11.2, 1.67-8.22 and 1.56-12.9; respectively) (Table 2).

Asymptomatic bacteriuria, UTIs and subsequent need for antimicrobial therapy were also significantly high in catheterized group [15 (12.5%), 18 (15%) and 18 (15%); respectively] compared to non-catheterized group [3 (2.5%), 2 (1.96%) and 2 (1.96%); respectively]. Relative risk of asymptomatic bacteriuria and UTIs after catheterization in women undergoing minor gynaecological procedures were 5 and 9; respectively (95% CI; 1.48-16.8 and 2.1-37.9) (Table 2).

## DISCUSSION

Preventive guidelines published by the United States Centers for Disease Control and Prevention suggest that avoiding catheterization is not often possible but should be considered.<sup>4,5</sup> Routine catheterization performed for bladder evacuation before minor gynecological procedures and it is not clear whether this routine catheterization associated with increased incidence of bacteriuria or UTIs or not.<sup>16</sup>

This randomized controlled study designed to detect the effect of routine urethral catheterization for women undergoing minor gynecological surgeries on urinary symptoms and urinary infections.

In this study, post-operative dysuria, frequency and urgency were significantly high in catheterized group (22 (18.33%), 26 (21.66%) and 18 (15%); respectively) compared to non-catheterized group [5 (4.16%), 7 (5.83%) and 4 (3.33%); respectively].

Relative risk of dysuria, frequency and urgency after catheterization were 4.4, 3.7 and 4.5; respectively (95% CI; 1.7-11.2, 1.67-8.22 and 1.56-12.9; respectively).

Asymptomatic bacteriuria, UTIs and subsequent need for antimicrobial therapy were also significantly high in catheterized group [15 (12.5%), 18 (15%) and 18 (15%); respectively] compared to non-catheterized group (3 (2.5%), 2 (1.96%) and 2 (1.96%); respectively). Relative risk of asymptomatic bacteriuria and UTIs after catheterization in women undergoing minor gynecological procedures were 5 and 9; respectively (95% CI; 1.48-16.8 and 2.1-37.9).

Emily et al, studied 200 women undergoing minor gynecological procedures to be catheterized or not catheterized. Patients were blinded and provided

preoperative and postoperative urine samples for culture.<sup>16</sup>

In this study relative risk of ASB and UTIs after catheterization were 5 and 9 respectively (95% CI; 1.48-16.8 and 2.1-37.9), Emily et al, found that there is relative risk of postoperative bacteriuria for catheterized patients about 1.24.<sup>16</sup>

Although, in this study the relative risk of dysuria, frequency and urgency after catheterization were 4.4, 3.7 and 4.5; respectively (95% CI; 1.7-11.2, 1.67-8.22 and 1.56-12.9; respectively), Emily et al, found the prevalence of postoperative urinary discomfort which was low and similar without any significant difference for both the catheterized (13%) and not catheterized (9%) women and they did not studied or compare the relative risk of urinary discomfort between two studied groups.<sup>16</sup>

Emily et al concluded that the intervention of preoperative one-time catheterization in minor gynecologic procedures is not associated with increased postoperative bacteriuria nor does it significantly increase postoperative urinary discomfort or pain.<sup>16</sup>

In this study, our finding suggests that even one-time catheterization in women undergoing minor gynecological surgery is associated with increased risk of dysuria, frequency, urgency, ASB, UTIs and subsequent antimicrobial therapy.

Approximately 80% of UTIs are catheter-associated.<sup>4,5</sup> In addition; Trautner et al, found that catheter-associated urinary tract infection (CAUTI) is one of the most common hospital-acquired infections and many cases treated as hospital-acquired CAUTI are actually asymptomatic bacteriuria (ABU).<sup>13</sup>

Trivedi, concluded that dilatation and curettage and evacuation of the uterus are the 2 most common minor gynecological procedures and routine urinary catheterization before these procedures is unnecessary.<sup>6</sup>

Surgeons should revise routine preoperative catheterization for women undergoing minor gynecological procedures, simply because women undergoing minor gynecological surgery can void normally and evacuate their bladders to decrease incidence of UTIs and need for antimicrobial therapies.

## CONCLUSION

This study was the first randomized controlled study designed to detect the effect of routine pre-operative urethral catheterization for women undergoing minor gynaecological procedures on urinary symptoms and urinary infections with adequate calculated sample size to produce a statistically acceptable figure. A woman ashamed to answer questions about their urinary symptoms was the only limitation faced during this study.

Larger studies required to confirm the drawbacks of routine preoperative catheterization for women undergoing minor gynaecological procedures.

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