

## Role of Urinary Catheter in Post-Partum Urinary Retention and Genitourinary Infections in Caesarean Deliveries

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### Abstract

**Background:** Urethral catheterization is done as a routine procedure in cesarean section. It is thought to be associated with high incidence of urinary tract infections, discomfort, delayed ambulation and longer hospital stay. The aim of our study were to determine the feasibility and safety of cesarean section without urethral catheterization.

**Subjects and Methods:** A prospective, randomized controlled trial was carried out in Beni-Suef General Hospital from April 1, 2014 to April 1, 2015. Among 100 patients who had undergone cesarean section 50 were catheterized and 50 were uncatheterized.

**Results:** The study showed that the catheterized group took longer time till first voiding  $7.80 \pm 2.88$  hours versus  $6.72 \pm 2.27$  hours for the uncatheterized group ( $p$  value = 0.04\*) and also took longer time till first ambulation  $8.64 \pm 2.62$  hours versus  $6.10 \pm 1.94$  hours for the uncatheterized group ( $p$  value = 0.001\*). Further, the females who were catheterized stayed for much longer period at hospital  $30.56 \pm 6.19$  hours versus  $20.46 \pm 2.92$  hours for the uncatheterized group ( $p$  value = 0.001\*). The catheterized group had much higher numbers of UTI among its females, 36 female compared to only 15 females of the uncatheterized group ( $p$  value = 0.001\*). Females who were subjected to catheterization were more likely to show urinary retention ( $p$  value = 0.039\*).

**Conclusion:** Cesarean section can be done safely without urethral catheterization with reduced morbidities.

**Keywords:** Cesarean section, Urethral catheterization, Urinary tract infection, Urinary retention

### Introduction

Urinary retention is failure to void in the postoperative period even though the urinary bladder is full. Urinary retention, which can be seen in the early postoperative period (the first 6-8 hours), is a general complication that can also be seen in patients who do not have known urinary complaints. Many factors play a role in the development of postoperative urinary retention. Although age is accepted as the general precipitating factor, long surgical procedures, the surgical site, and pain can also lead to postoperative urinary retention (1-5).

Urinary retention is seen most often after anterior abdominal wall and ano-rectal area operations. A cesarean section is an anterior abdominal wall operation. A urinary catheter may be inserted after abdomino-perineal operations if there is likelihood that urinary bladder functions will be impaired due to operation trauma in the sacral plexus. In our country urinary catheters are routinely inserted in patients before they undergo cesarean delivery, and they are removed shortly after surgery.

The literature has reported various methods to encourage voiding after surgery. These have included voiding in a sitting position; early ambulation; providing a bedpan; listening to the sound of water; pouring warm water onto the pelvic area; applying pressure on the urinary bladder in the form of a hand massage; pelvic floor exercises (the kegel exercise); and providing diuretic drinks such as tea and coffee (2, 4).

As mentioned earlier, acute urinary retention is an inability to empty the bladder despite being full, and this complication frequently occurs during the postoperative period. Nurses are able to evaluate the presence of urinary retention, monitor the volume and excessive relaxation of the bladder and avoid unnecessary catheterizations (2-4). The association between urinary catheterization and urinary tract infection is well documented in the literature (5-7).

Genitourinary infection is one of the most common complications (1.7 per 1000) of cesarean deliveries (6). One of the preoperative preparations for cesarean section is the placement of a Foley catheter. However, bladder catheterization increases the rate of both symptomatic and asymptomatic urinary tract infections. Catheterization of the urinary tract with the use of an indwelling urinary catheter has been implicated as a main cause of urinary tract contamination (5-7).

In one study, urinary system infection was reported in 2-16% of patients after cesarean section. The variation in rate of occurrence depended upon the duration of urinary catheter insertion intra- and postoperatively and on the postoperative health of the mother (1). The prevalence of urinary system infections during the hospital stay was found to be 1.7%, and 65% of these developed secondary to urinary bladder catheterization (5-8).

Since experience has now shown that routine urinary catheterization may not be necessary for all caesareans, and its use might carry a high risk for infection, confirmation of these findings should be approached before opening the gate to other techniques need to be explored (5-8).

## Aim of Study

The aim of our study were to detect the role of urinary catheter in developing both urinary retention and urinary infection in addition to detecting any further drawbacks.

## Subjects and Methods

This prospective study included 100 women delivered by cesarean section in Beni-Suef General Hospital from the period of April 1, 2014 to April 1, 2015.

After obtaining approval from the Ethical Committee of Beni-Suef University and a written informed consent, 100 Egyptian female with singleton term pregnancy and coinciding with the American Society of Anesthesiologists (ASA) Physical Status I and scheduled for elective CS under spinal anesthesia were enrolled. Exclusion criteria were emergency CS, history of renal, lower urinary tract, spinal or neurological disorders, coagulation disorders, autoimmune diseases, diabetes mellitus, obstetric pathologies and twin pregnancies. An ultrasound assessment of post-voiding residual volume was performed in all women at thirty-four weeks during the visit for the planning of the CS and repeated before the anesthetic procedure. Only those with a negative result were enrolled.

Then, instructions were given on how to time their first spontaneous voiding, manner of voiding, and time of first ambulation. A standard clock was used by the subject in the obstetric wards in timing their spontaneous voiding and time of ambulation.

Later, the females were randomly divided in two groups; a group of 50 females subjected to catheterization and an age-matched group of 50 females were not subjected to catheterization.

Before regional anesthesia, Ringer lactate solution 15 ml/kg was administered. Spinal anesthesia was performed at L3-L4 interspace with a Whitacre 25 gauge needle using hyperbaric bupivacaine 0.5% (9 mg) plus sufentanil 5 mcg. The surgical intervention started when sensory block reached T4 level. Non-invasive blood pressure (NIBP), heart rate monitoring (ECG) and oxygen saturation (SpO<sub>2</sub>) were recorded every 3 minutes during the surgical procedure. Postoperative analgesia was managed with intravenous paracetamol 1 g (repeated up to 4 g at six-hourly intervals), intravenous ketorolac 30 mg, morphine 0,1 mg·kg<sup>-1</sup> at the end of surgery and i.v. morphine (patient controlled analgesia (1 mg bolus on demand, 8-min lock-out, maximal dose 30 mg/4h). Intra and postoperative occurrence of maternal side effects (nausea, vomiting and pruritus) were also recorded.

All of the patients had a stable hemodynamic condition. Aseptic technique was employed prior to insertion of urinary catheter. Cesarean section was done in the standard manner in either a two-layer or a three-layer technique. Typically, the loose peritoneum fold overlying the upper margin of the bladder was gently separated from the underlying myometrium with blunt or sharp dissection.

Length of operation was noted in both groups of patients. Typically, 1-2 L of fluid was infused during and after the operation. In the recovery room, patients were monitored closely. They were given one dose of 50mg of meperidine and 25mg of promethazine intramuscularly and nothing by mouth for 6 hours after the operation.

## Ethical considerations

The study was approved by the ethical committee of the Faculty of Medicine and ethical scientific research committee at the Faculty of Nursing, Beni-Suef University. The questionnaires included explanations about the purpose of the study and its consequences with confirming confidentiality of data.

## Statistical analysis

Data were analyzed using the software, Statistical Package for Social Science, (SPSS) version 19. Frequency distribution with its percentage and descriptive statistics with mean and standard deviation were calculated. Chi-square, t-test, correlations were done whenever needed. P values of less than 0.05 were considered significant and marked with \*.

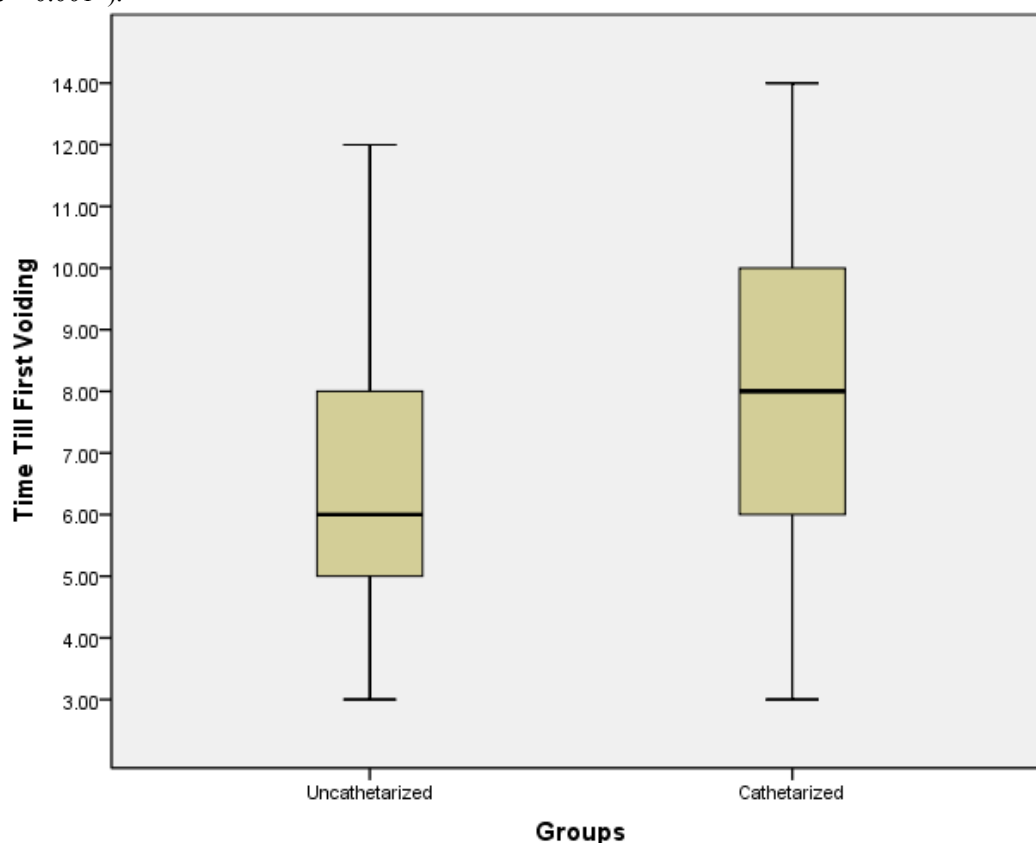
## Results

The ages of the 50 females who were not subjected to urinary catheterization ranged between 16 and 35 years ( $25.42 \pm 5.55$  years). The average time taken for first voiding in this group was  $6.72 \pm 2.27$  hours and for the first ambulation  $6.10 \pm 1.94$  hours while the average hospital stay was  $20.46 \pm 2.92$  hours. On the other hand, the ages of the 50 females who were subjected to urinary catheterization ranged between 17 and 35 years ( $25.66 \pm 5.15$  years). The average time taken for first voiding in this group was  $7.80 \pm 2.88$  hours and for the first ambulation  $8.64 \pm 2.62$  hours while the average hospital stay for the same group was  $30.56 \pm 6.19$  hours.

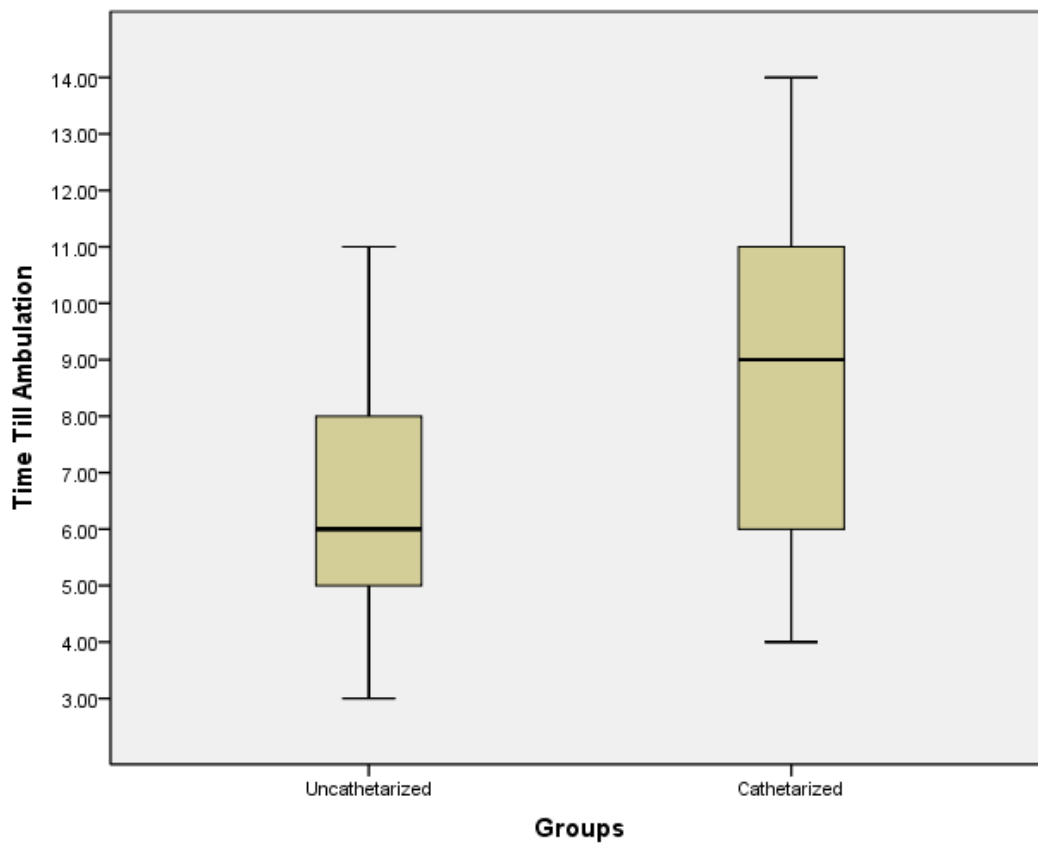
**Table 1: Comparison between Both Groups regarding Time till first voiding and ambulation and Hospital stay**

Groups			N	Mean	Std. Deviation	95% CI for Mean		Minimum	Maximum	P value
						Lower Bound	Upper Bound			
Time Till First Voiding	Uncatheterized		50	6.72	2.27	6.08	7.36	3.00	12.00	0.04*
	Catheterized		50	7.80	2.88	6.98	8.62	3.00	14.00	
Time Till Ambulation	Uncatheterized		50	6.10	1.94	5.55	6.65	3.00	11.00	0.001*
	Catheterized		50	8.64	2.62	7.90	9.38	4.00	14.00	
Hospital Stay	Uncatheterized		50	20.46	2.92	19.63	21.29	16.00	28.00	0.001*
	Catheterized		50	30.56	6.19	28.80	32.32	20.00	48.00	

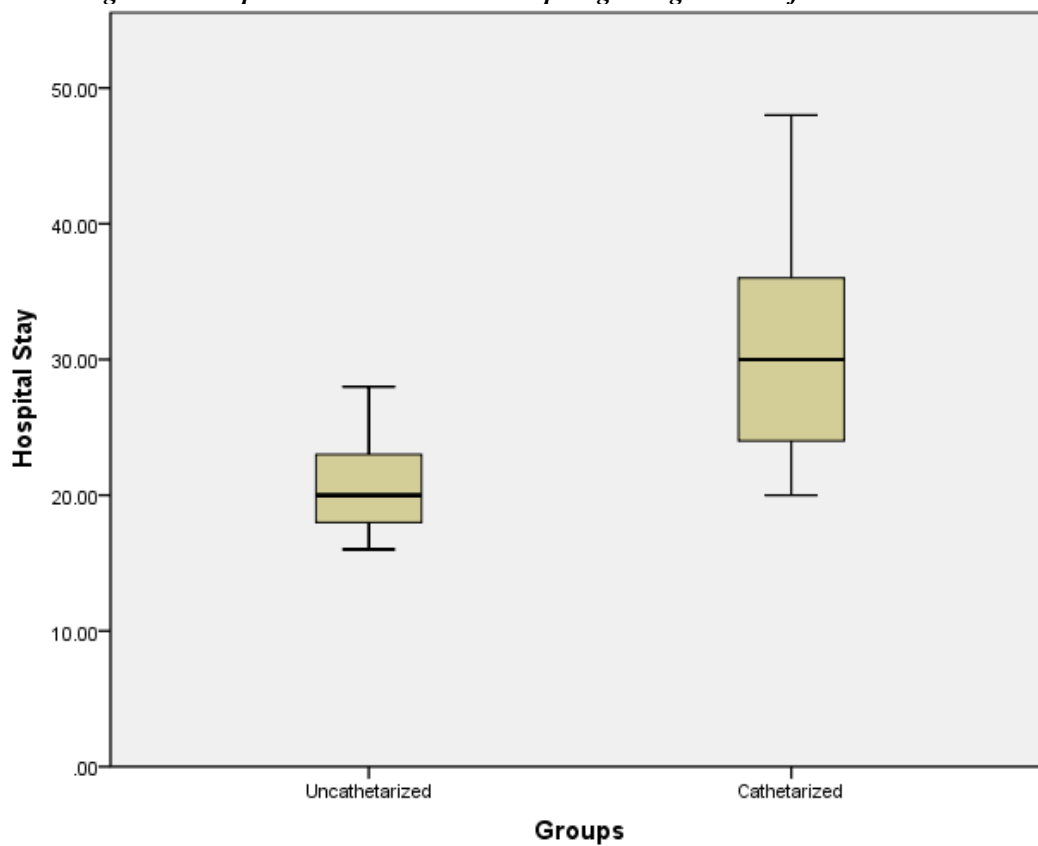
Table 1 and figures 1-3 show that the catheterized group was significantly different from the other group, as the females of the catheterized group took longer time till first voiding  $7.80 \pm 2.88$  hours versus  $6.72 \pm 2.27$  hours for the uncatheterized group (p value = 0.04\*) and also took longer time till first ambulation  $8.64 \pm 2.62$  hours versus  $6.10 \pm 1.94$  hours for the uncatheterized group (p value = 0.001\*). Further, the females who were catheterized stayed for much longer period at hospital  $30.56 \pm 6.19$  hours versus  $20.46 \pm 2.92$  hours for the uncatheterized group (p value = 0.001\*).



**Figure 1: Comparison between Both Groups regarding Time till first voiding**



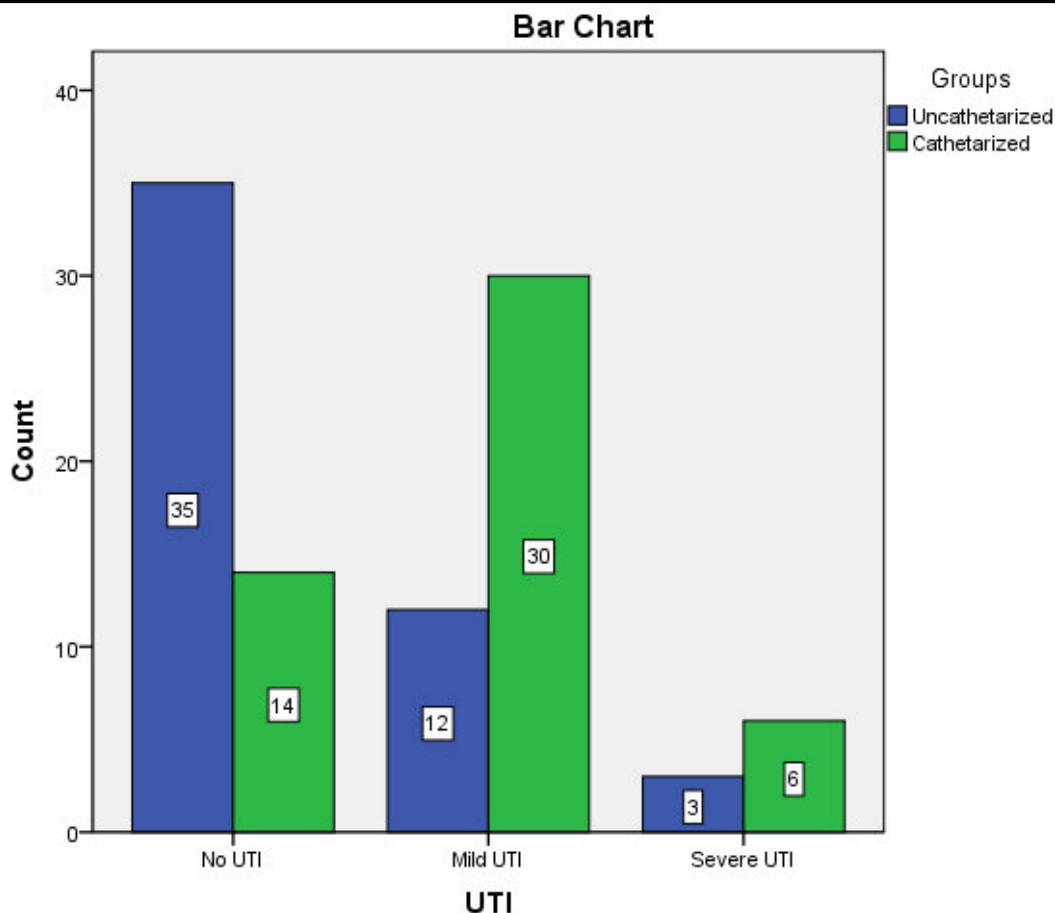
*Figure 2: Comparison between Both Groups regarding Time till first ambulation*



*Figure 3: Comparison between Both Groups regarding Hospital stay*

**Table 2 : Comparison between Both Groups regarding UTI**

UTI		Groups		Total	P value
		Uncatheterized	Catheterized		
No UTI	Count	35	14	49	0.001*
	%	71.4%	28.6%	100.0%	
Mild UTI	Count	12	30	42	
	%	28.6%	71.4%	100.0%	
Severe UTI	Count	3	6	9	
	%	33.3%	66.7%	100.0%	
Total	Count	50	50	100	
	%	50.0%	50.0%	100.0%	

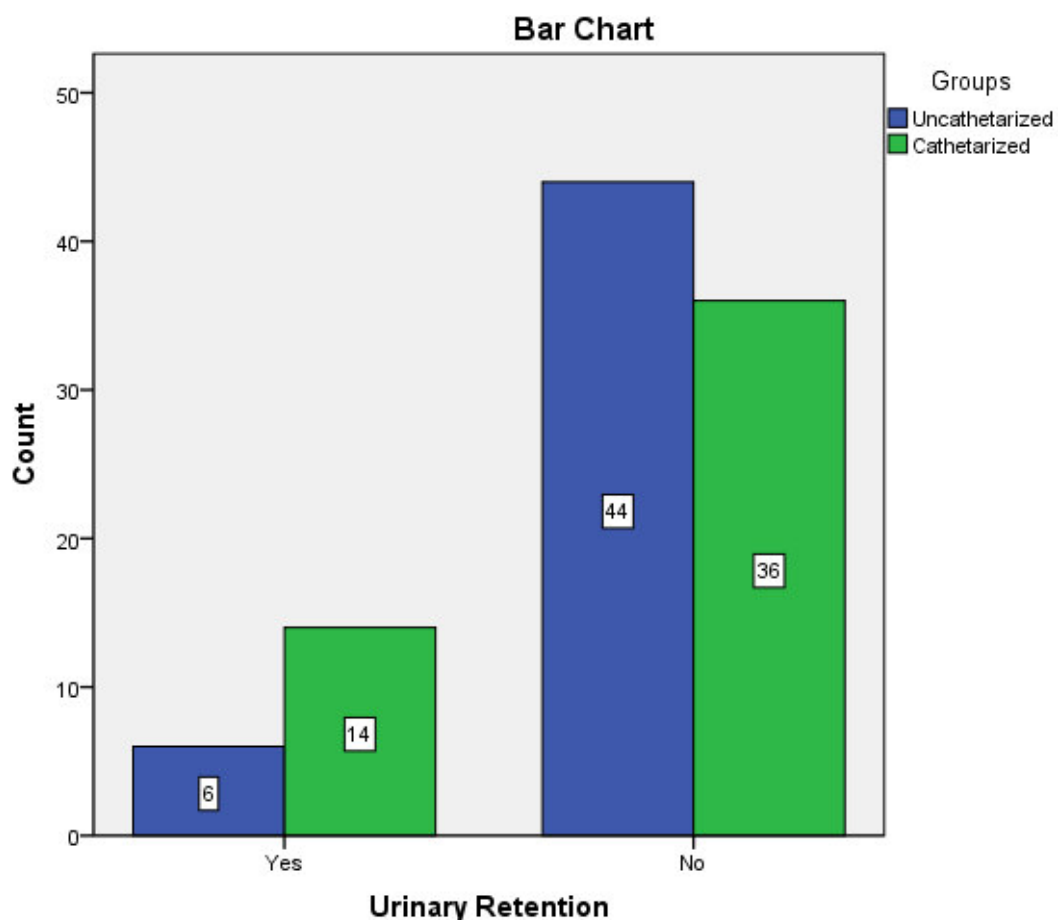


**Figure 4 : Comparison between Both Groups regarding UTI**

Table 2 and figure 4 show that the catheterized group had much higher numbers of UTI among its females, 36 female; 30 with mild UTI and 6 with severe UTI compared to only 15 females of the uncatheterized group who showed UTI; 12 with mild UTI and 3 with severe UTI ending at a statistically significant difference between both groups (p value= 0.001\*).

**Table 3 : Comparison between Both Groups regarding Urinary Retention**

Urinary Retention		Groups		Total	P value
		Uncatheterized	Catheterized		
Yes	Count	6	14	20	0.039*
	%	30.0%	70.0%	100.0%	
No	Count	44	36	80	
	%	55.0%	45.0%	100.0%	
Total	Count	50	50	100	
	%	50.0%	50.0%	100.0%	

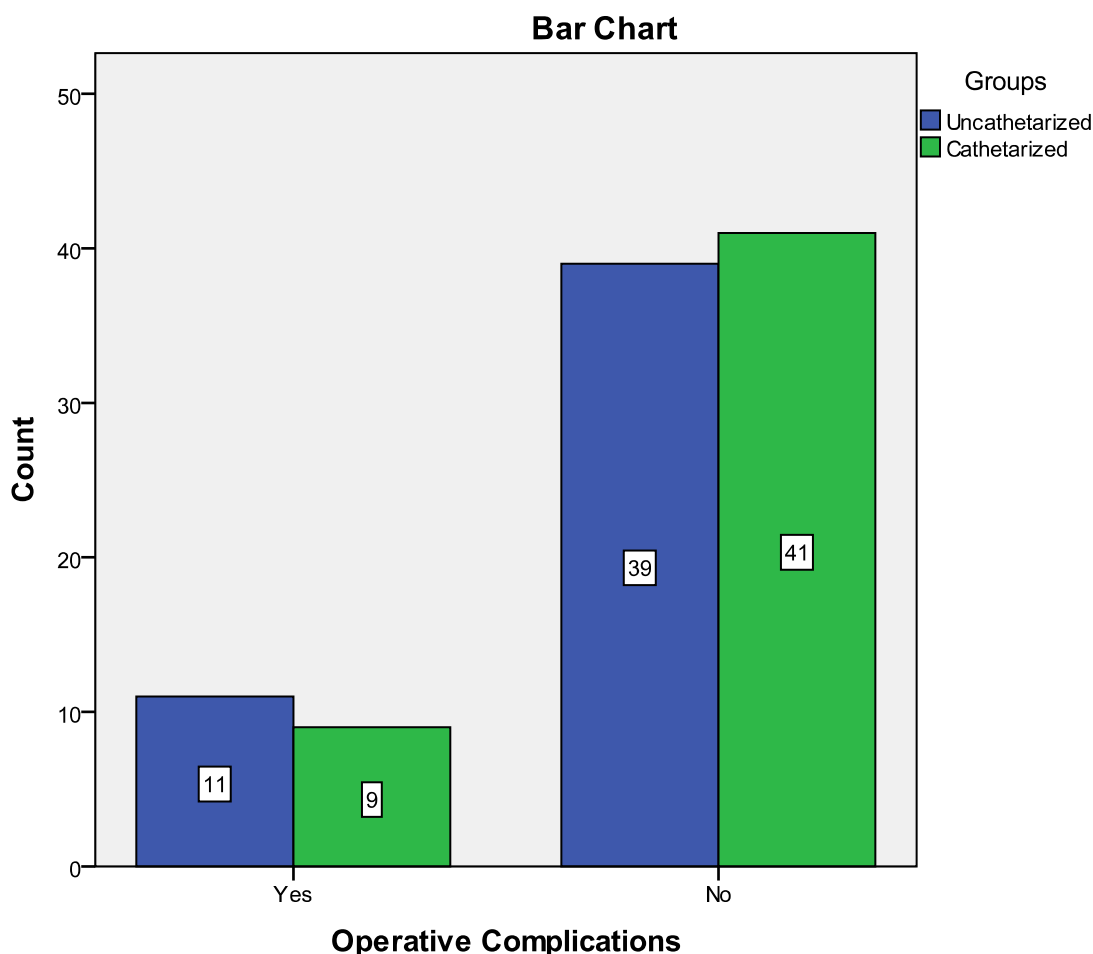


**Figure 5 : Comparison between Both Groups regarding Urinary Retention**

Table 3 and figure 5 show that females who were subjected to catheterization were more likely to show urinary retention , almost two and half times more (p value = 0.039\*).

**Table 4 : Comparison between Both Groups regarding Operative Complications**

Operative Complications		Groups		Total	P value
		Uncatheterized	Catheterized		
Yes	Count	11	9	20	0.40
	%	55.0%	45.0%	100.0%	
No	Count	39	41	80	
	%	48.8%	51.3%	100.0%	
Total	Count	50	50	100	
	%	50.0%	50.0%	100.0%	



**Figure 6 : Comparison between Both Groups regarding Operative Complications**

Table 4 and figure 6 did not show a statistically significant difference between both groups regarding operative complications (p value = 0.40).

**Discussion**

Disturbances of bladder function in pregnant submitted to cesarean section can be associated with obstetric, surgical and anesthesiological factors. Pregnancy is characterized by hormonal changes that reduce the smooth muscle tone of bladder that tends to be hypotonic after delivery, with an increased risk of urinary retention (9). Surgical section also can increase urinary retention causing bruising and edema of the bladder at the uterovesical area (10, 11), postoperative immobility and wound pain (12). Finally, the anesthesiological technique can affect lower urinary tract (13).

Disturbances of micturition have a prevalence ranging between 3% and 42%, and are related to subarachnoid injection of local anesthetics and/or opioids (13-17). Treatment begins with supportive measures to enhance the likelihood of micturition, such as ambulation, privacy, and a warm bath. Nurses or midwives use measures such as oral analgesia, a hot bath, and ambulation for patients who cannot void after 6 hours following cesarean delivery (2-4).

Besides, urinary catheters can lead to trauma and increase the risks of infection and bladder dysfunction. Approximately 25% of urinary catheterizations are not clinically necessary (8).

In our study, the catheterized group was significantly different from the uncatheterized one, as the females of the catheterized group took longer time till first voiding  $7.80 \pm 2.88$  hours versus  $6.72 \pm 2.27$  hours for the uncatheterized group ( $p$  value = 0.04\*) and also took longer time till first ambulation  $8.64 \pm 2.62$  hours versus  $6.10 \pm 1.94$  hours for the uncatheterized group ( $p$  value = 0.001\*). Further, the females who were catheterized stayed for much longer period at hospital  $30.56 \pm 6.19$  hours versus  $20.46 \pm 2.92$  hours for the uncatheterized group ( $p$  value = 0.001\*).

These results were consistent with many previous findings (6-17); for instance, Ghoreishi's prospective randomized study that was used to determine the effect of urinary bladder catheterization on first-void discomfort, time of ambulation, hospital stay, and urinary tract infection in women undergoing cesarean delivery found that the time of first postoperative voiding was 8-11 hours in 54 (42.5%) of cases, the ambulation time in the uncatheterized group was 6.8 hours, vs. 12.9 hours in the control group and uncatheterized patients had a shorter hospital stay, meanwhile he reached a conclusion that the routine use of an indwelling urinary catheter in cesarean section patients with a stable hemodynamic condition is not necessary (6).

Moreover, our study showed that the catheterized group had much higher numbers of UTI among its females, 36 female; 30 with mild UTI and 6 with severe UTI compared to only 15 females of the uncatheterized group who showed UTI; 12 with mild UTI and 3 with severe UTI ending at a statistically significant difference between both groups ( $p$  value= 0.001\*).

Further, females who were subjected to catheterization were more likely to show urinary retention, almost two and half times more ( $p$  value = 0.039\*). Our findings regarding retention and UTI were very similar to previous studies emerging from different hospitals, as these studies showed much higher rates of urinary retention and UTI amongst those who were subjected to catheterization with odds ratios hitting 5 for urinary retention and 3.5 for UTI (7-17).

## Conclusion

Non-placement of catheter during cesarean was more convenient to women. So, urinary catheter placement in hemodynamically stable patients proved not to be beneficial in our study.

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