

## Comparative Analysis of the Duration of Urethral Catheterization for Ceasarean Delivery

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**Keywords**—Acute Urinary Retention, Caesarean Section, Bladder Management and Urinary Tract Infection and Urethral Catheterization

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### I. Introduction

Urethral catheterization is commonly performed prior to Caesarean section for continuous bladder drainage. This practice has been considered as a cause of urinary tract infection in these women, especially if prolonged. The optimal time to remove the urethral catheter after caesarean section is still controversial, as varying time of removal has been reported in the literature. This study therefore is to determine the incidence of complications of urethral catheterization with time of removal of the catheter. Caesarean section is one of the commonly performed surgical procedures in obstetrics [1-5]. Its rate varies widely, across the globe, ranging from 0.4 to 41.9% [6]. In this environment, caesarean section rates of 22.2% - 26.2% have been reported [7-9]. The rationale for catheterization is to prevent bladder injury, decompress the bladder to improve visualization of the lower uterine segment and make surgery less difficult and reduce post-operative urinary retention [10,11]. Post-operatively, it avoids the need for the women to get out of bed to urinate or use a bedpan while she is still recovering from anaesthesia and pain at the site of operation. Little is known about the effect of this long-standing empirical practice with no scientific evidence of duration of the urinary catheter or benefits. Indwelling catheters are, however, associated with urinary tract infection, maternal discomfort, delayed ambulation and higher cost [1,4,12-15]. Furthermore, some other studies have shown a significant reduction in the incidence of urinary tract infection post caesarean section in women who were not catheterized [15,16]. However, the literature is replete with information on the timing of removal of urethral catheter post caesarean section, and whether it has a significant effect on the risk of occurrence of urinary tract infection. A study has shown that immediate post-operative removal of urethral catheter after elective caesarean section was associated with a lower risk of urinary infection [2]. In our department, a 24-hour time removal is often practiced. This is, however, empirical and not based on any study. The aim of this is to compare the effect of spontaneous voiding versus immediate removal, 6-hour and 24-hour removal of urethral catheter on the incidence of urinary tract infection. The outcome of this study will help direct the current practice in the department on the duration of urinary catheter after elective caesarean section. This is particularly important in our department where there is a high incidence of 17.7% of caesarean deliveries complicated by urinary tract infection (department of Obstetrics and gynaecology, University of Port Harcourt Teaching hospital. Unpublished annual report 2012)

### II. patient and methodology

#### 2.1 PATIENTS

This is a study of 160 booked patients undergoing an elective caesarean section at the University of Port Harcourt Teaching Hospital between January 1<sup>st</sup> and December 31<sup>st</sup>, 2014. The obstetric unit records an average of 150 deliveries per month. Caesarean delivery accounts for 50% of all deliveries (including the booked and unbooked patients) and elective caesarean section make up 20% of all caesarean deliveries per month. This gives an average of 180 cases within the study period. All the participants for this study were fully counseled about the study and reserved the right to withdraw for any reason.

All participants who met the inclusion criteria were divided into three study groups and control. Controls were patients who voided spontaneously prior to surgery and were not catheterized. The study population comprised of those that were catheterized preoperatively with size 16F Foley urethral catheter under sterile condition on the operating table and the catheters removed at various periods post operatively. Hence, the patients were divided into 4 groups as follow:

Group A – This includes patients who voided spontaneously without catheterization.

Group B – Patients who had their indwelling urethral catheter removed immediately after surgery.

Group C – Patients who had their indwelling urethral catheter removed 6 hours after surgery.

Group D – Patients who had their indwelling urethral catheter removed 24 hours after surgery.

All patients had their mid-stream sample of urine collected a week prior to admission and sent to the microbiology laboratory for bacterial culture. Patients with pre-operative positive urine culture were excluded from the study and given antibiotic treatment according to sensitivity. Post operatively, mid-stream sample of urine were also collected from the study population 72 hours after surgery and sent for bacterial culture. Spinal anaesthesia was used for all the participants in the study.

## 2.2 OUTCOME MEASURES

The outcome measures include significant bacteriuria (defined as more than  $10^5$  bacteria of the same colony per ml of urine [18] in a sample of mid-stream urine collected 72 hours post operatively for bacterial culture); post-partum urinary retention (defined as the inability to void associated with a painful, usually palpable or percussible bladder and relieved by catheterization [19])

The demographic characteristics of the patients were recorded and the patients matched for age and parity. The data from the study were analyzed using SPSS version-19 Software. Test of significance using the students' T-test and  $X^2$  – test with the level of significance set at 0.05 was carried out.

## 2.3 EXCLUSION CRITERIA

The exclusion criteria for the study women with:

- Severe pre-eclampsia/eclampsia
- Diabetes mellitus in pregnancy
- Significant bacteria growth on pre-operative urine culture.
- Patients with immune suppressive disease.

## III. RESULT

A total of one hundred and sixty women were enrolled in the prospective study with 40 women randomized to each group of the study. There were no significant differences between the groups regarding demographic characteristics and indications for caesarean section as in Table 1. The incidence of urinary tract infection in this study was 26.9%. The incidence of urinary tract infection was higher among women who had their urethral catheter removed after 24 hours (13.8%) when compared with those who had their catheter removed after 6 hours (5.6%), immediately after surgery (3.1%) and those who voided spontaneously before surgery (4.4%) There were statistically significant differences between the groups in incidences of urinary tract infection ( $P=0.02$ ) see Table 2.

Escherichia Coli was the commonest organism (43.2%) isolated in the patients with positive urine culture results. Other organisms isolated were Klebsiella species (29.4%), Proteus (11.3%) and Staphylococcus species (16.1%) as in Fig 1. All patients with urinary tract infection were treated with antibiotics according to their culture and sensitivity pattern.

The overall incidence of acute urinary retention in this study was 13.8%. Of the 40 women who voided spontaneously before surgery, 15(68.2%) had a need for catheterization. This was statistically significant when compared with the 7(31.8%) requiring re-catheterization in the group that had immediate removal of urinary catheter after surgery ( $X^2=25.81$ ,  $P=0.00$ ) as seen Table 3. None of the women in the 6-hour and 24-hour catheter removal groups needed re-catheterization. Of the other 25 that voided spontaneously, 10(40%) used the toilet while 15 (60%) used a bedpan.

## IV. Figures and Tables

| TABLE 1: DEMOGRAPHIC CHARACTERISTIC OF THE WOMEN IN THE GROUPS |             |             |             |             |       |         |
|--|-------------|-------------|-------------|-------------|-------|---------|
| CHARACTERISTICS  | GROUP A     | GROUP B     | GROUP C     | GROUP D     | $X^2$ | P-VALUE |
| MATERNAL AGE (MEAN+SD)   | 28.75(3.96) | 29.01(3.67) | 28.98(3.19) | 29.68(3.38) | 0.475 | .679    |
| GESTATIONAL AGE (MEAN+SD)                                      | 37.88(0.52) | 37.97(0.58) | 38.18(0.81) | 38.10(0.47) | 1.662 | .167    |

| CULTURE RESULT | GROUP A   | GROUP B   | GROUP C   | GROUP D   | X <sup>2</sup> | P-VALUE |
|----------------|-----------|-----------|-----------|-----------|----------------|---------|
| NEGATIVE       | 33(20.6%) | 35(21.9%) | 31(19.4%) | 18(11.3%) |                |         |
| POSITIVE       | 7(4.4%)   | 5(3.1%)   | 9(5.6%)   | 22(13.8%) | 9.56           | .02     |

| NEED FOR RE-CATHETERIZATION | GROUP A  | GROUP B  | GROUP C | GROUP D | X <sup>2</sup> | P-VALUE |
|-----------------------------|----------|----------|---------|---------|----------------|---------|
| YES                         | 15(9.4%) | 7(4.4)   | NIL     | NIL     | 25.81          | .00     |
| NO                          | 25(15.6) | 33(20.6) | 40(25%) | 40(25)  |                |         |

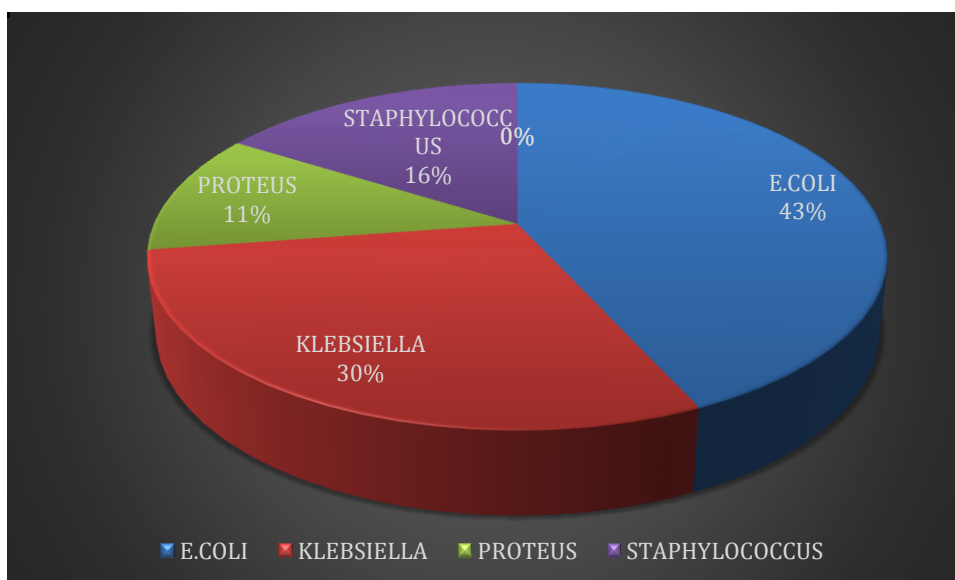


Fig 1: Prevalence of organisms isolated in patients with positive urine culture

### V. Discussion

Bladder care during and after surgery poses serious concern for the patient as well as the surgeon who makes conscious effort to avert any accident to the urinary apparatus. Reports abound of catastrophic surgical outcomes while operating on a field view intermittently disrupted by filling bladder. The empirical of urinary catheterization prior to caesarean section is a routine procedure in many countries as it is widely believed that its placement can improve exposure of the lower uterine segment at the time of surgery, reduce the possibility of injury to the urinary system during surgery and avoid post-operative urinary retention [20,21]. Several studies have investigated the effects of removing the catheter at various times and compared with an indwelling catheterization [2,10,11]. The results suggest that immediate post-operative removal of the urethral catheter is associated with a lower risk of urinary tract infection compared with indwelling catheter. This is consistent with the findings of this study. However, the resolve to retain or remove the catheter has occupied a crucial discuss in contemporary obstetric practice.

The overall incidence of urinary tract infection following caesarean delivery in this study was 26.9%. It was higher in women who had their urethral catheter removed after 24 hours. This could be as a result of increased formation of bio films [22,23,24] around the indwelling urethral catheter following prolonged placement as reported in these studies.

The present study demonstrated that Escherichia Coli was the commonest organism isolated from positive urine cultures. This is in contrast to another study, which showed Klebsiella as the predominant organism following post caesarean section urinary tract infection [11]. The difference may be as a result of technique of urine collection or the difference in the population personal hygiene disposition. The proximity of the urethra to the vagina and rectum allows faecal flora (with Coliforms such as uropathogenic Escherichia Coli) to colonize the periurethral area of women [25]. This relationship increases the prevalence of Escherichia Coli causing urinary tract infection by forward wipe from the anus into the vaginal area after a bowel movement. This may have played a role in the high prevalence of Escherichia Coli in this study. It also accounted for 80% of urinary tract infection in pregnancy, according to another study<sup>26</sup>. The relatively short urethra of women in comparison with men facilitated movement of bacteria into the bladder and explains the 50-times greater urinary tract infection rate in women than in men<sup>25</sup>.

One major rational for catheterizing the urinary bladder is to avoid post-operative urinary retention. The overall incidence of non-obstructive acute urinary retention in this study was low. This finding is in agreement with other studies [4,15]. The low rate of post-operative urinary retention in this study is probably due to the result of adequate analgesia, early ambulation and possibly the avoidance of blunt dissection of the bladder during surgery preventing disturbance of the bladder innervations [15]. However, for women who voided spontaneously prior to surgery, without catheterization, significantly higher number (68.2%) had a need for catheterization after surgery. This is in keeping with one study that reported a high retention rate of 39.2% amongst women without catheterization prior to caesarean delivery[11]. The study concluded that continued post-operative drainage with an indwelling catheter was a method of preventing retention of urine, as seen in the 6- hour and 24 hours catheter removal groups in the study. Urinary output after caesarean delivery depends on the amount of fluid input during preloading, the haemodynamic state of the patient and the effect of spinal anaesthesia. Spinal anaesthesia per se is not considered to cause a significant increase in urinary retention [27]. However, this may account for the increase retention noticed in the spontaneous voiding and immediate removal groups in this study.

There are several limitations to this study. Different surgeons were involved in these surgeries and different analgesic medications administered post operatively. The study also did not have sufficient sample size and lacked the power to analyze the effects of avoidance of urinary catheterization on post-operative urinary retention, surgical complications and long-term safety. I recommend that larger randomized controlled trials be carried out before generalization of study conclusions becomes possible.

## VI. Conclusion

Given the rising incidence of caesarean section, the direct and indirect benefits of avoiding catheterization are likely to be substantial. Immediate removal of urethral catheter after caesarean delivery in haemodynamically stable patients has been shown from this study to lower the incidence of urinary tract infection. Spontaneous voiding, without catheterization, has been shown to increase the risk of acute urinary retention, which causes much discomfort and dissatisfaction to the women. Comparatively, 6-hour duration of catheter placement has been found to be significantly desirable in terms of incidence of urinary tract infections and acute urinary retention when compared with the routine 24 hours catheter placement practiced in most institutions. However, larger randomized controlled trials are required before generalization of study becomes possible.

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