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Original Article

Obstetrics and Gynaecology Section

Effect of Duration of Bladder Catheterisation on Post Caesarean Recovery: A Prospective Observational Study

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ABSTRACT

Introduction: The duration of bladder catheterisation plays a vital role in postoperative recovery after Caesarean Section (CS).

Aim: To determine the association of the duration of the indwelling catheter on post Caesarean recovery.

Materials and Methods: This was a prospective observational study conducted over six months in the Department of Obstetrics and Gynaecology of North DMC Medical College and Hindu Rao Hospital, a tertiary care hospital in Delhi, India. A total of 260 women undergoing CS were enrolled in the study and based on the duration of indwelling bladder catheterisation, they were divided into four groups: Group A, B, C and D, corresponding to postoperative catheter durations of ≤12 hours, 12-24 hours, 24-36 hours and >36 hours, respectively. The outcome measures analysed were time of first void, time to ambulate, time to pass wind, development of Urinary Tract Infection (UTI), duration of hospital stay and Surgical Site Infection (SSI). Continuous variables were presented as mean±standard deviation. Categorical variables were expressed as frequencies and percentages. Statistical tests like the Kruskal-Wallis test and Fisher's exact test were used to assess various relationships.

Results: The mean age of the study population was 26.07±3.53 years. Primigravida constituted 53.1% of the participants, whereas 46.9% of the women were multigravida. One hundred sixty-seven women (64.2%) underwent a primary CS, while 93 (35.8%) had a repeat CS. Group A had significantly shorter times for first voiding (p-value <0.001), ambulation (p-value <0.001) and passage of wind (p-value <0.001). There was no difference in the incidence of UTIs (p-value=0.888), duration of hospital stay (p-value=0.513), re-catheterisation (p-value=0.370) and SSI (p-value=0.379).

Conclusion: Bladder catheterisation of ≤12 hours is associated with early post Caesarean recovery in terms of time for the first void, time to ambulate and passage of wind.

Keywords: Caesarean section, Early ambulation, First void urine, Surgical site infection, Urinary tract infection

INTRODUCTION

The CS is one of the most frequently performed obstetric surgeries in women of reproductive age. The global burden of CS stands at approximately 21.1% and continues to rise [1]. Despite significantly reduced perinatal morbidity and mortality, maternal morbidity in patients undergoing caesarean delivery remains a concern. Therefore, understanding the factors influencing postoperative recovery is essential. One such critical factor in postoperative care is the use of an indwelling Foley catheter, which helps prevent intraoperative bladder injury and postoperative urinary retention [2].

Catheter-associated UTIs are a leading cause of hospital-acquired bacteraemia, accounting for approximately 40% of nosocomial infections [3]. Hence, it is vital that catheters are inserted using strict aseptic techniques and remain in place for the shortest time possible [2,4]. Moreover, numerous studies have found that CS done without catheterisation do not compromise the ease of surgery but instead reduce the risk of UTIs and improve ambulation [4,5]. Early catheter removal postsurgery has been shown to enhance patient satisfaction, aid in early ambulation, reduce the need for analgesia and minimise postoperative complications like urinary retention and bladder dysfunction [2,4]. However, many authors have reported no difference in the incidence of UTIs or the duration of hospital stay with varying durations of catheterisation following CS [6,7].

Early mobilisation of patients postsurgery offers additional benefits, including a reduced risk of thromboembolism and improved bowel function [8,9]. These practices lead to quicker patient discharge and alleviate the burden on hospitals, aligning with the Enhanced Recovery After Surgery (ERAS) protocol [10,11]. Additionally, this approach reduces the risk of nosocomial infections, such as UTIs and SSIs [12].

Despite these known associations, the optimal duration of catheterisation following a CS remains a topic of ongoing debate. This study aimed to examine the relationship between the duration of Foley catheterisation and postoperative recovery.

MATERIALS AND METHODS

This prospective observational study was conducted from March 2023 to September 2023 in the Department of Obstetrics and Gynaecology at North DMC Medical College and Hindu Rao Hospital, a tertiary care centre in Delhi, India. Ethical clearance was obtained from the institutional ethical committee prior to starting the study (IEC/NDMC/2023/197).

Inclusion criteria: Pregnant women scheduled for a CS under spinal anaesthesia who were willing to participate were included in the study.

Exclusion criteria: Women who received general anaesthesia, experienced postpartum haemorrhage, required intensive care admission, underwent classical CS, or required prolonged catheterisation for urinary output monitoring were excluded from the study.

Sample size: A sample size of 114 was calculated based on a reported incidence of UTI after CS of 8%, with 80% power and a significance level of 0.05. This incidence was established in our own hospital prior to undertaking the study. However, ultimately included all 260 women who underwent CS during the study period, provided they met the inclusion criteria.

Study Procedure

Obstetric details like parity, period of gestation, type of caesarean (elective or emergency), indication and whether it was a primary or repeat CS were recorded.

A standard protocol was followed for catheter insertion and management. A 16 French size Foley catheter was used to catheterise the urinary bladder under strict aseptic conditions after the administration of spinal anaesthesia. CS was performed using a standard operating technique. The total duration of surgery was recorded, beginning from the time of the first incision to the completion of skin closure.

The timing of catheter removal was based on the preference of the treating clinician. Depending on the duration the catheter was kept in situ, the patients were categorised into four groups: Group A with catheter duration of ≤12 hours, Group B with catheter duration of 12-<24 hours, Group C with catheter duration of 24-36 hours and Group D with catheter duration of >36 hours.

The outcome measures recorded were: 1) The time from the removal of the urinary catheter to the first void; 2) The time from surgery to the first ambulation; 3) The time from surgery to the passage of intestinal wind; 4) The presence of UTI (urine was sampled for culture sensitivity 24 hours after the caesarean to rule out infection); 5) The need for re-catheterisation; 6) Duration of hospital stay; 7) Any signs of SSI. The recovery of the participants was monitored until discharge from the hospital.

STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS Statistics for Windows version 21 software. Continuous variables were presented as mean±standard deviation, while categorical variables were expressed as percentages. Statistical analysis was conducted using the Kruskal-Wallis test and Fisher's exact test as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 260 women were enrolled in the study. The mean age of the study population was 26.07±3.53 years. There was no difference in ages across the different catheter duration groups (p-value=0.534). Most of the women had term pregnancies, with 88.1% having a period of gestation between 37 and 40+6 weeks. One hundred sixty-seven women (64.2%) were undergoing a primary CS and 93 (35.8%) women had repeat CS [Table/Fig-1].

Characteristic	
Age (mean±SD) (years)	26.07±3.53
Surgery duration (mean±SD) (hours)	0.87±0.22
Age group (years)	**n (%)**
18-25	124 (47.7)
26-30	111 (42.7)
31-35	23 (8.8)
>35	2 (0.8)
Parity	
Primigravida	138 (53.1)
Multigravida	122 (46.9)
Period of Gestation (POG) (weeks)	
<34	3 (1.2)
34 to 36+6	16 (6.2)
37 to 40+6	229 (88.1)
≥41	12 (4.6)
Lower Segment Caesarean Section (LSCS)	
First	167 (64.2)
Repeat	93 (35.8)

[Table/Fig-1]: Demographic data.

[Table/Fig-2] enumerates the various indications for CS, with the leading indications being foetal compromise (42.3%) and previous CS (31.9%).

Indication	N (%)
Foetal compromise (foetal distress/meconium-stained liquor/non reassuring non stress test)	110 (42.3%)
Previous caesarean	83 (31.9%)
Unfavourable labour factors (poor bishop score/short stature)	35 (13.5%)
Labour abnormality (2nd stage arrest/deep transverse arrest/non progress of labour/failed induction)	28 (10.8%)
Abnormal presentation (breech/transverse lie/brow)	27 (10.4%)
Amniotic/placental abnormality (anhydramnios/oligohydramnios/ antepartum haemorrhage)	9 (3.5%)
Contracted pelvis/cephalopelvic disproportion	6 (2.3%)
Obstetric emergency (cord prolapse/scar tenderness)	2 (0.8%)

[Table/Fig-2]: Indication for Caesarean Section (CS).

A strong positive association was found between catheter duration and delays in recovery milestones, with Group A demonstrating a significantly shorter time to first voiding (p-value <0.001), ambulation (p-value <0.001) and passage of wind (p-value <0.001). There was no statistically significant association between longer catheter duration and SSI (p-value=0.379), the need for re-catheterisation (p-value=0.370), or increased UTI (p-value=0.888) [Table/Fig-3].

Parameters (N)	Catheter duration				p-value*
	≤12 hours (20)	12-24 hours (160)	24-36 hours (53)	>36 hours (27)	
Age (years)	25.70±3.77	26.23±3.35	25.74±4.09	26.04±3.36	0.534
Parity=n (%)					
Primigravida	14 (70.0)	84 (52.5)	30 (56.6)	10 (37.0)	0.146
Multigravida	6 (30.0)	76 (47.5)	23 (43.4)	17 (63.0)	
LSCS=N (%)					
First	16 (80.0)	105 (65.6)	33 (62.3)	13 (48.1)	0.143
Repeat	4 (20.0)	55 (34.4)	20 (37.7)	14 (51.9)	
Surgery duration (Mean hours)	0.77±0.22	0.88±0.22	0.88±0.21	0.91±0.24	0.201
First void (Mean hours)	12.53±2.33	20.78±5.26	31.69±3.95	41.41±6.69	<0.001
Ambulation (Mean hours)	12.43±2.30	19.80±4.30	29.50±5.89	36.11±10.32	<0.001
Flatus passed (Mean hours)	11.75±9.81	17.31±9.54	20.45±9.31	18.87±8.46	<0.001
Hospital stay (Mean hours)	71.33±18.65	73.47±16.92	73.50±19.47	69.46±15.26	0.513
UTI=N (%)	0	7 (4.4%)	2 (3.8%)	0	0.888
Re-catheterisation N (%)	1 (5.0%)	1 (0.6%)	0	0	0.370
SSI=N (%)	1 (5.0%)	2 (1.2%)	1 (1.9%)	0	0.379

[Table/Fig-3]: Association between catheter duration and various parameters.
*Statistical tests; Kruskal Wallis test: Age, Surgery duration, First void, Ambulation; Flatus passed, Hospital stay; Fisher's exact test: UTI, Re-catheterisation, SSI

DISCUSSION

Urinary bladder catheterisation during a CS is a globally accepted practice to prevent inadvertent intraoperative bladder injury and it also offers the additional advantage of urinary output measurement [2]. The duration of urinary catheter use after surgery should be determined based on clear clinical indications. Inappropriate catheter usage not only hinders patient mobility but also increases the risk of UTI as well as increases patient discomfort [10,11], potentially leading to prolonged hospital stays and increased costs. The ERAS [12] guidelines for postoperative care in CS recommend the immediate removal of urinary catheters postsurgery, despite concerns regarding bladder dysfunction resulting from anaesthesia and opioids [13].

A systematic review and meta-analysis by Hou D et al., determined that the optimal timing for urinary catheter removal is 0-6 hours

after CS [14]. However, various studies show differing perspectives regarding catheter use from the patient's viewpoint. Safdar N et al., reported that 45% of participants found catheters convenient, while a study by Liebermann M et al., identified catheterisation as a major barrier to mobility [11,15].

In present study, a strong positive association was found between catheter duration and delays in recovery milestones like first voiding, ambulation and passage of wind (p-value <0.001). Vihervaara H et al., also found a significant association between catheter removal and patient mobilisation after CS [9]. They reported that the mean time to ambulate was 8.86±3.22 hours in patients with early catheter removal, compared to 12.59±7.00 hours in those with late catheter removal. Ghoreishi J, found that out of 135 women without an indwelling urinary catheter at the time of CS, only six (4.4%) required postoperative urinary catheterisation [2]. The time to first postoperative voiding was 8-11 hours in 54 (42.5%) of the cases. The ambulation time in the group without a catheter was 6.8 hours, versus 12.9 hours in the group with a catheter. A shorter hospital stay was associated with the group without a catheter and they concluded that the routine use of indwelling urinary catheters in haemodynamically stable CS patients is unnecessary. Similar findings were reported by Pandey D et al., and Nasr AM et al., in their respective studies, where they observed that forgoing the use of urinary catheters during CS significantly reduced the time required for postoperative ambulation [4,8]. This indicates that prolonged catheterisation postsurgery is associated with a longer time to ambulate after CS.

Early mobilisation also prevents thromboembolism, which is one of the leading causes of maternal mortality [16]. Furthermore, present study found a significant association between catheter removal and passage of flatus. This may be attributed to early ambulation, which promotes gut motility and prevents postoperative ileus [8,17].

In this study, only two patients required re-catheterisation; both cases involved patients with early catheter removal (one each from Groups A and B). This indicates that early catheter removal could be associated with an increased risk of postoperative urinary retention. While urinary catheterisation is a known risk factor for UTI, the relatively low incidence of UTI in this study (3.5%) and the lack of a significant association with catheter duration may reflect the appropriate aseptic technique employed during catheter placement. Most cases of UTI occurred in the Group B participants, possibly because this group represented the largest proportion of patients. Hou D et al., also found similar results in their meta-analysis [14]. They reported that catheter removal at 6.1-12 hours, 12.1-24 hours and at >24 hours after CS was more likely to result in UTI, with pooled Odds Ratios (OR) of 5.95 (95% CI 1.58-22.38), 11.26 (95% CI 2.99-42.44) and 27.25 (95% CI 6.82-108.90), respectively, compared with catheter removal at 0-6 hours.

A similar finding was reported in a systematic review by Menshawy A et al., who indicated that early removal of the catheter significantly reduced dysuria (RR=0.60, 95% CI (0.38, 0.95), p-value=0.03), urinary frequency (RR=0.32, 95% CI (0.16, 0.66), p-value=0.002) and significant bacteriuria (RR=0.49, 95% CI (0.30, 0.83), p-value=0.007) [6].

Studies comparing catheterised and non catheterised patients during CS have consistently shown a significantly lower incidence of UTI in the non catheterised group [4,5,8]. A prospective randomised controlled trial by Basbug A et al., concluded that there was no significant difference in bacteriuria and urinary retention between women with catheterisation for less than 12 hours versus those with indwelling catheters for more than 12 hours [7]. Similarly, studies by Onile TG et al., and by Kerr-Wilson RH and McNally S found no significant differences in urinary retention or postoperative UTI rates between women who had their catheters removed immediately versus those whose catheters were removed 24 hours after surgery [18,19]. Additionally, Abdel-Aleem H et al., concluded in their systematic review that urinary retention was not significantly influenced by the duration of catheterisation [10].

Menshawy A et al., reported that the overall risk ratio for the length of hospital stay favoured neither early nor delayed catheter removal (WMD=-9.18, 95% CI (-2.64, 0.57), p-value=0.26) [6]. Present study also found no statistically significant difference in hospital stay durations across all catheter duration groups (p-value=0.513). A strength of this present study was that it was conducted at a tertiary care centre.

Limitation(s)

The limitations of the present study are that it was a prospective observational study and did not include a non catheterised group for comparison. Secondly, the study was conducted at a single institution, which may limit the generalisability of the findings to other settings with different clinical practices or patient populations. Future research with a larger sample size should be conducted, taking these factors into consideration and should incorporate more comprehensive multicentric randomised controlled trials.

CONCLUSION(S)

While longer catheter durations are associated with delayed recovery metrics such as time to first voiding, ambulation and passage of wind, they do not significantly affect the incidence of UTI, SSIs, or the length of hospital stays following CS. This suggests that reducing catheter duration may help improve recovery outcomes, particularly in terms of early voiding and mobility.

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