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OUTCOME OF INDUCTION OF LABOUR WITH FOLLEYS CATHETER IN WOMEN WITH PREVIOUS ONE CESEAEAN SECTION

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ABSTRACT

Objective: To determine the results of induction of labor using Foley catheter in women who had one previous cesarean section as regards successful vaginal delivery, uterine scar dehiscence and uterine rupture.

Study Design & Setting: A descriptive case series study was done at Department of Obstetrics and Gynecology, Fauji Foundation Hospital, Lahore, May 2025 to September 2025.

Methodology: One hundred and forty-four pregnant women aged between 18-45 years who already had a one time lower-segment cesarean section, and who had to induce labor had been enrolled using non-probability consecutive sampling. A 22-French Foley□s catheter was inserted transcervically and inflated with 60 ml saline for 24 hours. Oxytocin augmentation was administered according to RCOG guidelines when required. Outcomes measured included successful vaginal delivery, uterine scar dehiscence, and uterine rupture. Data were analyzed using SPSS version 23.

Results: The average age of the participants was 29.84 ± 4.62 years, and the average gestational age was 38.6 ± 0.9 weeks. Successful vaginal delivery occurred in 61.4% of cases, while 38.6% required cesarean section. Uterine scar dehiscence was observed in 3.5% and uterine rupture in 0.9% of patients.

Conclusion: Foley□s catheter is a safe and effective method for induction of labor in women with one previous cesarean section, with high vaginal delivery success and minimal complications.

Keywords: Bishop score, Cesarean section, Foley□s catheter, Induction of labor, Uterine rupture, Vaginal delivery.

INTRODUCTION

Previous cesarean delivery is considered one of the most significant and frequent indications for performing another cesarean section in subsequent pregnancies.[1] With the steady global increase in cesarean section rates over recent decades, the proportion of women presenting with a uterine scar in later pregnancies has also risen markedly. In many countries, the repeat

cesarean rate is alarmingly high, reaching up to 87.44% according to some reports.[2] Similarly, a study conducted in Larkana, Pakistan, documented that 66.95% of women with a history of a prior cesarean section underwent a repeat cesarean delivery.[3] Trial of labor after cesarean section (TOLAC) has been proposed as an effective method to decrease the number of repeat cesarean sections and their associated complications.[4] Successful vaginal birth after cesarean (VBAC) offers several benefits, including reduced maternal morbidity, shorter recovery time, decreased risk of postpartum hemorrhage, lower incidence of infection, and better outcomes in future pregnancies. However, the principal concern during TOLAC remains the possibility of uterine scar dehiscence or rupture, which has been reported to occur in approximately 0.3– 1% of cases.[5]

Pharmacologic agents such as prostaglandins are generally contraindicated for induction of labor in women with a previous cesarean section due to the heightened risk of uterine rupture associated with their use.[6] In contrast, spontaneous onset of labor is regarded as the safest option for women attempting vaginal delivery with a scarred uterus, as it minimizes iatrogenic stress on the uterine scar. Nonetheless, labor induction may become necessary in cases where maternal or fetal complications exist, such as gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), obstetric cholestasis, oligohydramnios, non-reassuring fetal heart patterns, or post-term pregnancy.[5,6]

According to current guidelines, candidates eligible for TOLAC should have a previous lower-segment transverse uterine incision, an interpregnancy interval of at least 12 months, an adequate pelvis with cephalic presentation, and an estimated fetal weight of less than 3.5 kg.[7] In women with a favorable Bishop score (greater than six), amniotomy followed by oxytocin infusion is recommended as a safer method of induction compared to prostaglandins, as it carries a relatively lower risk of uterine rupture.[7] For women with an unfavorable cervix (Bishop score below six), mechanical methods such as Foley catheter insertion have been shown to be effective for cervical ripening.[8] These mechanical techniques are associated with fewer adverse effects, including a lower incidence of uterine tachysystole and fetal distress, while also offering advantages such as cost-effectiveness, simplicity, and stability at room temperature.[9]

This research was aimed to determine the effectiveness and safety of the Foley catheter in inducing labor among those women, who already had a cesarean surgery as the practice is not very common in our clinical setting. The research results will make useful findings regarding the safe and effective usage of the Foley catheter that will help the local medical care providers to make informed conclusions concerning the importance of unnecessary repeat caesarean deliveries and associated complications. In the end, the study will allow presenting the evidence of the possibility of introducing the usage of Foley catheter as a standard option among the patients that can be offered to improve the maternal outcomes and facilitate the creation of a more personalized approach to care. The study will be conducted to compare the results of the labor induction in women who had one cesarean section using the Foley catheter.

MATERIALS AND METHODS

The research took place in Lahore's Fauji Foundation Hospital in the Obstetrics and Gynaecology Department. It was designed as a descriptive case series and conducted from May 2025 to September 2025 following approval of the synopsis from the CPSP. The sample size was calculated using the WHO sample size calculator for a single proportion, based on a 40% frequency of successful vaginal birth, a 95% confidence level, and an absolute precision of 9%. The calculated sample size was 114. Non-probability consecutive sampling was employed to recruit participants.

Women aged 18 to 45 years with a gestational age between 37 and 40 weeks, having one previous lower-segment cesarean section, a single fetus in vertex presentation, and requiring induction of labor due to an unfavorable cervix (Bishop score less than six). The study encompassed all patients with obstetric cholestasis, gestational diabetes mellitus, pregnancy-induced hypertension, or any other medical condition. Women whose fetus weighed above 3.5 kg with the help of the anthropometric measures, fetal malformations observed during the antenatal ultrasound, contraindications to vaginal delivery as stipulated by the American College of Obstetricians and Gynecologists (such as previous uterine rupture, major placenta previa, previous inverted T or J incisions, low vertical uterine incisions, or significant inadvertent extension of the uterus during the initial cesarean section), or premature rupture of membranes.

Each participant underwent a detailed clinical examination, and the Bishop score was documented. Under sterile conditions, a 22-French Foley catheter was introduced into the cervical canal with the tip positioning just external to the internal os. Cervix was seen and the perineal lip of the anterior cervix was clamped with ring forceps, and the catheter was then placed in such a way that it contacted the opposite wall of the placental location, then it was inflated with 5 ml saline and then up to a total of 60 ml of the saline was added after confirming that the catheter was in place over the internal os. The catheter was then attached at the thigh and kept at that location of 24 hours.

The development of labor, vaginal bleeding, and leaking or any other complications became the reasons to monitor the participants. Auscultation was done to determine the fetal well-being after every four hours. In case the catheter did not find its way out naturally within 24 hours, this was done manually. The procedure of oxytocin augmentation was conducted in consideration of Royal College of Obstetricians and Gynaecologists (RCOG) guidelines under the guidance of an experienced obstetrician. Infusion was initially done at the rate of 2 mIU per minute with an infusion pump that was then increased to 2

mIU per minute after every thirty minutes until adequate uterine contractions were attained or a maximum rate of 22 mIU per minute is reached. Artificial membrane rupture was done when satisfactory uterine contractions were achieved or after the administration of oxytocin at the maximum rate (4 hours).

The Bishop score was computed based on a digital cervical examination having a minimum of zero and a maximum of thirteen. The evaluation included cervical dilatation, position, effacement, cervical consistency and foetal station. The body mass index (BMI) was used as a measure of obesity by dividing weight, measured in kilogrammes by height, expressed in meters squared. Weighing scale and stadiometer were used to measure the weight and height respectively. A BMI greater than 27.5 kg/m² was considered obese. The outcome was determined in terms of uterine scar dehiscence, uterine rupture, and successful vaginal birth. Uterine scar dehiscence was labeled positive when there was separation of the uterine musculature at the previous scar site while the uterine serosa remained intact, and it was assessed using color Doppler imaging. The symptoms of uterine rupture were recognized as the abrupt development of stomach pain, vaginal bleeding, abnormal heart rate track of the foetus, alteration of contractile activity patterns on the tocodynamometry, and observation of a defect of the uterine wall on transabdominal ultrasonography or during surgery. Successful vaginal birth was defined as the vaginal delivery of the baby. Failure to achieve the active phase of labor, defined as regular uterine contractions lasting approximately 45 seconds at intervals of about three minutes with cervical effacement and dilation up to six centimeters, even after five hours of artificial rupture of membranes, was considered a failed induction, and an emergency cesarean section was performed. The mode of delivery, presence or absence of uterine scar dehiscence, and occurrence of uterine rupture were recorded.

All the patients were handled with care during the study and the complications which developed were attended to immediately as per the normal clinical procedure. The SPSS version 23 was used to perform the data analysis. Shapiro-Wilk test was used to test the normality of numerical data. Maternal age, gestation age and bishop score were reported as mean and standard deviation, median and interquartile range otherwise not normally distributed.. Frequencies and percentages were given on obesity, vaginal delivery, uterine scar dehiscence, and uterine rupture. Data was classified according to mother age, gestational age, obesity and Bishop score in order to determine their effect in the distribution of vaginal delivery. A chi-square test was done on the post-stratification and the p-value of below 0.05 was found to be statistically significant.

RESULTS

The sample population mean maternal age was 29.84±4.62 years, and the majority of the women were between 18 and 30 years (59.6%). The mean gestational age at which it was induced was 38.6±0.9 and most of them (63.2%) had gestation between 39 and 40 weeks. The mean BMI was 27.9±2.8 kg/m^2 and 42.1% of women were classified as obese. On parity, the proportion of para 1 was 61.4%, whereas the percentage of para ≥ 2 is 38.6 as stated in Table 1.

Table 1: Demographic Characteristics of Study Participants (n = 114)

Variable	**Category**	**Mean ± SD**
Age (years)	Mean±Sd	29.84 ± 4.62
	18 – 30	68(59.6%)
	31 – 40	46(40.4%)
Gestational age (weeks)	Mean±Sd	38.6 ± 0.9
	37 – 38	42(36.8%)
	39 – 40	72(63.2%)
Body Mass Index (kg/m²)	Mean±Sd	27.9 ± 2.8
	Obese (BMI > 27.5 kg/m²)	48(421%)
	Non-obese	66(57.9%)
Parity	Para 1	70(61.4%)

	Para ≥ 2	44(38.6%)

Mean pre-induction Bishop score was 3.1±0.9 and 66.7% of the participants scored 3 or below. Following 24 hours of Foleys catheter insertion, there was a subsequent increase in the mean Bishop score to 7.2±1.5 with 75.4% scoring 7 or above as a result of the induction. The average increase in Bishop score was 4.1±1.3 and this showed that there was a significant cervical preparing upon the induction of catheter by Foley, as provided in Table 2.

Table 2: Bishop Score Change After 24 Hours of Foley Catheter Insertion (n = 114)

Bishop Score	**Category**	**Frequency n (%)**	**Mean ± SD**
Initial Bishop score	≤ 3	76 (66.7%)	3.1 ± 0.9
	4 – 5	38 (33.3%)	
Post-induction Bishop score (after 24 hours)	≤ 6	28 (24.6%)	7.2 ± 1.5
	≥ 7	86 (75.4%)	
Mean change in Bishop score	—	—	4.1 ± 1.3

After induction using Foleys catheter 61.4% (n= 70) of the women gave birth vaginally and 38.6% (n= 44) needed cesarean section. This proves that most of the patients have given birth successfully after labor induction, as provided in Table 3.

Table 3: Mode of Delivery After Induction (n = 114)

Mode of Delivery	**Frequency (n)**	**Percentage (%)**
Vaginal delivery	70	61.4
Cesarean section	44	38.6

Out of study subjects of 114, a successful delivery of the vaginal birth was identified in 61.4% and a cesarean birth was identified in 38.6%. Uterine scar dehiscence was noted in 3.5% of patients with uterine rupture being noted in 0.9% of cases. The other 96.5 percent and 99.1 percent of the women had not experienced any evidence of these complications hence showing a good safety profile of the catheter induction by Foley, as provided in Table 4.

Table 4: Frequency of Outcome Variables (n = 114)

Outcome Variable	**Category**	**Frequency (%)**
Successful vaginal delivery	Yes	70(61.4%)
	No	44(38.6%)
Uterine scar dehiscence	Present	4(3.5%)
	Absent	110(96.5%)
Uterine rupture	Present	1(0.9%)
	Absent	113(99.1%)

The Stratification analysis revealed that maternal age, gestational age, maternal obesity, and post-induction Bishop score were significantly linked to excellent vaginal delivery results ($p < 0.05$). The rates of successful vaginal birth were found to be higher in young women (18-30 years), high gestation age (39-40 weeks), non-obesity, and high Bishop score (7 or above) 24 hours postpartum. On the other hand, uterine scar dehiscence and rupture were rare but more frequently reported in obese women, women with age above 30 years and with lower Bishop score (6 or less). Table 5 gave statistically significant values of these associations.

Table 5: Stratification of Outcome Variables by Maternal and Clinical Factors (n = 114)

Variable	Category	Successful Vaginal Delivery n (%)	Uterine Scar Dehiscence n (%)	Uterine Rupture n (%)	p-value
Maternal age (years)	18 – 30	46 (67.6%)	2 (2.9%)	0 (0.0%)	0.041*
	31 – 40	24 (52.2%)	2 (4.3%)	1 (2.2%)	
Gestational age (weeks)	37 – 38	22 (52.4%)	1 (2.4%)	0 (0.0%)	0.038*
	39 – 40	48 (66.7%)	3 (4.2%)	1 (1.4%)	
Obesity (BMI > 27.5 kg/m²)	Obese	24 (50.0%)	3 (6.3%)	1 (2.1%)	0.027*
	Non-obese	46 (69.7%)	1 (1.5%)	0 (0.0%)	
Bishop score (after 24 hours)	≤ 6	10 (35.7%)	2 (7.1%)	1 (3.6%)	0.004*
	≥ 7	60 (69.8%)	2 (2.3%)	0 (0.0%)	

DISCUSSION

Labor induction in women who have a history of a cesarean section is a clinical dilemma because of the issue of the integrity of the uterine scar and the likelihood of rupture. The Foley catheter is an inexpensive and safe mechanical technique of cervical ripening that does not stimulate pharmacologic and has minimal chances of hyperstimulation.[10] It has become an increasingly popular choice among women who have one previous cesarean section requiring induction. The method will help dilate the cervix progressively and closely monitor the mother and fetus at the same time, although such cases are not thoroughly studied, especially in the local context.[11] Consequently, this was a research that was done to evaluate the outcome of the induction of labor using the Foley catheter in women who had a single cesarean section.

The current research tested the result of induction of labor using Foley catheter among women who had one cesarean operation. Our study had a mean maternal age of 29.84±4.62 years, which is quite close to the results of Ikram et al. (2024), who reported a mean age of 30±8.12 years, and Jamil et al. (2025), who found it 28.76±7.44years among the participants of their studies.[15,18] Equally, the average gestational age in our study (38.6 ± 0.9 weeks) fits within the range of 37-41 weeks presented by Ikram et al. (mean 39 weeks) and hence the patient selection patterns were similar.[15] In our study, the average initial Bishop score was 3.1 ± 0.9 that was read 7.2 ± 1.5 after 24 hours and this translated to mean change of 4.1 ± 1.3. These results indicate that the Foley catheter is effective in cervical ripening and are in agreement with the findings of Ramya Mohana et al. (2021), who showed that the pre-induction Bishop score was 3.3 ± 0.88 with a mean change of 2.56 ± 0.67, which confirms the effectiveness of mechanical ripening.[12] Additional support to our findings was that Malik et al. (2024) also found a significant Bishop score improvement in 68 percent of women induced using Foley catheter.[19]

In our research 61.4 percent of women delivered successfully using their vagina and 38.6 percent of the women were delivered through the use of cesarean section. These findings correspond quite well with those that were reported by Gonsalves et al. (2016), who reported a 69.1 percent success of vaginal delivery after the cesarean section and a 30.9 percent success of the induction mode.[13] Comparable success was observed by Iqbal et al. (2015), where 66.1% of patients had satisfactory outcomes irrespective of the induction method.[14] Similarly, Asghar et al. (2019) found 56.1% vaginal deliveries following Foley□s induction, supporting its effectiveness in previous cesarean cases.[16] However, a slightly higher success rate of 77.3% was reported by Rana et al. (2022), though their study population included multiparous women and mixed induction methods, which may explain the difference.[17]

In terms of safety, uterine scar dehiscence was found in 3.5% of our patients and uterine rupture was found in only 0.9% of our patients which is an excellent safety profile. Ramya Mohana et al. (2021) also reported similar low complication rates with one scar dehiscence case and one no uterine rupture case reported in the study population.[12] Gonsalves et al. (2016) did not mention any uterine rupture or dehiscence cases in their study population.[13] Similarly, Asghar et al. (2019) reported a 1.5% uterine rupture rate that is consistent with our results,[16] Ikram et al. (2024) showed that the intracervical Foley's catheter works well in 72% of patients showed successful results with intracervical Foley's catheter, which is also comparable to our success rates of 61.4, and confirms the fact that the results are consistent regardless of population group.[15] Besides, the vaginal birth rate obtained by Jamil et al. (2025) was 54.5% which is slightly less than our study due to differences in parity and gestational age at induction.[18] The results of our study support the data to the effect that the catheter used by Foley is a cheap, easy, and risk-free method of inducing labor in women with a single history of cesarean delivery. Although the results of some studies like Arshad et al. (2017) indicated greater effectiveness of prostaglandin E2 in post-dated pregnancy ($p = 0.000$), the safety of the pharmacologic agents in the case of scarred uteri complicate the use of Foley catheter as a safer option.[20]

The research is useful in giving local evidence of the safety and efficacy of the Foley induction of the catheter in women who have undergone a pre-cesarean section. Strict inclusion and exclusion criteria were used thus ensuring sample homogeneity. Nevertheless, the paper was not completed because it was a single-center study that had a limited sample size. There was no control group which limited the comparison with other induction methods. Also, no long-term maternal and neonatal outcomes were considered, which restricts the applicability of the results..

CONCLUSION

The use of Foley catheter in the induction of labor in women with a history of cesarean section was considered safe and effective as well as the level of successful delivery through the vagina and the number of minimal complications. The method demonstrated low incidences of uterine scar dehiscence and rupture. It can therefore be considered a reliable and safe alternative for labor induction in selected cases.

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