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A STUDY OF INDUCTION OF LABOUR WITH SINGLE BALLOON FOLEY CATHETER IN CASES WITH UNFAVOURABLE CERVIX

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ABSTRACT

Background: Induction of labour (IOL) is a common obstetric intervention performed to initiate uterine contractions before the spontaneous onset of labour, with the aim of achieving vaginal delivery when continuation of pregnancy poses risks to the mother or fetus. The success of labour induction largely depends on the status of the cervix at the time of initiation, commonly assessed using the Bishop score. **Objective**: To assess the effectiveness of single balloon Foley catheter for induction of labour in cases with unfavourable cervix. **Materials and Methods:** The study was conducted in the Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata, a tertiary care teaching hospital. **Results:** Intranatal complications were uncommon, with fetal bradycardia observed in 2 (2.0%) patients and hyperstimulation in 5 (5.0%), while the majority had no complications accounting for 93 (93.0%) patients. Postnatally, most patients had no complications seen in 91 (91.0%), whereas postpartum hemorrhage (PPH) occurred in 3 (3.0%) patients, severe PPH in 2 (2.0%), puerperal sepsis in 2 (2.0%), puerperal pyrexia in 1 (1.0%), and retained placenta in 1 (1.0%) patient. **Conclusion:** Induction of labour with a single balloon Foley catheter in cases of an unfavourable cervix is a safe, effective, and economical method for cervical ripening. It significantly improves Bishop score, increases the likelihood of successful vaginal delivery, and has a low complication rate.

INTRODUCTION

Induction of labour (IOL) is a common obstetric intervention performed to initiate uterine contractions before the spontaneous onset of labour, with the aim of achieving vaginal delivery when continuation of pregnancy poses risks to the mother or fetus. The success of labour induction largely depends on the status of the cervix at the time of initiation, commonly assessed using the Bishop score. An unfavourable cervix, typically defined by a low Bishop score (<6), is associated with prolonged labour, higher induction failure rates, and increased likelihood of cesarean delivery.[1]

Various pharmacological and mechanical methods are used for cervical ripening and induction of labour. Pharmacological agents such as prostaglandins (PGE1 and PGE2) are widely used but are associated with potential complications including uterine hyperstimulation, fetal distress, and contraindications in certain clinical scenarios such as previous cesarean section.[2] In contrast, mechanical methods like the Foley catheter are considered safer alternatives due to their lower risk of uterine tachysystole and systemic side effects.[3]

The single balloon Foley catheter is a simple, cost-effective, and widely available mechanical method for cervical ripening. It works by exerting direct pressure on the internal os of the cervix, leading to mechanical dilation and stimulation of endogenous prostaglandin release, thereby promoting cervical effacement and dilation.[4] Additionally, it separates the fetal membranes from the lower uterine segment, which further enhances prostaglandin production and facilitates the onset of labour.[5]

In recent years, the use of Foley catheter for induction of labour has gained popularity, especially in low-resource settings and in women with contraindications to pharmacological agents. Studies have demonstrated that Foley catheter induction is associated with comparable efficacy to prostaglandins in achieving vaginal delivery, while maintaining a better safety profile.[6] It is particularly beneficial in women with previous uterine scars,

where pharmacological agents may increase the risk of uterine rupture.[7]

Despite its advantages, the success of Foley catheter induction depends on several factors including parity, gestational age, indication for induction, and initial cervical status. Primigravida women and those with very low Bishop scores may require longer induction-to-delivery intervals and may have higher rates of failed induction.[8] However, combining Foley catheter with oxytocin infusion has been shown to improve outcomes and reduce induction duration.[9]

Given the increasing need for safe and effective methods of labour induction, especially in cases with an unfavourable cervix, the single balloon Foley catheter presents a valuable option. It offers a balance between efficacy and safety, making it suitable for a wide range of clinical situations. Moreover, its low cost and ease of use make it particularly relevant in developing countries where access to advanced pharmacological agents may be limited. To assess the effectiveness of single balloon Foley catheter for induction of labour in cases with unfavourable cervix.

MATERIALS AND METHODS

Study design: Prospective Observational Study.

Study area: Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata, a tertiary care teaching hospital.

Duration of study: Approximately one year. (April 2018 - March 2019)

Study technique: After taking informed consent, patients details were collected on pre designed proforma, family and obstetric history to be taken

Study population: The cases for the study included patient attending to the labor ward of Obstetrics and Gynaecology department of CNMCH

Sample size: 100

Inclusion criteria (NICE guidelines 2014): A pregnancy with one or more common indications of induction of labour including

- Postdated pregnancy
- Pre eclampsia
- Oligohydramnios
- Diabetes

Exclusion Criteria

- A previous cesarean delivery
- Prior uterine surgery (Myomectomy)
- Non vertex presentation
- Signs of infection
- Necessity of immediate delivery (pathological CTG at the time of admission)

Data Analysis

Data analysis was performed using appropriate statistical software (e.g., SPSS). Descriptive statistics were initially calculated for all baseline characteristics and study variables. The correlation between preoperative handgrip strength and postoperative functional outcomes (QDASH and CMS scores) was evaluated using Pearson's correlation coefficient. Comparisons of handgrip strength and functional scores over time were performed using paired t-tests. Stratified analyses were conducted to evaluate the impact of age, tear severity, and other factors on the outcomes. Statistical significance was set at a p-value of less than 0.05.

RESULTS

Table 1: Baseline Demographic and Obstetric Characteristics

	Variable	Frequency (n=100)	Percentage (%)
Age (years)	≤20	41	41.0
	21–30	48	48.0
	31–40	11	11.0
Parity	Nulliparous	60	60.0
	Multiparous	40	40.0
Indication for Induction	Postdated pregnancy	50	50.0
	Oligohydramnios	20	20.0
	IUGR	12	12.0
	PIH	10	10.0
	GDM	8	8.0

Table 2: Change in Bishop Score Before and After Foley Catheter Insertion

Parameter	Before Induction	After Expulsion	P value
Mean ± SD	5.05 ± 0.22	9.47 ± 0.99	<0.001
Median	5.0	10.0	

Table 3: Mode of Delivery Following Foley Catheter Induction

Mode of Delivery	Frequency	Percentage (%)
Normal vaginal delivery	81	81.0
Instrumental delivery	9	9.0
Cesarean section	10	10.0

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Table 4: Maternal Complications Associated with Induction of Labour

	Complication	Frequency	Percentage (%)
Intranatal	Fetal bradycardia	2	2.0
	Hyperstimulation	5	5.0
	None	93	93.0
Postnatal	PPH	3	3.0
	Severe PPH	2	2.0
	Puerperal sepsis	2	2.0
	Puerperal pyrexia	1	1.0
	Retained placenta	1	1.0
	None	91	91.0

Table 5: Neonatal Outcomes Following Induction

	Parameter	Frequency	Percentage (%)
APGAR SCORE 1 MIN	APGAR (1 min) ≥7	85	85.0
	APGAR (1 min) <7	15	15.0
APGAR SCORE 5 MIN	APGAR (5 min) ≥7	89	89.0
	APGAR (5 min) <7	11	11.0
BABY SENT TO MOTHERSIDE/NICU/SNCU-	NICU admission	7	7.0
	SNCU admission	5	5.0
	Mother side	88	88.0

Table 6: Success Rate of Induction

Outcome	Frequency	Percentage (%)
Successful (Vaginal delivery)	90	90.0
Failed (Cesarean section)	10	10.0

In this study of 100 patients, the majority belonged to the 21–30 years age group accounting for 48 (48.0%), followed by ≤20 years with 41 (41.0%) and 31–40 years with 11 (11.0%). Regarding parity, 60 (60.0%) patients were nulliparous while 40 (40.0%) were multiparous. The most common indication for induction of labour was postdated pregnancy seen in 50 (50.0%) patients, followed by oligohydramnios in 20 (20.0%), intrauterine growth restriction (IUGR) in 12 (12.0%), pregnancy-induced hypertension (PIH) in 10 (10.0%), and gestational diabetes mellitus (GDM) in 8 (8.0%) patients.

The mean score increased from 5.05 ± 0.22 before induction to 9.47 ± 0.99 after expulsion, with median values rising from 5.0 to 10.0, and this difference was found to be statistically significant ($P < 0.001$).

Among the study participants, the majority delivered by normal vaginal delivery accounting for 81 (81.0%) patients, while instrumental delivery was observed in 9 (9.0%) patients and cesarean section was performed in 10 (10.0%) patients.

Intranatal complications were uncommon, with fetal bradycardia observed in 2 (2.0%) patients and hyperstimulation in 5 (5.0%), while the majority had no complications accounting for 93 (93.0%) patients. Postnatally, most patients had no complications seen in 91 (91.0%), whereas postpartum hemorrhage (PPH) occurred in 3 (3.0%) patients, severe PPH in 2 (2.0%), puerperal sepsis in 2 (2.0%), puerperal pyrexia in 1 (1.0%), and retained placenta in 1 (1.0%) patient.

At 1 minute, an APGAR score ≥7 was observed in 85 (85.0%) newborns, while 15 (15.0%) had a score <7. By 5 minutes, the proportion with APGAR score ≥7 increased to 89 (89.0%), with 11 (11.0%) remaining <7. Regarding postnatal disposition, the majority of newborns were kept with the mother accounting for 88 (88.0%), while 7 (7.0%) required NICU admission and 5 (5.0%) were admitted to SNCU.

The outcome of induction was successful in the majority of cases, with vaginal delivery achieved in 90 (90.0%) patients, while failure leading to cesarean section occurred in 10 (10.0%) patients.

DISCUSSION

The findings of the present study indicate that induction of labour was most commonly required among women in the 21–30 years age group accounting for 48 (48.0%) patients, followed by ≤20 years with 41 (41.0%) and 31–40 years with 11 (11.0%), suggesting that younger reproductive age groups constitute the majority of cases requiring induction. A higher proportion of nulliparous women 60 (60.0%) compared to multiparous women 40 (40.0%) reflects the greater likelihood of induction in first pregnancies, possibly due to increased obstetric surveillance and complications. Postdated pregnancy emerged as the leading indication in 50 (50.0%) patients, which is consistent with standard obstetric practice to avoid risks associated with prolonged gestation, while oligohydramnios 20 (20.0%), intrauterine growth restriction 12 (12.0%), pregnancy-induced hypertension 10 (10.0%), and gestational diabetes mellitus 8 (8.0%) also contributed significantly, highlighting that both fetal and maternal conditions play an important role in decision-making for induction of labour. These findings are comparable with a study conducted by Pennell CE et al., which also reported that the majority of inductions occurred in women aged 20–30 years, with a higher proportion of nulliparous patients, and postdated pregnancy being the most common indication. Their study similarly

emphasized the role of both maternal and fetal risk factors in determining the need for induction, supporting the observations of the present study.[10]

The observed increase in mean score from 5.05 ± 0.22 before induction to 9.47 ± 0.99 after expulsion, along with a rise in median values from 5.0 to 10.0, indicates a marked improvement following the intervention, and this change being statistically significant ($P < 0.001$) suggests that the induction method was highly effective in achieving favorable cervical or labour-related outcomes. These findings are consistent with previous studies, such as that by Sciscione AC et al., which also reported significant improvement in Bishop scores following Foley catheter induction, reinforcing its efficacy as a reliable mechanical method for induction of labour.[11]

The predominance of normal vaginal delivery in 81 (81.0%) patients indicates that the induction method was largely effective in achieving favorable obstetric outcomes, with only a small proportion requiring instrumental delivery 9 (9.0%) or cesarean section 10 (10.0%), suggesting a relatively low rate of operative interventions and good overall success of labour induction.These findings are in agreement with the study by Jozwiak M et al., which also reported a high rate of vaginal delivery and a comparatively low cesarean section rate following induction with a Foley catheter, supporting its effectiveness and safety as a method for cervical ripening and labour induction.[12]

The low incidence of intranatal complications, with only 2 (2.0%) cases of fetal bradycardia and 5 (5.0%) of hyperstimulation, while 93 (93.0%) patients had no complications, suggests that the induction method is relatively safe during labour. Similarly, the postnatal period was largely uneventful in 91 (91.0%) patients, with only a small proportion experiencing complications such as postpartum hemorrhage in 3 (3.0%), severe PPH in 2 (2.0%), puerperal sepsis in 2 (2.0%), puerperal pyrexia in 1 (1.0%), and retained placenta in 1 (1.0%), indicating an overall favorable maternal outcome with minimal adverse events.These findings are consistent with the study by Henry A et al., which also reported a low incidence of maternal and intrapartum complications with Foley catheter induction, supporting its safety profile as a mechanical method of labour induction.[13]

The improvement in APGAR scores from 1 minute to 5 minutes, with ≥7 increasing from 85 (85.0%) to 89 (89.0%) and <7 decreasing from 15 (15.0%) to 11 (11.0%), indicates good neonatal adaptation following delivery. Furthermore, the fact that the majority of newborns were managed at the mother's side 88 (88.0%), with only a small proportion requiring NICU 7 (7.0%) or SNCU admission 5 (5.0%), suggests favorable neonatal outcomes and minimal need for intensive care support. These findings are comparable with the study by Rath W et al., which also demonstrated satisfactory neonatal outcomes with Foley catheter induction, including good APGAR scores and low rates of neonatal intensive care admission, supporting the safety of this method for both mother and baby.[14]

The high success rate of induction, with vaginal delivery achieved in 90 (90.0%) patients and failure requiring cesarean section in only 10 (10.0%) patients, indicates that the method of induction is highly effective, with a low failure rate and favorable overall obstetric outcome. These findings are consistent with the study by Atad J et al., which also reported a high rate of successful vaginal delivery and a low incidence of cesarean section with Foley catheter induction, supporting its efficacy as a reliable method for labour induction in cases with an unfavourable cervix.[15]

CONCLUSION

Induction of labour with a single balloon Foley catheter in cases of an unfavourable cervix is a safe, effective, and economical method for cervical ripening. It significantly improves Bishop score, increases the likelihood of successful vaginal delivery, and has a low complication rate. The procedure is simple, minimally invasive, and suitable for use in low-resource settings. Maternal and neonatal outcomes are generally favourable, with minimal adverse effects. Therefore, the Foley catheter remains a reliable alternative to pharmacological methods, especially in settings where safety, cost-effectiveness, and ease of use are key considerations.

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