RESEARCH
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ASSESSING MATERNAL AND FETAL OUTCOMES IN LABOR INDUCTION: A COMPARATIVE STUDY BETWEEN FOLEY'S CATHETER AND CERVICAL RIPENING BALLOON IN WOMEN WITH A HISTORY OF PREVIOUS CESAREAN SECTION

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Abstract

Introduction: By comparing the maternal and foetal outcomes of labour induction using Foley's catheter and cervical ripening balloons for women who have previously had caesarean sections, this study fills a vacuum in the literature. The objective is to improve care standards for this expanding patient population and direct evidence-based healthcare practises.

Aim and Objective: The study focused on women who had previously undergone a lower segment caesarean section (LSCS). The particular goals were to compare and evaluate the effectiveness of Foley's catheter and the cervical ripening balloon, as well as to look at and compare the results for both induction techniques in terms of mother and foetus health.

Methods and Material: Contractions and biochemical alterations cause the ejection of conception products, which is a physiological aspect of labour. One of the labour mechanisms is the facilitation of foetal transit by cardinal movements. Amniotomy and membrane stripping are two surgical techniques that have advantages and disadvantages.

Result: The Cervical Ripening Balloon (CRB) and Foley's groups are thoroughly compared in the tables with respect to maternal age, gestational age, indications for prior C-sections, and delivery timings.

Conclusion: It emphasise safety and efficacy in the delicate balance of maternal and foetal well-being during labour induction, adding to the body of knowledge that helps doctors select the best induction techniques based on the unique profiles of their patients.

Keywords: Labour induction, Foley's catheter, Cervical ripening balloon, Previous caesarean section, Maternal outcomes, Foetal outcomes

I. INTRODUCTION

When the mother's or fetus's health is in jeopardy or the pregnancy is past its due date, the procedure known as labour induction is frequently used to start or accelerate labour. It is a crucial aspect of obstetric treatment [1]. The use of mechanical devices like Foley's catheter and cervical ripening balloons has become more popular among the various treatments available for inducing labour, especially for women who have already undergone caesarean sections. Under these conditions, the decision to induce labour requires careful consideration of the advantages and hazards to the foetus in addition to the mother's well-being. For medical professionals, women who [2] have previously had caesarean sections present a special problem. A previous caesarean delivery scarring the uterus may result in decreased contractility, which could affect the efficacy and security of labour induction. As such, choosing the best possible approach is essential to reducing risks and maximising results. To [3]encourage cervical ripening and induce labour, two well-established mechanical techniques are used: Foley's catheter and cervical ripening balloons, a more modern tool in the toolbox. Nevertheless, there is a dearth of comparative evaluation of these techniques in women who have previously had caesarean sections in the literature [4].

With a history [5] of prior caesarean sections, this study attempts to close this gap by performing a thorough comparative analysis of the maternal and foetal outcomes related with labour induction using Foley's catheter and cervical ripening balloons. In order to choose the best course of action for this particular

patient population, healthcare professionals must have a thorough understanding of the subtleties and variations in results between these two approaches. The potential for this study to provide insightful information that can guide evidence-based healthcare practises is what makes it significant [6]. Healthcare professionals can customise their approach to labour induction, minimising risks and optimising outcomes for mother and foetus, by clarifying the relative efficaciousness and safety profiles of Foley's catheter and cervical ripening balloons. The results [7] of this study may have an impact on clinical guidelines and enhance the standard of care given to this particular patient population, as the number of caesarean sections performed worldwide is still rising, particularly among women who have previously had a caesarean birth. This project aims to increase our understanding of labour induction techniques and obstetric care for women who have previously had a caesarean section by carefully examining the results for both mother and foetus.

II. AIM AND OBJECTIVE

Research Aim:

After a prior one lower segment caesarean section (LSCS), this study sought to compare and examine the results for both the mother and the foetus after labour induction utilising Foley's catheter and cervical ripening balloon.

The following particular Objective were the reason behind the study's inception:

- Analyse and contrast the superiority of cervical ripening balloon with Foley's catheter for inducing labour.
- Examine and contrast the maternal results following the use of Foley's catheter and the Cervical Ripening Balloon (CRB) for inducing labour.
- Analyse and contrast the foetal results following the use of Foley's catheter and the Cervical Ripening Balloon (CRB) for inducing labour.

III. METHODS AND MATERIAL

A. Labor:

The physiological process of labour involves the ejection of conception products from the uterus. It is triggered by regular contractions and biochemical changes that cause cervical dilatation and effacement. Clinical diagnosis is made by seeing consistent, painful contractions.

- Epidemiology: Research [8],[9] casts doubt on established theories of labour progression. Labour duration is influenced by maternal variables, including parity and age. There are racial/ethnic differences; some groups go through longer or shorter stages than others. An extended labour period and fewer interventions are associated with midwife-led care.
- Vaginal Birth: The anatomy of the bipedal human causes difficulties during childbirth. Three channels are impacted by the intricacy of the pelvic floor and the erect posture. The series of movements the baby's head and shoulders go through is essential for negotiating the pelvic ring in the mother during childbirth.

B. Mechanism of Labor:

During labour, the foetus must successfully negotiate its way through the mother's pelvis via a number of cardinal movements or mechanisms. In almost 95% of pregnancies, a vertex presentation takes place, and in this case, the movements are essential for the best possible passage of the foetal head [10]. Despite the fact that labour is an ongoing process, these seven distinct sequences are known as the cardinal movements:

1. Involvement

- The pelvis receives the presenting component with its widest diameter when the head is typically well-flexed.
- The presenting portion aligns with the mother's ischial spines at 0 station.

2. Ascent:

- The presenting component descends and passes through the pelvis sporadically while contracting.
- Highest rate during labor's second stage.

3. Extension

- Pelvic floor or bony pelvic resistance causes the foetal occiput to passively flex.
- To maximise passage through the pelvis, the chin makes touch with the foetal thorax.

4. Rotation Within:

- The head rotates to anteroposterior under the symphysis, descending at a 45° angle.
- Matches the pelvic outlet's diameter to the head's.

5. Finalisation:

- It is through complete bending and further descent that the occiput meets the pubic symphysis.

Occipital extension is brought about by uterine contractions and pelvic floor resistance, which aids in the delivery of the foetus.

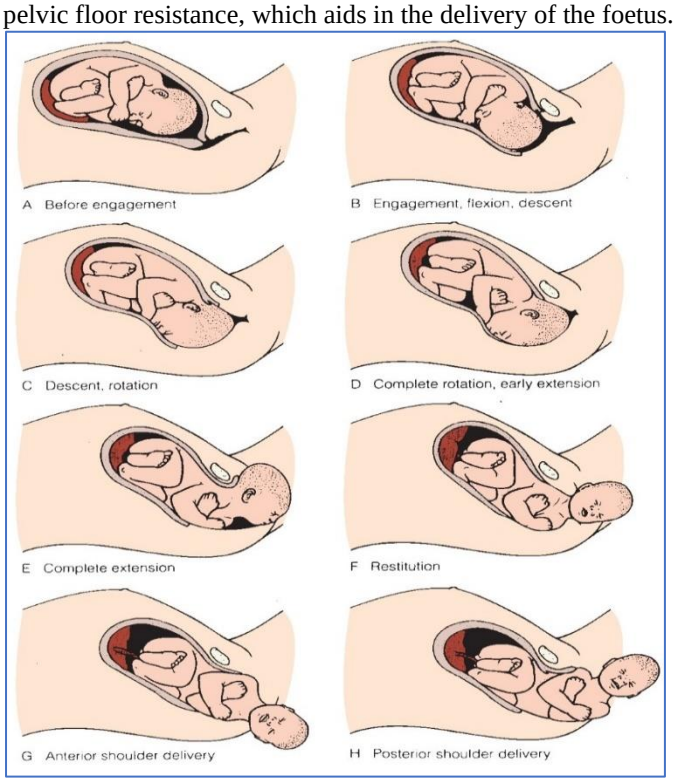

Figure 1: Different Mechanism of labor

6. External Rotation and Restitution:

- Following head delivery, it untwists by roughly 45° to revert to its initial alignment with the body.

7. Removing:

- The posterior shoulder and the remainder of the foetus descend farther to reach the pubic symphysis level after the anterior shoulder.

8. Moulding and Station:

- The term "station" describes how the ischial spines relate to the foetal presenting portion.
- Primiparous women are more likely to experience moulding, a transient alteration in the foetal head's form, during their first vaginal delivery.

9. Neck Ripening:

The cervix undergoes [11] chemical and physical alterations during cervical ripening in order to become ready for stretching during foetal passage. Cervical ripening is evaluated by the Bishop score, which helps with labour induction planning, postdate pregnancy management, and labour timing prediction. Comprehending these complex mechanisms offers significant perspectives for healthcare professionals regarding labour management, labour progression prediction, and safe and effective delivery.

C. Surgical Methods:

The surgical removal [12] of the membranes is one technique for inducing labour. Using this method, labour is induced by raising prostaglandin F2α (PGF2α) and phospholipase A2 activity. Prostaglandins are also released throughout the process when the cervix mechanically dilates. The inferior pole of the membranes is separated from the lower uterine segment by inserting a finger through the internal cervical OS and rotating it in a circular motion. Membrane stripping carries several risks, including as haemorrhage, infection, unintentional rupture, and discomfort for the patient. Cochrane [13] reviewers have reported that although membrane stripping does not appear to offer substantial clinically noteworthy benefits on its own, it is connected when used as an adjuvant with a reduced mean dose of oxytocin needed and an increased rate of normal vaginal births. Another surgical method for inducing labour is amniotomy. Amniotomy is thought to enhance the local synthesis or release of prostaglandins. Risks associated with the surgery include the possibility of foetal damage, bleeding from placenta previa or low-lying placenta, foetal heart rate (FHR) deceleration, maternal or newborn infection, and umbilical cord prolapse or compression. Amniotomy is performed by presenting part station and doing a pelvic examination to evaluate the cervix [14],[17]. Both before and after the surgery, the foetal heart rate is monitored. The cervix should receive a good application of the presenting portion. After removing the membranes covering the foetal head, the membranes are ruptured by hooking or scraping the through the cervical canal. The properties of the amniotic fluid are noted, including its clarity, presence of blood, thickness or thinness, and meconium content.

IV. RESULT

The tables that are provided allow for a thorough comparison between the Foley's Group and the Cervical Ripening Balloon (CRB) group by providing a detailed insight into many areas of the research. An overview of the distribution of mother age in the two research groups is given in Table 1. It is clear that both groups' distributions throughout various age groups are comparable. The bulk of moms in both groups 38.1% in the CRB group and 39.7% in the Foley's group are between the ages of 25 and 30. By ensuring a balanced representation of mother age, this uniform distribution reduces the possibility of confounding variables when comparing the results.

Table 1: Comparison of the mothers' ages in the two research groups

Age of mother	CRB group (n=63)		Foleys Group (n=63)	
	Cases	Percentage	Cases	Percentage
18-20 year	6	9.5%	7	11.1%
20-25 year	14	22.2%	15	23.8%
25-30 year	24	38.1%	25	39.7%
30-35 year	13	20.6%	11	17.5%
>35 year	6	9.5%	5	7.9%
Total	63	100.0%	63	100.0%

The gestational ages at the time of labour induction are shown in Table 2, where they are divided into three groups: less than 38 weeks, 38-42 weeks, and more than 42 weeks. With 84.1% in the CRB group and 88.9% in the Foley's group, the bulk of cases in both groups occur between 38 and 42 weeks. The two groups are more comparable as a result of this alignment in the gestational age distribution, which lessens the impact of gestational age variances on the results.

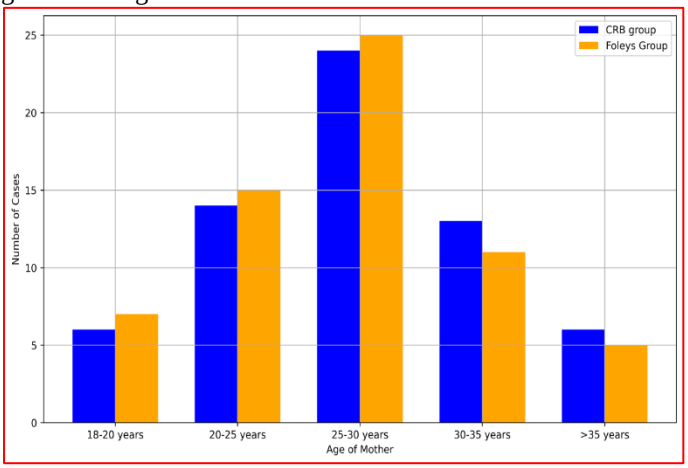

Figure 2: Comparison of Age Distribution in CRB and Foleys Groups

Table 2: Comparison of the two groups' gestational ages at the time of induction study teams

Gestation at labor induction (weeks)	CRB group (n=63)		Foleys Group (n=63)	
	Cases	Percentage	Cases	Percentage
<38 week	7	11.1%	4	6.3%
38-42 week	53	84.1%	56	88.9%
>42 week	3	4.8%	3	4.8%
Total	63	100.0%	63	100.0%

Table 3 explores the indications for previous C-sections, highlighting the causes of the previous surgical procedures in each category. Interestingly, there are no appreciable differences in the distribution of indicators between the CRB and Foley's groups. The comparison's validity is strengthened by this similarity in the indication distribution, which guarantees that the groups have traits in common that are connected to the prior caesarean procedures.

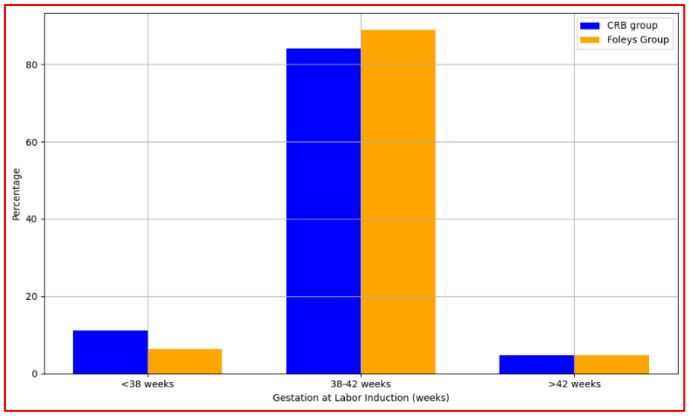

Figure 3: Comparison of Gestation at Labor Induction

Table 3: A comparison of the past caesarean section indications between the two study teams

Reference to a prior caesarean section	CRB group (n=63)		Foleys Group (n=63)	
	No of Cases	Percentage	No of Cases	Percentage
Failure of Induction	22	34.9	20	31.7
Malpresentation	18	28.6	19	30.2
Placenta praevia	5	7.9	6	9.5
Fetal distress	4	6.3	3	4.8
Cord round neck	2	3.2	4	6.3
Large for gestational age with GDM	5	7.9	4	6.3
Meconium-stained liquor	4	6.3	3	4.8
Large head circumference	1	1.6	0	0.0
Bad obstetric history	2	3.2	4	6.3
Total	63	100	63	100
Duration from last caesarean deliver (mean years)	3.5 ± 1.2		3.1 ± 1.4	

Finally, a thorough comparison of the vaginal delivery times for the CRB and Foley's groups is shown in Table 4. The Foley's group had a little shorter mean time from catheter insertion to delivery (18 hours) than the CRB group (19 hours), although this difference is not statistically significant (p=0.081). Similarly, there is no statistically significant difference (p=0.326) in the mean time from catheter withdrawal/expulsion to delivery in the CRB group (6.9 hours) and the Foley's group (7.2 hours). These results imply that both approaches are equally effective in terms of delivery times.

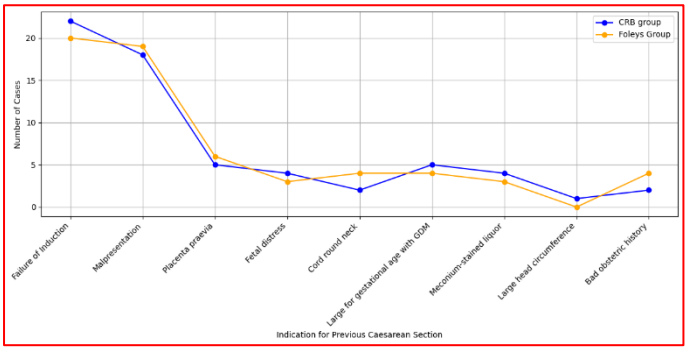

Figure 4: comparison of the past caesarean section indications between the two study teams

Table 4: Comparison of the vaginal delivery times for the two studies collectives

Vaginal Delivery	CRB group (n=45)		Foleys Group(n=34)		P Value
	Mean	SD	Mean	SD	
Catheter insertion to delivery time (h)	19	2.5	18	2.7	0.081
Catheter withdrawal/expulsion to delivery time (h)	6.9	1.3	7.2	1.5	0.326

The tables taken as a whole offer a comprehensive analysis of important factors, guaranteeing that the CRB and Foley's groups are well-matched with respect to maternal age, gestational age, indications for previous caesarean sections, and delivery timings.

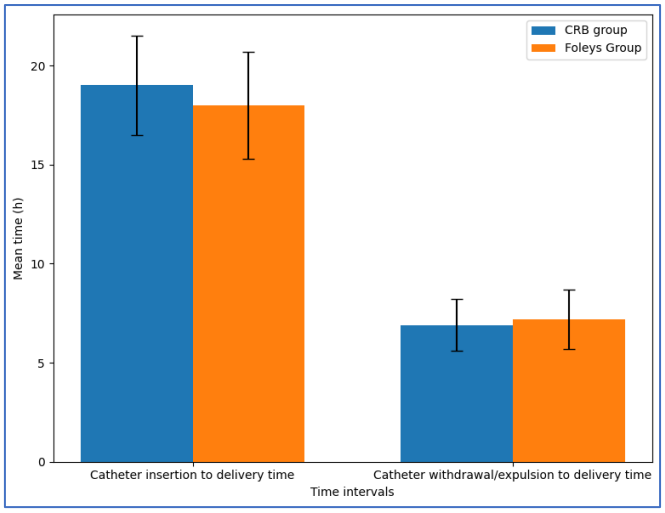

Figure 5: Vaginal Delivery Times Comparison

The study's internal validity is strengthened by the baseline features' comparability, which allows for a thorough comparison of the two induction methods' efficacy. The use of statistical analyses, such as chi-square and t-tests, adds to the research's methodological rigour. All things considered, the tables provide a strong framework for an insightful conversation about the findings and implications of the research.

V. CONCLUSION

The focus on maternal and foetal outcomes is crucial in guiding therapeutic decision-making in this comparative study evaluating labour induction techniques in women who have previously undergone a caesarean surgery. The use of the Cervical Ripening Balloon (CRB) and Foley's catheter provide different mechanical techniques, each with pros and downsides of its own. Maternal outcomes analysis provides complex insights. Although there was no significant difference in the mean time from catheter insertion to delivery between the Foley's catheter and CRB groups, the minor differences in delivery timings are remarkable. A possible efficiency advantage is suggested by the CRB group's shorter mean time from catheter withdrawal/expulsion to delivery. The fact that both length measurements lack statistical significance, however, suggests that both approaches are equally effective at facilitating vaginal births. To optimise labour management and resource utilisation, it is imperative to comprehend these temporal factors. With an emphasis on foetal outcomes, the study clarifies the safety profiles of CRB induction and Foley's catheter. The lack of statistically significant variations in delivery durations indicates that both approaches are well-tolerated, hence reducing the possibility of unfavourable foetal consequences. The study also emphasises the significance of gestational age distribution, which guarantees comparability between the two groups and increases the reliability of the foetal outcome evaluations.

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