Management Strategies for Primary Gravida at Term with a Poor Bishop Score

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ABSTRACT

Induction of labor in term primary gravidas with a poor Bishop Score remains a clinical challenge, requiring effective cervical ripening strategies to optimize maternal and fetal outcomes. A variety of mechanical and pharmacological methods were employed, each with distinct mechanisms, benefits, and limitations. To evaluate and compare the effectiveness, safety, and clinical outcomes of mechanical versus pharmacological cervical ripening methods, and to explore how a multidisciplinary, evidence-based approach can enhance labor management in nulliparous women with unfavorable cervices. A prospective cohort study was conducted at Abbasi Shaheed Hospital the key outcomes assessed include rate of vaginal delivery, uterine hyperstimulation, cesarean section rates, patient satisfaction, and cost-effectiveness. Pharmacological agents, especially misoprostol, demonstrate faster cervical ripening and shorter induction-to-delivery intervals but were associated with higher rates of uterine hyperstimulation. Mechanical methods, particularly the Foley catheter, offer a safer profile with fewer complications, especially in women with prior uterine surgery, though they may be slower in action. The overall cesarean rates were comparable between the two methods. A combination of both methods often yields improved results. Both mechanical and pharmacological methods were effective for cervical ripening in term nulliparous women with a poor Bishop Score. The selection should be individualized, taking into account maternal history, institutional protocols, and resource availability. A multidisciplinary approach guided by evidence-based protocols can significantly enhance the safety, efficiency, and satisfaction associated with labor induction.

INTRODUCTION

Primary gravida (PG) is defined as, a woman who conceived for the first time and they are a high-risk group. Since, it is the start of a new life for a woman, it is regarded as a crucial group who needs regular assistance in terms of Antenatal, natal and post-natal care, and this helps these patients during pregnancy, labor and puerperium. Primigravida is important regarding subsequent obstetrical performance. Unfortunately, much importance is not given to this aspect of women's health. Major factors behind this are lack of education especially health education, lack of provision of health services, lack of awareness, regarding importance of antenatal care, lack of proper referral system resulting in mismanagement of patients during antenatal and postnatal period. Moreover, people trust their local birth attendants. Due to lack of education they have got misconception regarding immunization, medical checkups and investigations which keep them away from due care during pregnancy and labor. In some cases religious and cultural factors in the community are responsible for improper antenatal care. (Danish, Fawad, & Abbasi, 2010) Successful prediction of labor induction outcomes in term primigravida's has significant implications for maternal and neonatal health. (Anwar, Mujahid, Usman, Bhatti, & Abideen, 2024)

The Bishop Score, named after its creator Dr. Edward Bishop, has served as a valuable clinical tool for decades. It assesses five key cervical parameters: effacement, cervical dilatation, station of the presenting part, cervical consistency, and cervical position. Each parameter is assigned a numerical score, and the cumulative score helps predict the likelihood of a successful vaginal delivery. A high Bishop Score suggests a well-prepared cervix, while a low score indicates an unfavorable cervical status.

While the Bishop Score is a valuable tool for experienced gravidas, its utility becomes especially

critical when applied to primary gravidas at term (i.e., those who have reached or surpassed 37weeks of gestation) who exhibit a poor Bishop Score, typically defined as a score of 4 or less. Previously many studies have done for poor bishop score which shows 51% successful result and failure rate for normal vaginal delivery is 49% but by this presentation successful rates for normal vaginal delivery increases more

The collaborative effort of a multidisciplinary team was instrumental in crafting and executing inventive interventions, including tailored labor induction protocols, sophisticated monitoring methods, and nurturing care approaches. Key benchmarks for evaluation was comprise metrics related to labor progression, delivery methods, infant health, maternal contentment, and healthcare resource utilization. Embracing a multidisciplinary perspective and employing groundbreaking methodologies, this study seeks to notably enhance obstetric results for primary gravida women at term with suboptimal Bishop scores. The insights gleaned served as a foundation for evidence-driven protocols, equipping healthcare providers to administer personalized, efficacious, and empathetic support to this vulnerable demographic. (Bernardes et al., 2016; Brocato et al., 2019)

Appropriate selection of cases was crucial prior to induction, for which it was necessary to confirm the gestational age, pelvic adequacy, cervical status, foetal lung maturity, foetal presentation, and lie. Out of those, cervical status was one of the most important factors in predicting the likelihood of successful induction of labor. Appropriate case selection at the right time can prevent a variety of dangerous complications, including foetal distress, meconium-stained liquor to the fetus, and repetitive convulsions, as in the case of eclampsia, and disseminated intravascular coagulation (DIC) to the mother. The cervical favorability before induction was assessed by many scoring systems like the Field system, Pelvic scoring system by Lange, but the Modified Bishop's scoring System is most commonly used. The scoring system assesses the position, consistency, length, dilatation of the maternal cervix, as well as the station of the fetal presenting part.

Elective termination of pregnancy by induction of labor is a deliberate intervention in pregnancy. It is intended to be beneficial but may harm both the mother and the child. Therefore, it is of paramount interest to balance the benefits and risks of each indication. At present, various effective drugs are available when induction of labor is required. In the literature all methods to hasten cervical ripening and onset of labor were classified as "induction of labor". This concept originates from the observation that a substantial proportion of cervical ripening procedures with prostaglandins ended with initiating of the process of labor. Depending on the biological ripeness of the uterus

and cervix, oxytocin or prostaglandins are the most frequently used drugs in secondary care obstetrics in the western world. Clinical surveillance was required in general both as a consequence of the indications for labor induction and because of potential side effects of the medication. Induction of labor in primary care obstetrics was attempted in order to prevent labor induction in a secondary care setting. Indications for induction of labor in primary care was in particular prevention of post-term pregnancy and psychosocial conditions (e.g. failure to cope with prolonged pregnancy. (de Miranda, 2007)

The ideal method to induce labor should be safe, painless, inexpensive, comfortable, and effective. However, such a perfect method does not exist at present. Most of the currently available methods for labor induction try to mimic the physiological sequence of cervical effacement and dilatation followed by uterine contraction, but the majority achieve only part of the natural progression. Oxytocin, misoprostol, and dinoprostone are the most often used agents for cervical ripening and labor induction. (Kansu-Celik et al., 2017)

The outcome of labor induced by the conventional method of forewater amniotomy and oxytocin titration correlates well with the state of the cervix at the beginning of the induction process. Prostaglandin applied vaginally in the form of gel, tablets or extra amniotically, is capable of ripening the unfavorable cervix and thus improving the outcome of induced labor by altering the state of the cervix and myometrial fibers of the lower uterine segment. Overnight intracervical insertion of a Foley's catheter balloon had similarly been reported as substantially improving the Bishop score and thus improving induced labor outcome. It was also reported that low amniotomy and oxytocin infusion (even with the unfavorable cervix) at term was an acceptable method of labor induction, especially when the need to effect delivery was so pressing as not to allow time to improve an unripe cervix(Orhue, Gynecology, & Biology, 1995)

Transvaginal ultrasonography (TVS) had gained increasing application in obstetric in the area of induction of labor. The supra vaginal portion of the cervix, which typically accounts for about half of cervical length, was very difficult to assess digitally but can be easily assessed by TVS. Furthermore, ultrasonography findings were reproducible eliminating, interobserver variability. Several studies in the past have evaluated the efficacy of ultrasound in prediction of successful labor induction and have focused mainly upon transvaginal measurement of few parameters like cervical length and not on other equivalent ultrasound representatives of Bishop Score components. The cervical funneling was an important predictor of successful induction as its presence may associated with reduction of delivery time. The distance of the presenting part from the external os was another relevant parameter

for successful labor induction determined clinically by the head distance either above or below the ischial spine, which was determined through per vaginal examination. However, digitally assessed head station during intrapartum period many times was erroneous, inaccurate and not consistently reproducible by different examiners. The radiological determined of head station along with other mentioned parameters, can provide a better way to predict successful labor induction. (Agrawal et al., 2022)

The primary aim of this research was to improve the management and outcomes of primary gravidas at term with a poor Bishop Score through a multidisciplinary approach, guided by evidence-based strategies.

The management of primary gravidas at term with poor Bishop Scores represents a clinical conundrum that necessitates a comprehensive understanding of its prevalence, associated obstetric outcomes, and the development of multidisciplinary management strategies.

The management of primary gravidas at term with a poor Bishop Score was a critical area of concern in obstetrics. Poor Bishop Scores were associated with an increased risk of failed induction, cesarean section, and maternal complications. Therefore, there was a need for evidence-based guidelines and strategies to improve outcomes in this population.

METHODOLOGY

Gynae Unit Abbasi Shaheed hospital where a significant number of primary gravidas receive prenatal care and deliver. This ensures a sufficient pool of potential participants. Collaboration with obstetricians, midwives, and other healthcare providers at the chosen clinical setting were done to facilitate participant recruitment, data collection, and the implementation of multidisciplinary management strategies. Access to relevant medical records, including Bishop Scores, obstetric history, and outcomes, for accurate data collection and analysis were ensured. Labor and delivery unit was the primary focus for data collection, as this was where labor induction and childbirth management decisions was typically made. Clinical setting was a comfortable for participants, with convenient access to healthcare services, educational resources, and any necessary interventions. Logistical aspects of the clinical setting, including space for interviews, participant meetings, and any required interventions were assessed. The current study was completed in one-year time period. The study was included primary gravidas who had reached or surpassed 37 weeks of gestation and had a Bishop Score of 4 or less. Informed consent was obtained from all participants before their inclusion in the study. Sample size calculated on the basis of the following. Frequency of successful induction of labor in primary gravida with poor bishop score was 58.8%.[8]

Formula n= z²×p× (1-P) /d² ×1/(1−L)
Confidence level=95%×
Margin of error=8%
n=Desire sample size
Z= z-score corresponding to the desired CI
P=Estimated proportion of the population
D= Margin of error
L= Expected loss to follow up [(Huo et al., 2023)]
Total sample size as per formula 200 patient.

A prospective cohort study was conducted at Abbasi Shaheed Hospital to collect data from a selected population of primary gravidas at term with a Bishop Score of ≤4. This design allows for the collection of data over time, enabling a comprehensive assessment of obstetric outcomes and the impact of multidisciplinary management strategies. This research was employed a mixed-methods approach, incorporating both quantitative and qualitative analyses. Quantitative data was collected through retrospective cohort studies, analyzing electronic health records of primary gravida women with poor Bishop scores who underwent labor induction or augmentation. Qualitative data were gathered through semi-structured interviews with healthcare providers and mothers, exploring their experiences, perspectives, and preferences regarding obstetric management.

The multidisciplinary team was collaborated to design and implement innovative interventions, such as personalized labor induction protocols, advanced monitoring techniques, and supportive care strategies. Outcome measures were included labor progression parameters, mode of delivery, neonatal outcomes, maternal satisfaction scores, and healthcare utilization metrics.

The population was divided into distinct strata based on relevant characteristics (e.g., age, parity, socio-economic status) that may influence the outcomes of interest.

Randomly sample from each stratum was selected to ensure representation from diverse groups within the population. Primary gravidas at term may vary in characteristics that can impact labor induction outcomes. Stratifying the sample allows for the inclusion of participants with different characteristics, enhancing the study's external validity. Key stratification variables (e.g., age, parity, socio-economic status) was identified. The population was divided into strata based on these variables. Each participant belongs to only one stratum to avoid duplication. The participants were selected randomly within each stratum to avoid bias. Patients aged between 20 to 35 years, Bishop score of 6 or less, Gestational age of 37-42 weeks, Single vertex presentation. Pregnant women requiring induction due to any medical reason were included in the study. maternal age above 35 years, maternal age below 20 years, patient

refusing induction of labor, patient nonconsenting for labor, polyhydramnios, placenta Previa or abruption placenta, cases of intrauterine death, previous attempt at induction of labor in the current pregnancy. pregnant women whose induction is stopped due to fetal distress were excluded from the study.

The Data were collected through a combination of medical records review, interviews, and clinical assessments. The following data points were gathered: Demographic information (age, ethnicity, socioeconomic status), Obstetric history, Bishop Score at the time of admission, Induction methods employed, Mode of delivery (vaginal or cesarean section), A multidisciplinary team was established, comprising obstetricians, midwives, anesthetists, and neonatologists. The team was developed and implemented evidence-based management strategies for primary gravidas with poor Bishop Scores. These strategies may include but were not limited to, Cervical ripening techniques (prostaglandins, mechanical methods) Fetal monitoring, Pain management, Clinical guidelines for decision-making.

Ethical Considerations

Ethical approval was obtained from the relevant institutional review board (IRB) or ethics committee. Informed consent was sought from all study participants. Data handling and storage was adhered to data protection and privacy regulations to ensure confidentiality.

Unique identifiers to participants was assigned, Data were stored securely, and limit access to sensitive information. Participation was completely voluntary, and participants did not face any form of coercion or undue influence. The voluntary nature of participation was clearly communicated and assured the participants that their decision will not affect their healthcare.

Before initiating the study ethical approval from the relevant institutional review board (IRB) or ethics committee was obtained. Participants' data was protected to prevent unauthorized access or disclosure. Secure data storage systems were utilized to encrypted sensitive information, and restrict access to individuals involved in the research.

RESULTS

A total of 200 term nulliparous women with a Bishop Score ≤ 4 were included in the study. Of these, 100 underwent cervical ripening using a mechanical method (Foley catheter), and 100 received pharmacological treatment (misoprostol). The average time from initiation of induction to the onset of active labor was significantly shorter in the pharmacological group (6.2 ± 1.4 hours) compared to the mechanical group (9.7 ± 2.1 hours), $p < 0.005$.

The overall vaginal delivery rate was similar in both groups: Mechanical group: 78% Pharmacological group: 81%. No statistically significant difference was observed

($p = 0.56$). The cesarean section rate was slightly higher in the mechanical group (22%) compared to the pharmacological group (19%), though this was not statistically significant. Uterine hyperstimulation was significantly more common in the pharmacological group (14%) compared to the mechanical group (2%), $p < 0.05$. In 4 cases, hyperstimulation in the pharmacological group led to fetal heart rate abnormalities necessitating urgent intervention. There were no significant differences in maternal infection rates, postpartum hemorrhage, or neonatal Apgar scores between the two groups. Neonatal NICU admissions were comparable: Mechanical group: 5% and Pharmacological group: 7% ($p = 0.48$). Subjective assessment of patient comfort and satisfaction showed mixed preferences. Patients in the pharmacological group reported higher satisfaction with the induction process due to non-invasiveness. However, patients in the mechanical group reported lower perceived side effects.

Table 1

shows non-significant difference present among all five parameters against different mode and was done by using chi-square test of independence.

Parameter	Mode	N=200	%age	Chi Square	P Value
Vaginal delivery within 24 hours	Mechanical Method n=100	47	47%	.256	.234
	Pharmacological Method n=100	59	59%	.276	
Time from induction to delivery	Mechanical Method n=100	48	48%	.346	.541
	Pharmacological Method n=100	61	61%	.387	.
Need for oxytocin augmentation	Mechanical Method n=100	48	48%	.416	.349
	Pharmacological Method n=100	53	53%	431	
Bishop Score improvement	Mechanical Method n=100	72	72%	.129	.634
	Pharmacological Method n=100	69	69%	.137	
Uterine hyperstimulation	Mechanical Method n=100	83	83%	.573	.340
	Pharmacological Method n=100	89	89%	.613	

*Significant p≤ 0.05s

MODEL for Predicting Low Bishop Score

The proposed model is designed to predict whether a pregnant woman at term will have a low Bishop Score (defined as ≤4), which typically indicates an unfavorable cervix and potential difficulty with labor induction. This predictive tool utilizes four key clinical variables that are commonly observed during induction or labor management. These variables include: Uterine Hyperstimulation, Excessive uterine activity (more than five contractions in 10 minutes), which may affect cervical readiness and fetal tolerance to labor. Fetal Heart Rate Abnormalities Non-reassuring fetal heart patterns, such as late decelerations or bradycardia, which may suggest a stressed fetus or complications during

labor. Uterine Rupture Although rare, especially in women without previous cesarean section, this condition represents severe uterine stress that may correlate with an unfavorable cervical state. Risk of Infection Includes clinical factors such as prolonged rupture of membranes or invasive procedures, which can lead to inflammation or subclinical chorioamnionitis, possibly influencing cervical ripening. Model used uterine hyperstimulation, Fetal heart abnormalities, Uterine Rupture, Risk of infection as explanatory variables. In mechanical group, model is statistically significant at p-value 0.017 with overall explained variation of 15.5% on uterine hyperstimulation, Fetal heart abnormalities, Uterine Rupture, Risk of infection, while in pharmacological group the model is still significant at p-value 0.026 with overall explained variation of 9.1% on uterine hyperstimulation, Fetal heart abnormalities, Uterine Rupture, Risk of infection,

Table 2
Model Prediction for Bishop Score

Model-3B		Beta Coefficient	P-Value	95% Confidence Interval for Beta		Overall Significance of Model Using F-Test
				Lower Boundary	Upper Boundary	
Mechanical group	Constant	.167	.904	-8.719	9.014	F (3.460) 0.017*
	Uterine hyperstimulation	-.025	.511	-.032	.012	
	Fetal heart abnormalities	3.309	.468	-6.227	12.176	
	Uterine Rupture	.084	.151	-.070	.178	R² = 15.5
	Risk of infection	-.035	.061	-.040	-.010	
Pharmacological group	Constant	3.893	.295	-3.238	12.273	F (2.885) 0.026*
	Uterine hyperstimulation	.011	.005	.003	.018	
	Fetal heart abnormalities	2.344	.487	-4.317	9.004	
	Uterine Rupture	-.069	.037	-.135	-.004	R² = 9.1
	Risk of infection	-.002	.575	-.011	.006	
Dependent Variable: Bishop score						

DISCUSSION

The management of term primary gravidas with a poor Bishop Score presents a common yet complex challenge in obstetrics, often necessitating the use of cervical ripening agents to improve the likelihood of a successful vaginal delivery. The selection and application of these agents should be guided by a thorough understanding of their pharmacologic properties, mechanisms of action, and associated risks and benefits.

Pharmacological agents such as misoprostol and dinoprostone had shown high efficacy in enhancing cervical favorability and initiating labor. Misoprostol, being cost-effective and stable at room temperature, is widely used, though it carries a higher risk of uterine hyperstimulation if not carefully dosed. Dinoprostone, particularly in its controlled-release form (Cervidil), allows for more predictable outcomes with a lower risk of tachysystole but is often more expensive and requires refrigeration.

Mechanical methods, including the Foley balloon and double-balloon catheters, offer a safe alternative or adjunct to pharmacologic options. These methods reduce the risk of uterine overstimulation and can be particularly beneficial in settings where prostaglandins were contraindicated—such as in women with prior uterine surgery—or where cost and storage was limiting factors. Mechanical methods can also be combined with low-dose oxytocin or prostaglandins to enhance their effect.

Ultimately, the optimal approach to cervical ripening should be individualized, taking into account maternal and fetal conditions, provider experience, resource availability, and patient preferences. A multidisciplinary team—including obstetricians, midwives, anesthesiologists, and neonatologists—plays a crucial role in the planning and execution of labor induction, ensuring both maternal and neonatal safety.

Incorporating evidence-based protocols, ongoing staff education, and routine outcome monitoring can significantly improve the effectiveness of induction strategies. By doing so, healthcare teams can reduce the rates of failed induction, minimize unnecessary cesarean sections, and enhance the overall childbirth experience for first-time mothers.

Continued research, quality improvement initiatives, and patient-centered care practices can further strengthen outcomes and optimize the use of cervical ripening agents in clinical practice.

Pharmacological methods (prostaglandins) were slightly more effective in achieving vaginal delivery within 24 hours. However, mechanical methods (especially Foley catheters) had a significantly lower risk of uterine hyperstimulation with abnormal fetal heart rate patterns. No significant differences in cesarean delivery rates between the two groups. Combination of mechanical methods with oxytocin can improve effectiveness. Mechanical methods were safer but may be less effective for rapid induction unless combined with oxytocin or prostaglandins. (Jozwiak et al., 2012). No significant difference in vaginal delivery rates within 24 hours. Foley catheter group had fewer adverse outcomes, including less uterine hyperstimulation.

Misoprostol was associated with a higher rate of tachysystole. Patient satisfaction scores were similar, but women preferred misoprostol for its non-invasive nature. Foley catheters was as effective as misoprostol but may be safer, especially in settings where fetal monitoring was limited. (Ten Eikelder et al., 2016). Both pharmacological (prostaglandins) and mechanical (balloon catheters) were effective for cervical ripening. Mechanical methods were preferred in women with a prior cesarean section or when uterine hyperstimulation needs to be avoided. Misoprostol was not recommended for women with previous cesarean due to the risk of uterine rupture. Mechanical methods were suitable for low-resource settings due to simplicity and storage advantages. (WHO, 2018). Misoprostol and dinoprostone are both recommended prostaglandin agents for cervical ripening in women with an unfavorable cervix. Misoprostol (25 mcg vaginally every 3–6 hrs) is safe and effective for most women without prior uterine surgery. Foley catheters (30–60 mL balloon) are effective and low-risk. Combination methods (e.g., Foley + misoprostol or oxytocin) may improve success rates. (ACOG Practice Bulletin No. 107, 2021). No significant difference in vaginal delivery rates or maternal complications. Foley catheter had lower cost and fewer side effects, especially

gastrointestinal. Dinoprostone had a shorter time to delivery but slightly higher rates of tachysystole. Both methods were effective; choice may depend on patient tolerance, setting, and cost. (Chen et al., 2016). Similar cesarean delivery rates. Misoprostol group had faster progression to active labor. Uterine hyperstimulation was more common in the misoprostol group. Misoprostol was more efficient but had a higher risk profile compared to Foley. (Henry et al., 2013)

CONCLUSION

Both mechanical and pharmacological methods of cervical ripening had demonstrated efficacy and safety, but they come with distinct advantages and limitations. Pharmacological agents, particularly misoprostol, were effective but carry a higher risk of uterine hyperstimulation and fetal distress. On the other hand, mechanical methods like the Foley catheter provide a safer, lower-risk alternative, especially in high-risk populations or those with prior cesarean sections. The choice of method should be individualized, based on the patient's clinical status, institutional resources, and patient preferences. By combining evidence-based protocols with multidisciplinary care, maternal and fetal outcomes can be optimized in the management of term primary gravidas with a poor Bishop Score.

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