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A comparitive study between unfavourable cervix and favorable cervix for incidence of caesarean section with the induction of labour

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Abstract
Aims: To determine the incidence of cesarean delivery with the induction of labor in patients with unfavourable cervix and favourable cervix. To compare the efficacy and effects of induction methods on mode of delivery
Methodology: This is a prospective comparative study of 200 nulliparous women classified as groups. 1: Induction group with unfavorable cervix (Bishop score <5) A: Intracervical PGE_2 gel, B: Foley catheter, C: tablet misoprostol. 2: Induction group with favorable cervix (Bishop score >5)-Amniotomy + oxytocin.
Results: Cesarean delivery rate was 31.3% among patients with unfavourable cervix and 16% with favorable cervix. Comparing Foley, PGE_2 gel, misoprostol change in Bishop score was almost similar between Foley and misoprostol and more than PGE_2
Conclusion: Induction of labor in a term nulliparous patient resulted in significantly higher cesarean section rate with unfavourable cervix. Foley catheter for pre-induction cervical ripening have greater change in Bishop score.

Keywords: Cesarean delivery, bishop score, foley catheter, prostaglandin E_2 gel, misoprostol

1. Introduction
Induction of labor has become one of the most common interventions in obstetrics. Induction of labor is defined as the process of artificially stimulating the uterus to start labor [1] before its spontaneous onset to deliver the feto-placental unit. Induction of labor is thought to be associated with an increase in the risk of cesarean delivery both for nulliparous and multiparous women [2]. This has been demonstrated both for inductions on medical grounds and for elective inductions [3, 4]. The incidence of cesarean section rate increases with the induction of labor which was 30.8% for nulliparous women [5].
Labor induction may be complicated by uterine tachysystole, uterine hyperstimulation with fetal heart rate abnormalities or fetal distress, prolonged labor, prolonged membrane rupture and chorioamnionitis. Because of the presence of underlying maternal and fetal medical conditions leading to induction and because the uterus and uterine cervix are often not prepared for labor when induction becomes necessary, it may be associated with prolonged labor and a significantly increased risk of cesarean delivery when compared to women entering labor spontaneously. This has been demonstrated for elective inductions also [6].
Successful labor is related to the state of the cervix. A 'ripe' soft, yielding cervix requires a lower quantum of uterine work than an 'unripe,' hard and rigid one would. An unripe cervix fails to dilate well in response to myometrial contraction [7].
Women with an unfavorable cervix who have not experienced the cervical ripening phase before labor present the most significant challenge concerning labor induction. The duration of labor induction is also affected by parity and to a minor degree by baseline uterine activity and sensitivity to oxytocic drugs.
The unfavorable cervix has an increased risk of induction failure and an increased risk of cesarean delivery. The purpose of this study is to explore the risk of cesarean delivery after induction in an unfavorable cervix and to compare the efficacy of induction methods used.

2. Aims and Objectives
To determine the incidence of cesarean delivery with the induction of labor in patients with unfavorable cervix compared to the favorable cervix.

To compare the efficacy of induction methods used.
To explore the effects of induction on the mode of delivery for women.

3. Materials and Methods

3.1 Source of Data: Women admitted in government maternity hospital, Sri Venkateswara Medical College, Tirupati.

3.2 Study Design: prospective study comparative

3.3 Study place: labor room complex in, Government Maternity Hospital.

3.4 Sample size: 200

3.5 Inclusion criteria

1. Single live intrauterine term pregnancy between 37-42 weeks of gestation in cephalic presentation.
2. Obstertric and medical indication for the induction of labor.
3. Women are given consent for the study.

3.6 Exclusion criteria

1. Malpresentations
2. Placenta previa, cord prolapse,
3. Fetal anomalies and fetal demise
4. Contracted pelvis
5. Prior cesarean section

3.7 Methodology

1. Women who fulfilled the above criteria were counseled and given details of the study. Written informed consent was obtained from each patient.
2. Detailed obstetric, menstrual, medical and past history followed by a thorough general physical examination (to note anemia, edema, pulse rate, respiratory rate, blood pressure, temperature), systemic examination (cardiovascular, respiratory, central nervous systems).
3. Obstetric examination (for gestational age, lie and presentation, fetal heart rate, uterine contractions); per vaginal examination to assign the Burnett's modified Bishop score.
4. Investigations did include Hb%, urine for albumin, sugar and microscopy, Blood grouping, HIV, HBsAg.
5. Women are classified into group 1 (unfavorable cervix) with bishops <6 and group 2 (favorable cervix) and again group is subdivided into group 1A who are given foleys induction for cervical ripening and group 1B, and these people are given dinoprost gel for cervical ripening and 1C these people are given with misoprostol.
6. If the modified Bishop score remained < 5 for 12-18 hours range after induction, it was considered as a failed case in group 1.
7. If the bishops become>6, then amniotomy and oxytocin are used for the induction of labor and also in group 2.
8. For each group enlisted above the following labor, fetal and maternal outcomes are noted

1) Labour outcome

a) Cervical changes during labor
b) Mode of delivery
c) Induction to active-phase interval
d) Induction to delivery interval

2) Fetal and neonatal outcomes

a) Intrapartum complications
b) Neonatal complications

4. Results

This study was performed on 200 cases who fulfilled the before mentioned criteria admitted to government maternity hospital tirupati. The induction group with an unfavourable cervix (Bishop Score <6) Group 1 consists of 150 patients, 50 in each sub group 1a PGE_2 GEL 1B Foley's 1C misoprostol as cervical priming agent. The induction group with favorable cervix [Bishop Score ± 6] consists of 50 patients in whom amniotomy with or without oxytocin was used as an inducing agent.

Mean age in group 1 and group 2 was 24.5 ± 3.71years and 22.0 ± 2.9 years respectively with significant p value < 0.0001. Mean gestational age in group 1 and group 2 was 40.3 ± 2.4 and 40.0 ± 1.1 respectively with no statistical difference was observed (p= 0.3945). Bishop score at the time of admission in group 1 was 2.8 ± 0.7 and in group 2 was 6.1 ± 0.8. The Bishop score was the lowest in the induction group with an unfavourable cervix and the difference is statistically significant.

In the induction group 1 with an unfavourable cervix the indications for induction of labor include 29% prolonged pregnancy, 12.6% mild PE, 14.6% severe PE, 4% imminent eclampsia, 4% antepartum eclampsia, 10% gestational hypertension, 8% Rh negative pregnancy, 3% gestational diabetes mellitus, 2% IUGR, 3.3% oligohydramnios, 2.6% polyhydramnios, 5.3% elective. In the induction group 2 with favorable cervix the most common indication was elective 42%, prolonged pregnancy 18%, mild PE 10%, severe PE 8%, imminent eclampsia 2%, gestational HTN 8%, oligohydramnios 4%.

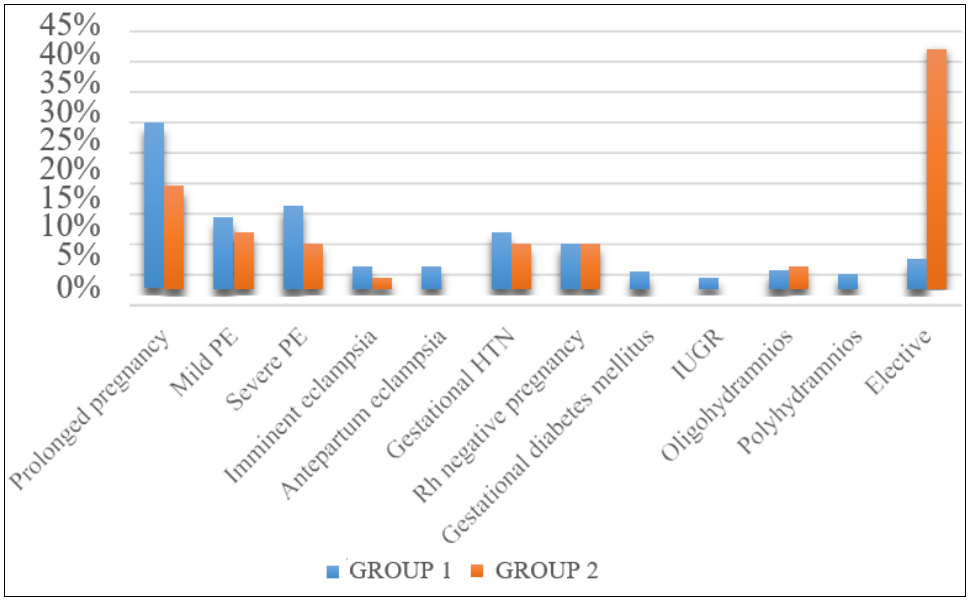

Fig 1: Comparing Various Indication for Induction

The change in the bishop before and after induction among group almost similar between Foley's and misoprostol i.e. group 1b 3.1 ± 0.9 and group 1c 3.2 ±0.9 which no statistical difference between the two groups (p=0.579) and with PGE_2 it is 2.9 ± 0.9.

Table 1: induction to active phase interval in group 1

	Group 1A	Group 1 B	Group 1C
Range In hours	5.40 – 10.50	4.00 – 9.00	3-9.2
Mean ± SD	8.06 ± 1.31	6.00 ±1.16	6.6 ± 1.6

Table 2: Induction to Active Phase interval between the two groups

	Group1 (A+B+C)	Group 2
Range In hours	3.00 – 10.50	1.30 – 4.00
Mean ±SD	6.9 ± 1.61	2.33 ±0.70
P value	P < 0.05, S	

As seen the table 2 induction to active phase interval between Foley's and misoprostol was almost similar and is less than PGE_2 and among the two groups induction to active phase interval is less in group 2(2.33 ± 0.70) than group 1 (6.9 ± 1.61) and according to student t test it was statistically significant.

Table 3: Induction to Delivery Interval in Induction Groups

	Group 2A	Group 2B	Group 1C	Group 2	Group 3
Range In hours	7.00 – 20.30	7.30 – 20.00	7.00 – 20	7.00 – 20.30	5.00 – 15.00
Mean ± SD	15.70 ± 3.00	12.90 ± 2.83	12.9 ± 3.4	13.79 ± 3.33	8.60 ± 2.32
P value				t = 10.217 P < 0.05, S	

The induction to delivery interval in Group 1 was 13.79 ± 3.33hours (Range: 7.00-20.30 hours) and in Group 2 was 8.60 ± 2.32 hours (Range: 5.00-15.00 hours). Thus the induction to delivery interval in the Group 1 with unfavourable cervix was longer when compared to Group 2 with favorable cervix and was statistically significant. The induction to delivery interval in Group 1A was 15.70 ± 3.00 hours (Range 7.00-20.30 hours) and Group 1B was 12.90 ± 2.83 hours (Range: 7.30-20.00 hours) and group 1C was 12.9± 3.4hours (Range: 7.00-20 hours) Thus the Foley group and misoprostol group had a shorter induction to delivery interval compared to PGE_2 group and is statistically significant.

Table 4: Mode of Delivery in the Induction Groups

Mode of delivery	Group 1An (%)	Group 1Bn (%)	Group1Cn (%)	Group 2 n (%)
Vaginal delivery	28 (56)	25 (50)	22(44)	34 (68)
Instrumental delivery	5 (10)	10 (20)	13(26)	8 (16)
LSCS	17 (34)	15 (30)	15(30)	8 (16)

The rate of caesarean delivery with unfavourable cervix was 31.1% and with favorable cervix it was 16%. With unfavourable cervix group1A 34% and group 1B 30% and group 1C 30% indicating increased risk of caesarean section seen among PGE_2 than with Foley and misoprostol.

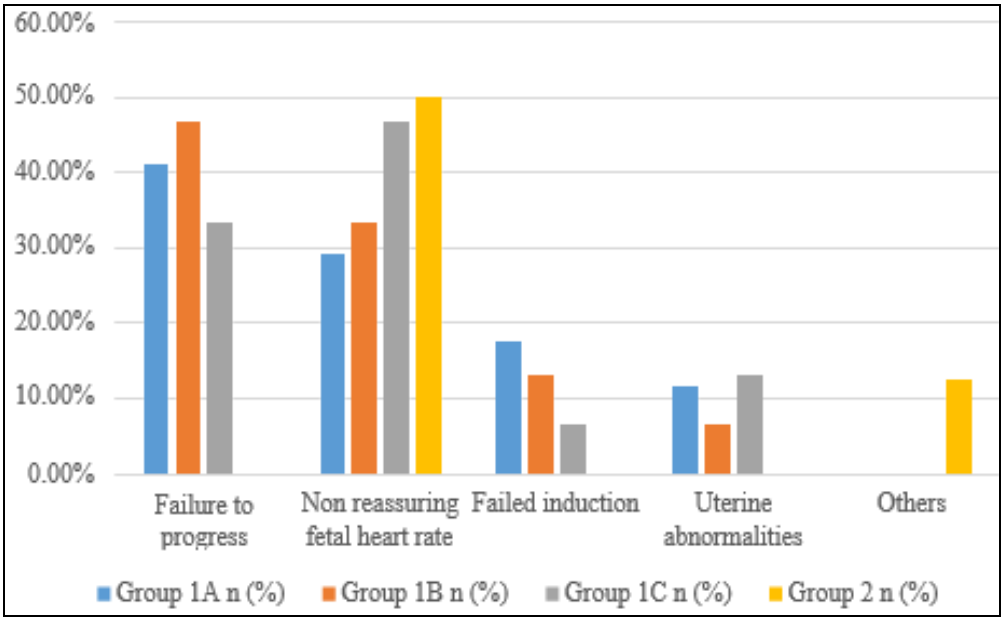

Fig 2: Comparing the Indication Cesarean Section

The most common indication was failure to progress and in the induction group with unfavourable cervix and non-reassuring fetal heart rate in induction group with favorable cervix. Group 1A and in group 1B the most common cause of caesarean section is failure to progress whereas for group 1c it is non-reassuring fetal heart rate.

Among the sub groups of group 1 intrapartum neonatal complications are more with group 1C (28%) than group 1A (24%) and group 1B (20%) and in them requiring NICU admissions also more among group 1C and in group 2 intrapartum complications accounts 20%.

12% of patients in the misoprostol (1C) group had uterine contraction abnormalities 9% due to hyper stimulation 2% due to tach systole and 1% due to hypertonic contraction (8% of patients in the PGE_2 gel (1A) group had uterine contraction abnormalities with 6% due to hyper stimulation and 2% due to tach systole. 4% of patients in the Foley group (1B) had uterine contraction abnormalities 2% due to hyper stimulation and 2% due to tach systole. No abnormalities are found in Group 2 with favorable cervix. Thus the uterine abnormalities are slightly more in the misoprostol Group 1C.

5. Discussion

The results of the study show that induction of labor in term nulliparous women with unfavorable cervix leads to significant increase in the rate of cesarean section this is in correspondence with an American study done by Johnson, Davis and Brown, 2003 [8] in which The cesarean delivery rate was 31.5% among patients whose Bishop score was <5 at induction versus 18.1% for patients with a score ≥5 (*P*<.001) Vahratian *et al.* 2005 [9] Elective induction with cervical ripening the rate of cesarean section was 41.3% and Elective induction without cervical ripening it was 16.8% as similar to above studies the rate of cesarean section is 31.1% with unfavorable cervix and 16% with favorable cervix.

Table 5: Comparative Data on the Indications of Cesarean Delivery

	Failure to progress n (%)	Nrfhr n (%)	Failed induction n (%)	Others n (%)
Johnson, Davis and Brown, 2003 [8]	342 (54.5)	182 (29.0)	-	103 (16.4)
Present study	22 (40)	21 (38.2)	6(11)	6(11)

In the present study the main reason for higher frequency of cesarean delivery in the induction group was due to failure to progress which was comparable to the study mentioned

Mean age in patients with unfavorable cervix and favorable cervix was 24.5 ± 3.71years and 22.0 ± 2.9 years respectively with significant p value <0.0001 and Mean gestational age was 40.3 ± 2.4 and 40.0 ± 1.1 respectively with no statistical difference was observed (p= 0.3945). Bishop score at the time of admission in group 1 was 2.8 ± 0.7 and in group 2 was 6.1 ± 0.8. The Bishop score was the lowest in the induction group with an unfavorable cervix and the difference is statistically significant.

Table 6: Comparative data on indications for induction

Study	Prol Preg n (%)	Ghtn n (%)	PE+ Eclampsi a n (%)	Gdm n (%)	Iugr n (%)	Oligo n (%)	Rh – n (%)	Electivn (%)
Syeb *et al.* 1999 [10]	121(41.2)	5 (!. 7)	10.9 (32)	4 (1.4)	10 (3.4)			88 (61.5)
Vrouenraets *et al.* 2005 [11]	144 (23.07)	74 (11.8)	61 (9.7)	3 (0.4)	19 (3.0)		1(0.1)	189 (30.2)
Present study	53 (26.5)	19 (9.5)	63 (31.5)	5 (2.5)	4 (2)	7 (3.5)	16 (8)	29 (14.5)

Like most other studies prolonged pregnancy, hypertensive disorders and elective inductions formed the most common indications for induction In the study conducted by Sciscione *et al.* [12] induction to delivery interval between PGE_2 and Foley's group was 30.4 ± 12.6 and 22.4 ± 10.9 hours respectively with normal vaginal delivery 71% and 73% respectively. In an

another Indian study done by Priya Nandana Alaparthi13 comparison done between PGE_2 and misoprostol induction to delivery interval was 15.25 +/-3.14 and 11.15 +/-2.17 respectively and the rate of vaginal delivery was 78% and 90% respectively.

The present study compared all the three I.e. PGE_2, Foley's group, and misoprostol group the interval to delivery interval was 15.70 3.00 hours, 12.90 2.83 hours and 12.9+3.4 hours respectively and the rate of vaginal delivery was 66% with PGE_2, 70% with Foley's and misoprostol which shows that induction to delivery interval is less among Foley's and misoprostol group than PGE_2 and vaginal delivery also high among Foley's and misoprostol group than PGE_2 which was in agreement with the studies.

In the study conducted by Priya Nandana Alaparthi [13] comparing misoprostol and dinoprostol gel there was an increased incidence of meconium aspiration syndrome and birth asphyxia in the Misoprostol group and was associated with uterine hyper stimulation. which was similar to our study indicating the use of misoprostol leads to increase in neonatal complications and NICU admissions than the other two methods of induction.

In study conducted by ramya D [14] comparing misoprostol versus dinoprostol gel higher incidence of side effects in Misoprostol group and is statistically significant (p value = 0.003). The major side effect in the Misoprostol group was chills. Which was similar to the present study but the major side effect was vomiting.

6. Conclusion

Induction of labor in a term nulliparous patient resulted in significantly higher cesarean section rate with unfavorable cervix. Foley catheter and misoprostol for pre-induction cervical ripening have greater change in Bishop Score misoprostol was cost effective than Foley's catheter but maternal and neonatal complications are more with misoprostol.

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