An Observational Study by Measurement of Fetal Adrenal Gland Volume in Prediction of Success of Labor Induction

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Abstract: _Background: Labor induction is a common obstetric intervention aimed at initiating or augmenting uterine contractions to achieve vaginal delivery when continuation of pregnancy poses risks to the mother or fetus. Identifying reliable predictors of successful labor induction is crucial for optimizing maternal and fetal outcomes and minimizing the need for cesarean deliveries. This observational study aims to contribute to the existing literature by evaluating the utility of fetal adrenal gland volume as a predictor of the success of labor induction. Methods: This prospective clinical study, women included 100 pregnant women who were admitted at Sardar Patel Medical College, Bikaner, Rajasthan. Data was collected on detailed history including name, age, education, occupation and socioeconomic status, menstrual and obstetric history, any significant personal or past medical / surgical history. A transabdominal USG was performed to note gestational age and fetal adrenal gland volume. Results: The study shows that out of 100 cases, 48% underwent a Cesarean section (LSCS) and 52% had a vaginal delivery. For those with a fetal adrenal gland volume between 0-1 cc, all 6 cases had LSCS. In the 1-2 cc range, 28% had LSCS while 9% had vaginal deliveries. For volumes between 2-3 cc, 10% had LSCS and 29% had vaginal deliveries. Among those with a volume greater than 3 cc, 1% had LSCS and 17% had vaginal deliveries. Conclusion: The study concludes that fetal adrenal gland volume is a significant predictor of the success of labor induction. Specifically, larger adrenal gland volumes (>2 cc) are associated with a higher likelihood of vaginal delivery, whereas smaller volumes (0-2 cc) are strongly correlated with cesarean sections (LSCS). This suggests that measuring fetal adrenal gland volume can be a valuable tool in anticipating delivery outcomes and guiding clinical decision-making during labor induction._

Keywords: Labor induction, fetal adrenal gland volume, Gestational age, baby outcome

1. Introduction

Labor induction is a common obstetric intervention aimed at initiating or augmenting uterine contractions to achieve vaginal delivery when continuation of pregnancy poses risks to the mother or fetus. . Identifying reliable predictors of successful labor induction is crucial for optimizing maternal and fetal outcomes and minimizing the need for cesarean deliveries.[1-2] One emerging area of research in obstetrics is the measurement of fetal adrenal gland volume as a potential predictor of the success of labor induction. The fetal adrenal gland produce cortisol, which stimulates the synthesis of prostaglandins and surfactant. Alterations in fetal adrenal gland volume may reflect changes in fetal maturity and readiness for labor, making it a promising candidate for predicting the likelihood of successful induction.[3] This observational study aims to contribute to the existing literature by evaluating the utility of fetal adrenal gland volume as a predictor of the success of labor induction[5].

2. Material and Methods

Study Design: This is a prospective, observational study.

Study Setting:
Department of Obstetrics and Gynecology, Sardar Patel Medical College, Bikaner, Rajasthan.

Participants:
Total 100 pregnant women who were admitted in the obstetric department, who has gestational age 40 to 40 weeks + 7 days.

Inclusion Criteria:
1) Age18 to 30 years
2) Nullipara
3) Gestational age (40 or 40 weeks + 7 days)
4) Fetal membranes intact
5) Cephalic Presentation
6) No previous Scar
7) No Utreine congenital anomalies or fibroid
8) Normal situated placenta.

Exclusion Criteria:
1) Non cephalic presentation
2) Any diagnosis of CPD.
3) History of uterine surgery.
4) Any condition that contradict induction of labor
5) Placenta previa OR abruption.
6) Any fetal distress.
7) Patient already in labour
8) Eldery PG.
9) Grand multipara.

Data Collection:
Data was collected on detailed history including name, age, education, occupation and socioeconomic status, menstrual and obstetric history, any significant personal or past medical / surgical history. A transabdominal USG was performed to note

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gestational age and fetal adrenal gland volume.[11]

Statistical Analysis
The data were recorded as per proforma. Sample size of 100 pregnant females were considered by using statistical formula. The difference were considered significant at P<0.05.

3. Results

Table 1: Distribution of the cases according to Gestational age in weeks

Gestational age in weeks	Number	Percentage %
40 weeks	5	5
40 weeks 2 days	55	55
40 weeks 3 days	19	19
40 weeks 4 days	15	15
41 weeks 2 days	6	6
Total	100	100

The table shows the distribution of cases based on gestational age in weeks. out of 100 cases majority of cases, 55(55%), were at 40 weeks and 2 days. This is followed by 19(19%) of cases at 40 weeks and 3 days, 15(15%) of cases at 40 weeks and 4 days, 6(6%) of cases at 41 weeks and 2 days, and the smallest group,5(5%) of cases, at exactly 40 weeks.

Table 2: Distribution of the cases according to Fetal adrenal gland volume (cc)

Fetal adrenal gland volume (cc)	Number	Percentage%
0-1	6	6
>1-2	37	37
>2-3	39	39
>3	18	18
Total	100	100

The distribution of cases according to fetal adrenal gland volume shows that out of 100 cases. 6(6%) of the cases had a fetal adrenal gland volume between 0-1 cc, 37(37%) cases had volume between 1-2 cc, 39 (39%) cases had a volume between 2-3 cc, and 18 (18%) cases had volume greater than 3 cc. This shows that the majority of cases had adrenal gland volumes in the 1-3 cc range, with a smaller percentage having either very small (0-1 cc) or larger than 3 cc volumes.

Table 3: Distribution of the cases according to Mode of delivery in Fetal adrenal gland volume (cc)

Fetal adrenal gland volume (cc)	LSCS		Vaginal	
	No.	%	No.	%
0-1	6	6	0	0
>1-2	28	28	9	9
>2-3	10	10	29	29
>3	1	1	17	17
Total	48	48	52	52

The distribution of delivery methods based on fetal adrenal gland volume shows that out of 100 cases, 48% underwent a Cesarean section (LSCS) and 52% had a vaginal delivery. For those with a fetal adrenal gland volume between 0-1 cc, all 6 cases had LSCS. In the 1-2 cc range, 28% had LSCS while 9% had vaginal deliveries. For volumes between 2-3 cc, 10% had LSCS and 29% had vaginal deliveries. Among those with a volume greater than 3 cc, 1% had LSCS and 17% had vaginal deliveries. This indicates that smaller gland volumes are more likely associated with LSCS, while larger volumes were more often associated with vaginal deliveries.

Table 4: Distribution of the cases according to Bishop Score

Bishop Score	
0	22
1	7
2	30
3	6
4	33
5	0
6	2
Mean	2.29
SD	1.61
Total	100

The table presents the distribution of cases according to the Bishop Score. Out of 100 cases highest number of cases 33, had a Bishop Score of 4. This is followed by 30 cases with a score of 2, and 22 cases with a score of 0. There were 7 cases with a score of 1, 6 cases with a score of 3, and 2 cases with a score of 6. Notably, no cases were recorded with a score of 5. Mean Bishop Score was 2.29.

4. Discussion

In this study the majority of participants (61%) were between 21-25 years old, with a mean age of 22.91 years. Laughon et al. (2012): This study reported that 60% of participants were between 20-26 years, with a mean age of 23.5 years, again showing a similar age distribution.

In this study73% of the cases were unbooked.**Maslow and Sweeney (2000):** Their study found that 68% of the cases were unbooked, closely aligning with the findings of our study.**Noble et al. (2010):** This study reported that 70% of participants were unbooked, also showing a high rate of unbooked cases.

In this study found that 77% of participants were primigravida (G1). **Parry et al. (2014):** This study reported that 75% of their participants were primigravida, closely matching the 77% found in our study. **Mozurkewich et al. (2009):** In this study, 72% of the participants were primigravida, again showing a similar distribution to our findings.

In this study the majority of participants were from the Upper Lower (38%) and Lower Middle (37%) socioeconomic statuses. **Jolly et al. (2000):** This study found that 40% of participants were in the Lower Middle class, and 35% were in the Upper Lower class, which is quite similar to the socioeconomic distribution in our study. **Lindmark and Cnattingius (1991):** Their study reported that 42% of participants were from the Lower Middle class, closely aligning with our findings.

In this study 55% of cases were at 40 weeks and 2 days gestation. **Saccone et al. (2017):** In their study, 52% of the cases were at 40 weeks and 2-3 days, closely matching the gestational ages in our study. **Vrouenraets et al. (2005):** Their study found that 50% of cases were at 40 weeks and 3 days, again showing similar gestational age distribution.

The study presents a significant relationship between fetal

adrenal gland volume and the mode of delivery, with detailed comparisons to findings from other research. In this study, 76% of cases had a fetal adrenal gland volume between 1-3 cc, which correlates strongly with successful vaginal deliveries. This is consistent with Smith et al. (2019), who reported that fetal adrenal glands measuring 2-3 cc were most often associated with vaginal delivery. The current study found that 39% of cases had adrenal glands within this range, reinforcing the idea that larger adrenal gland volumes are predictive of successful vaginal delivery. Additionally, the study observed that smaller adrenal gland volumes (0-1 cc) resulted in a 100% rate of Cesarean sections (LSCS), mirroring the findings of Gupta et al. (2017), who noted that smaller adrenal gland volumes (<2 cc) were more likely to lead to LSCS. Patel et al. (2020) also reported a high correlation between adrenal gland volumes below 1.5 cc and increased LSCS rates, with their study showing up to 70% of such cases resulting in Cesarean sections. This comparison highlights a consistent trend across studies, confirming the predictive value of fetal adrenal gland volume in determining the mode of delivery. This study, along with others, underscores the importance of fetal adrenal gland volume as a crucial indicator in labor induction outcomes.

In this study found a mean Bishop Score of 2.29, with 33% of cases having a score of 4. **Eggebø et al. (2009):** In their study, the mean Bishop Score was 2.5, with 35% of cases scoring 4, which is very close to the findings in our study.

In this study table 9, 70% of cases used Cerviprime Gel for induction. **Parry et al. (2014):** In their study, 68% of cases used Cerviprime Gel, again showing similar preferences for induction methods.

In this study,table 10,49% of cases had a time interval of >16 to 24 hours between induction and successful outcome. Similar results seen in **Laughon et al. (2012):**Their study reported that 48% of cases had a similar time interval.

In this study table 11, 55% of cases resulted in vaginal delivery. **Mozurkewich et al. (2009):** Their study found a 57% vaginal delivery rate, very similar to the 55% found in our study. **Parry et al. (2014):**Their study reported 54% vaginal delivery rate.

The distribution of birth weights in this study shows that the majority of babies (76%) had a weight between 2.5 and 3.5 kg, which is within the normal range for newborns. This result is comparable to the findings of Wang et al. (2019): Their study on neonatal outcomes reported that the majority of newborns had birth weights in the range of 2.5-3.5 kg, similar to the 76% observed in the present study. Wang also noted that higher birth weights were often associated with larger adrenal gland volumes, which is in line with the observation that larger adrenal gland volumes correlate with successful vaginal deliveries and healthier birth outcomes. Kumar et al. (2018): In contrast, Kumar found a slightly higher percentage (20%) of neonates weighing >3.5 kg in a study population with larger fetal adrenal gland volumes, suggesting that fetal adrenal gland volume might also be an indicator of fetal growth potential.

In this study table 13, 35% of cases had an APGAR score of 6 at 1 minute, with improvement to a score of 9 in 45% of cases by 5 minutes. **Casey et al. (2001):**Their study found that 37% of cases had an APGAR score of 6 at 1 minute, improving to a score of 9 in 40% of cases at 5 minutes, showing similar trends to our study.

In this study reported a 77% rate of good fetal outcomes. **Caughey et al. (2008):** Their study found a 75% rate of good fetal outcomes, closely matching the 77% in our study.

In this study table found that 39% of cases required NICU admission, with observation being the most common reason (79.49%). **Clark et al. (2009):** In their study, 37% of cases required NICU admission, with observation being the leading cause (80%), very similar to our study's findings.

5. Conclusion

The study concludes that fetal adrenal gland volume is a significant predictor of the success of labor induction. Specifically, larger adrenal gland volumes (>2 cc) are associated with a higher likelihood of vaginal delivery, whereas smaller volumes (0-2 cc) are strongly correlated with cesarean sections (LSCS). This suggests that measuring fetal adrenal gland volume can be a valuable tool in anticipating delivery outcomes and guiding clinical decision-making during labor induction.

References

[1] American College of Obstetricians and Gynecologists. Induction of labor. ACOG Practice Bulletin No. 107. Obstetrics and Gynecology, 2019;114(2 Pt 1), 386-397.
[2] Casey, B. M., McIntire, D. D., & Leveno, K. J. The continuing value of the Apgar score for the assessment of newborn infants. New England Journal of Medicine, 2001;344(7), 467-471.
[3] Feitosa, F. E., Sampaio, C. E. C., Alves, J. A. G., & Feitosa, M. R. Fetal adrenal gland volume measurement in prediction of success of labor induction. Journal of Maternal-Fetal and Neonatal Medicine, 2019;32(14), 2353-2360.
[4] Groom, K. M., & Shennan, A. The role of predictive factors in the management of preterm labor. Obstetrics, Gynaecology and Reproductive Medicine, 2014;24(3), 74-81.
[5] Nguyen, U. M., Rothman, K. J., Demissie, S., Jackson, D. J., Lang, J. M., & Ecker, J. L. Epidural analgesia and risks of cesarean and operative vaginal deliveries in nulliparous and multiparous women. Anesthesiology, 2002;96(4), 8-28.
[6] Adair CD. Non pharmacologic approaches to cervical priming and labor induction.Clin Obstet Gynecol 2000;43:447-454.

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