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Original Research Article

A Hospital Based Analytical Observational Study Assessing the Risk Factors for Cesarean Delivery in Induced Labor at Term

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Conflict of interest: Nil

Abstract

Aim: The aim of this study was to identify those factors which influence the risk of emergency cesarean delivery in induced labors at term.

Material & Methods: A case–control study was conducted in the Department of Obstetrics and Gynaecology, JLNMCH, Bhagalpur, Bihar, India over a period of one year. A total of 150 women were studied, out of which 50 women delivered by emergency caesarean section and 100 women delivered vaginally. The cohort included all women with a live singleton fetus in the cephalic position and induced at term (C37 weeks). Cases were women who delivered by emergency caesarean section and controls were women with a vaginal delivery among the cohort. Informed consent was taken for all patients.

Results: Factors associated with cesarean delivery were analysed. Our study had shown that maternal age C35 years, BMI C30 kg/m2, nulliparity, preinduction Bishops score less than 5, gestational diabetes mellitus, and intrauterine growth restriction are significantly associated with caesarean delivery. The presence of epidural analgesia, gestational hypertension, postterm pregnancy, and premature rupture of membranes was not associated with significant increase in cesarean delivery if labor was induced at term.

Conclusion: A vaginal delivery is the best choice for both mother and child. However, it is better to take those patients with multiple risk factors for elective cesarean section rather than inducing them at term. Women with multiple risk factors for caesarean can be taken up for elective cesarean section rather than inducing them at term.

Keywords: Induction of labor; Cesarean section; Term pregnancy; Risk factor.

Introduction

Induction of labor is a common and essential element of the contemporary obstetric practice and now accounts for approximately 20% of all deliveries. [1-3] Induction of labor is thought to be associated with an increase in the risk of cesarean delivery both for nulliparous and multiparous women. [4] This has been demonstrated both for inductions on medical grounds and for elective inductions. [5,6] More recent randomized comparisons have demonstrated that the effect of the induction of labor on the risk of cesarean delivery is limited. In postterm women as well as in women with prolonged rupture of membranes at term and in women with hypertensive disease, induction of labor is more effective than expectant management. [7-9] Data in parous women undergoing labor induction have revealed conflicting results. Some observational studies suggest that the rate of cesarean delivery in multiparous women with an elective induction is similar to that in those women with a spontaneous onset of labor. [6,10,11] Induction of labor has been associated with a risk of emergency cesarean delivery. The decision to induce a delivery in less imminent situation is often difficult. If induction fails, an emergency cesarean delivery has to be performed, and maternal risks are greater in emergency cesarean delivery than those in elective cesarean deliveries.

One recent study even reported a lower caesarean delivery rate in multiparous women in whom labor was induced preventively, in order to ensure that pregnant women entered labor at an optimal time for the mother-baby pair. [12] Not much is known about factors related to a caesarean delivery after induction of labor in multiparous women. In women where cesarean delivery is required, the procedure not only carries the operative risks in the

index pregnancy, but also increases risks for future pregnancies. [13] However, a number of obstetric interventions including labor induction (IOL) have been practiced to save lives of mothers and the unborn. Being one of life-serving interventions in obstetrics, IOL can; decrease frequency of still births, reduce risks of infection, and lower caesarean section (CS) rates without increasing adverse pregnancy outcomes. [14,15] WHO recommends IOL procedure to be done only when it is more advantageous to terminate the pregnancy than to let it progress and it also recommends non-clinical interventions to reduce unnecessary CS delivery. [16]

So, the aim of this study was to identify those pregnancies which are associated with greater risk of cesarean delivery when induced at term.

Material & Methods

A case–control study was conducted in the Department of Obstetrics and Gynaecology, JLNMCH, Bhagalpur, Bihar, India over a period of one year(March 2020 to Feb 2021) A total of 150 women were studied, out of which 50 women delivered by emergency caesarean section and 100 women delivered vaginally. The cohort included all women with a live singleton fetus in the cephalic position and induced at term (C37 weeks). Cases were women who delivered by emergency caesarean section and controls were women with a vaginal delivery among the cohort. Informed consent was taken for all patients. Ethical clearance was obtained from institutional review and the Ethics Committee.

Exclusion Criteria

The exclusion criteria include previous cesarean section, uterine scar (myomectomy), multifetal gestation, malpresentation, and where vaginal delivery was otherwise contraindicated.

Information of women induced was obtained from case records and antenatal cards. All women enrolled were examined prior to induction and induced using Dinoprostone gel (0.5 mg) intracervically (doses may be repeated after 6 h, with a maximum of two doses in 24 h) and if required, labor was augmented using oxytocin (starting dose of 6 mU/min, with 6 mU/min increase every 40 min, but employs flexible dosing based on uterine response).

Statistical Analysis

The data were modeled through multiple logistic regressions, and adjustments were made for independent variables that had a significant influence on the risk of cesarean delivery in the univariate analysis. The data analysis was performed using IBM SPSS Statistics version 18 software and Hosmer and Lemeshow Test. Student's t-test was performed to see mean difference. Chi-square test was performed to see difference in proportions.

Results

Table 1: Analysis of risk factors for cesarean delivery

Risk factors	Cesarean delivery (N = 50)N%	Vaginal delivery (N = 100) N%	Crude odds ratio (95 % CI)
Maternal age			
<35 years	44 (88)	97 (97)	7.359 (1.586–34.367)
>35 years Body mass index (Kg/M^2)	6 (12)	3 (3)	
<30	35 (70)	93 (93)	5.75 (2.934–11.996)
>30	15 (30)	7 (7)	
Parity			
Nullipara (0)	45 (90)	59 (59)	0.172 (0.092–0.355)
Multipara (C1)	15 (10)	41 (41)	
Bishops score			
<5	16 (32)	51 (51)	0.4245 (0.2559–0.6879)
>5	34 (68)	49 (49)	
Epidural analgesia			
No	15 (30)	30 (30)	1.1535 (0.6908–1.9360)
Yes	35 (70)	70 (70)	
Hypertensive disorders in pregnancy			
Yes	14 (28)	32 (32)	0.8543 (0.5032–1.4453)
No	36 (72)	68 (68)	
Gestational diabetes mellitus			
Yes	12 (24)	19 (19)	1.9830 (1.0587–3.7244)
No	38 (76)	81 (81)	

Postterm pregnancy			
Yes	15 (30)	30 (30)	1.0335 (0.6177–1.7411)
No	35 (70)	70 (70)	
IUGR			
Yes	1 (2)	12 (12)	0.0813 (0.0108–0.6402)
No	49 (98)	88 (88)	
PROM			
Yes	11 (22)	14 (14)	1.3889 (0.7389–2.6019)
No	39 (78)	86 (86)	

Our study had shown that maternal age C35 years, BMI C30 kg/m2, nulliparity, preinduction Bishops score less than 5, gestational diabetes mellitus, and intrauterine growth restriction are significantly associated with caesarean delivery. The presence of epidural analgesia, gestational hypertension, postterm pregnancy, and premature rupture of membranes was not associated with significant increase in cesarean delivery if labor was induced at term.

Table 2: Multivariate analysis of risk factors for cesarean delivery

Risk factors	Adjusted odds ratio (95 % CI)	Sig.
Maternal age	7.490	0.003
Body mass index	29.441	0.000
Nulliparity	26.034	0.000
Bishops score	13.037	0.001
Epidural analgesia	0.312	0.525
Hypertensive disorders in pregnancy	0.390	0.536
Gestational diabetes mellitus	4.720	0.032
Postterm pregnancy	0.014	0.840
IUGR	9.012	0.002
PROM	1.046	0.360

Multivariate analysis showed statistically significance in terms of maternal age, BMI, nulliparity, Bishops score, gestational DM and IUGR.

Discussion

The history of labor induction dates back to the time of Hippocrates' original descriptions in which mammary stimulation and mechanical dilation of the cervical canal are used methods of induction. [17] Induction implies stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes. Augmentation refers to stimulation of spontaneous contractions that are considered inadequate. Induction is indicated when the benefits to either mother or fetus outweigh those of continuing the pregnancy. Common indications include gestational hypertension, premature rupture of membranes, non-reassuring fetal status, postterm pregnancy, intrauterine growth restriction, and various maternal medical conditions such as chronic hypertension and diabetes. Women with a previous preterm delivery had a higher risk of cesarean delivery after induced labor than those with at least one previous term delivery. This finding corresponds with the results of the study of Park et al. [18] He examined the predictive value of previous obstetric history, Bishop score and sonographic measurement of cervical length for predicting failed induction of labor in parous women at term. Induction failed in 15 women (14%) of whom 13 delivered vaginally after 24 hours and two had a caesarean delivery (1.8%). Our results are in line with the results of Park, indicating that the course of induction in women with a history of preterm delivery differs from women with a term delivery.

Using logistic regression analysis, all comparisons are estimated and expressed as OR with 95 % CI. Factors associated with cesarean delivery were analysed. Our study had shown that maternal age C35 years, BMI C30 kg/m2, nulliparity, preinduction Bishops score less than 5, gestational diabetes mellitus, and intrauterine growth restriction are significantly associated with caesarean delivery. The presence of epidural analgesia, gestational hypertension, postterm pregnancy, and premature rupture of membranes was not associated with significant increase in cesarean delivery if labor was induced at term. Poobalan et al [19] did a systematic review on the effect of BMI in nulliparous women on mode of delivery. They concluded that cesarean delivery risk is increased by 50 % in overweight women (BMI 25–30 kg/m2), and is more than double for obese women (BMI 30–35 kg/m2) compared with women with normal BMI (20–25 kg/m2). Study by Sheiner et al [20] and Ehrenberg et al [21] also showed significant association between obesity and

caesarean delivery even after the exclusion of hypertensive disorders and diabetes mellitus. Our study also has shown significant association between high BMI (>30 kg/m2) and cesarean delivery.

As far as role of preinduction Bishops score is concerned, our study has showed significant association between low preinduction Bishops score (<5) and caesarean delivery. Similar results were seen in study by Johnson et al. [22] Study by Ehrenberg et al [21] and Rosenberg et al [23] has shown significant association between cesarean delivery and pregestational as well as gestational diabetes mellitus. Our study has concluded the same results. The increased risk of CS on high birth weight infants may be explained by the high risk of labor obstruction that may be caused by shoulder dystocia which happens when the baby's anterior shoulder gets caught above the mother's pubic bone, leading to complications including brachial plexus injury or clavicle fracture, vaginal tears, and excessive bleeding. This obstruction eventually led to failure in vaginal delivery and hence, necessitates emergency CS delivery. [24]

In our study, postterm pregnancy is not significantly associated with cesarean delivery. Similar results were seen in a study by Sanchez-Ramos et al. [25] They recommended that labor induction at 41-weeks' gestation for otherwise an uncomplicated singleton pregnancy reduces cesarean delivery rates without compromising perinatal outcomes. Our study has shown that IUGR and cesarean deliveries are significantly associated. However, K E Boers and associates [26] have shown that there is no increase in operative and instrumental delivery rates in induced labors in pregnancies complicated by IUGR. In our study, pregnancies with PROM and induction of labor were not significantly associated with cesarean deliveries. Induction of labor in such cases reduces risk of maternal infections. Systematic review by Dare et al [27] concluded the same results.

Conclusion

A vaginal delivery is the best choice for both mother and child. However, it is better to take those patients with multiple risk factors for elective cesarean section rather than inducing them at term. Women with multiple risk factors for caesarean can be taken up for elective cesarean section rather than inducing them at term.

References

1. The Netherlands Perinatal Registry, 2006.
2. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, Munson ML. Births: final data for 2002. National vital statistics reports. 2003 Dec 17;52(10):1-13.
3. Induction of labor—Clinical Guideline (NICE, NHS), July 2008.
4. Yeast JD, Jones A, Poskin M. Induction of labor and the relationship to cesarean delivery: a review of 7001 consecutive inductions. American journal of obstetrics and gynecology. 1999 Mar 1;180(3):628-33.
5. Maslow AS, Sweeny AL. Elective induction of labor as a risk factor for cesarean delivery among low-risk women at term. Obstetrics & Gynecology. 2000 Jun 1;95(6):917-22.
6. Dublin S, Lydon-Rochelle M, Kaplan RC, Watts DH, Critchlow CW. Maternal and neonatal outcomes after induction of labor without an identified indication. American Journal of Obstetrics and Gynecology. 2000 Oct 1;183(4):986-94.
7. Gülmezoglu AM, Crowther CA, Middleton P, Heatley E. Induction of labour for improving birth outcomes for women at or beyond term. Cochrane database of systematic reviews. 2012(6).
8. Koopmans CM, Bijlenga D, Groen H, Vijgen SM, Aarnoudse JG, Bekedam DJ, van den Berg PP, de Boer K, Burggraaff JM, Bloemenkamp KW, Drogtrop AP. Induction of labour versus expectant monitoring for gestational hypertension or mild pre-eclampsia after 36 weeks' gestation (HYPITAT): a multicentre, open-label randomised controlled trial. The Lancet. 2009 Sep 19;374(9694):979-88.
9. Dare MR, Middleton P, Crowther CA, Flenady V, Varatharaju B. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more). Cochrane database of systematic reviews. 2006(1).
10. Macer JA, Macer CL, Chan LS. Elective induction versus spontaneous labor: a retrospective study of complications and outcome. American journal of obstetrics and gynecology. 1992 Jun 1;166(6):1690-7.
11. Smith LP, Nagourney BA, McLean FH, Usher RH. Hazards and benefits of elective induction of labor. American journal of obstetrics and gynecology. 1984 Mar 1;148(5):579-85.
12. Nicholson JM, Caughey AB, Stenson MH, Cronholm PF, Kellar L, Bennett I, Margo K, Straton JB. The active management of risk in multiparous pregnancy at term: association between a higher preventive labor induction rate and improved birth outcomes. American journal of obstetrics and gynecology. 2009 Mar 1;200(3):250-e1.
13. Kwee A, Bots ML, Visser GH, Bruinse HW. Obstetric management and outcome of pregnancy in women with a history of caesarean section in the Netherlands. European Journal of Obstetrics & Gynecology and

Reproductive Biology. 2007 Jun 1;132(2):171-6.
14. Mozurkewich E, Chilimigras J, Koepke E, Keeton K, King VJ. Indications for induction of labour: a best-evidence review. BJOG: An International Journal of Obstetrics & Gynaecology. 2009 Apr;116(5):626-36.
15. Hannah ME, Hannah WJ, Hellmann J, Hewson S, Milner R, Willan A, Canadian Multicenter Post-term Pregnancy Trial Group*. Induction of labor as compared with serial antenatal monitoring in post-term pregnancy: a randomized controlled trial. New England Journal of Medicine. 1992 Jun 11;326(24) :1587-92.
16. World Health Organization (WHO). Recommendation for labor induction.
17. De Ribes C. De l'Accouchement Provoque, Dilatation du Canal Genital al'Aide de BallonsIntroduitsdans la Cavite Uterine Pendant la Grossesse. Paris, Steinheil. 1988.
18. Park KH, Hong JS, Shin DM, Kang WS. Prediction of failed labor induction in parous women at term: role of previous obstetric history, digital examination and sonographic measurement of cervical length. Journal of Obstetrics and Gynaecology Research. 2009 Apr;35(2):301-6.
19. Poobalan AS, Aucott LS, Gurung T, Smith WC, Bhattacharya S. Obesity as an independent risk factor for elective and emergency caesarean delivery in nulliparous women–systematic review and meta-analysis of cohort studies. Obesity reviews. 2009 Jan;10(1):28-35.
20. Sheiner E, Levy A, Menes TS, Silverberg D, Katz M, Mazor M. Maternal obesity as an independent risk factor for caesarean delivery. Paediatric and perinatal epidemiology. 2004 May;18(3):196-201.
21. Ehrenberg HM, Durnwald CP, Catalano P, Mercer BM. The influence of obesity and diabetes on the risk of cesarean delivery. American journal of obstetrics and gynecology. 2004 Sep 1;191(3):969-74.
22. Johnson DP, Davis NR, Brown AJ. Risk of cesarean delivery after induction at term in nulliparous women with an unfavourable cervix. Am J Obstet Gynecol. 2003;188(6): 1565–72.
23. Rosenberg TJ, Garbers S, Lipkind H, Chiasson MA. Maternal obesity and diabetes as risk factors for adverse pregnancy outcomes: differences among 4 racial/ethnic groups. American journal of public health. 2005 Sep;95(9):1545-51.
24. Caughey AB, Stotland NE, Washington AE, Escobar GJ. Maternal and obstetric complications of pregnancy are associated with increasing gestational age at term. American journal of obstetrics and gynecology. 2007 Feb 1;196(2):155-e1.
25. Sanchez-Ramos L, Olivier F, Delke I, Kaunitz AM. Labor induction versus expectant management for postterm pregnancies: a systematic review with meta-analysis. Obstetrics & Gynecology. 2003 Jun 1;101(6):1 312-8.
26. Boers KE, Vijgen SM, Bijlenga D. Scherjon SA; DIGITAT study group. Induction versus expectant monitoring for intrauterine growth restriction at term: randomised equivalence trial (DIGITAT). BMJ 341: c7087. 2010.
27. Dare MR, Middleton P, Crowther CA, Flenady V, Varatharaju B. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more). Cochrane database of systematic reviews. 2006(1).