

Indications for labour induction and predictors for failed induction at KMCTH

Rayamajhi RT¹, Karki C², Shrestha N³, Padhye SM⁴

¹Assistant Professor, ²Associate Professor, ³Senior Resident, ⁴Professor and Head.
Department of Obs/Gyn, Kathmandu Medical College Teaching Hospital.

Abstract

Objective: To study the incidence and indications for labour induction and study the predictors of failed induction.

Materials and methods: A hospital based prospective study done over a 12 month period between 1st November 2007 to 30th October 2008. Selection criteria: Singleton pregnancies beyond 37 weeks with vertex presentation and unscarred uterus requiring induction of labour.

Results: The incidence of labour induction was 19.7%. Operative delivery was 34.6% in the study group and 27.4% in those with spontaneous onset of labour. 74.07% of the induction group required operative delivery for failed induction and 25.03% for foetal distress. The predominant indication for induction was post term pregnancy (51.28%) followed by PROM (17.3%), isolated oligohydramnios (8.97%), hypertensive disorders of pregnancy (8.33%), maternal perception of decreased foetal movements (7.69%) and others. Failed induction was higher in nulliparas (41.2%) as compared to multiparas (23.7%). Failure rate was 53.8% when maternal age >30y and 28.2% in those <30y. Women with normal BMI had a failure rate of 25.6% compared to 36% for overweight and 44.4% for obese women. 24.1% had failed induction when Bishop score was >5 and 40.8% when Bishop score was <5. Between 38-41 weeks pregnancy failed induction occurred in 28-31% while it was higher at <38 weeks and >41 weeks pregnancy. The best outcome was seen when the birth weight was 2500-2900g (22.5% failures) while 72.7% had failed induction when the birth weight was >3500g. The duration of induction was >24 hours in 42.6% of women and 48.2% were in the latent phase of labour when taken for caesarean section.

Conclusion: Despite the proven benefit of induction of labour in selected cases, one must keep in mind its impact on increasing the rates of operative delivery. Strategies for developing practice guidelines may help to prevent unwarranted case selection and help to reduce the current high operative delivery rates.

Key words: caesarean section rate, failed induction, induction of labour.

The goal of induction of labour is to pre-empt the natural process of labour by initiating its onset artificially by stimulating cervical ripening and uterine contractions before this occurs spontaneously. Generally, induction of labour has merit as a therapeutic option when benefits of expeditious delivery outweigh the risk of continuing the pregnancy. Labour induction has become commonplace in modern obstetrics. According to most current studies, the rate varies from 9-33% of all pregnancies annually. Clearly, the favourability of the cervix has a substantial impact on the potential success of any labour induction. The effectiveness of PGE₂ to achieve cervical ripening and induction is currently beyond doubt. Other agents that have been employed for this purpose are misoprostol, mifepristone and relaxin. When the Bishop score is favourable, the preferred agent is oxytocin. Regardless of cervical status and parity, vaginal delivery can be anticipated in the majority of patients undergoing labour induction

Objective

To determine the incidence and outcome of labour induction, identify the common indications for induction and analyze the clinical variables associated with unsuccessful labour induction.

Materials and methods

This was a hospital based prospective study of obstetric patients selected for induction of labour at Kathmandu Medical College Teaching Hospital during a one year period from November 1, 2007 to October 30, 2008. Singleton pregnancies with vertex presentation and unscarred uterus at 37 completed weeks or more were

Correspondence

Dr. Roshan Thapa Rayamajhi
Assistant Professor, Dept of Obs/Gyn,
KMCTH
E-mail: roshantr@hotmail.com

the inclusion criteria. The indications and the outcome of induction of labour were studied. The clinical variables analyzed were parity, maternal age and body mass index, Bishop score at the initiation of induction, gestational age, the phase of labour and the interval from induction to caesarean section and foetal birth weight.

Results

The total number of deliveries during the study period was 790 of which 156 were selected for induction of labour, giving an incidence of labour induction of 19.7%. Of the 156 cases, 91 (58.33%) underwent vaginal deliveries and 11 (7.05%) had instrumental deliveries. Hence, 102 (65.38%) of the study group had successful induction. 54 cases from the study group required Caesarean sections giving a failure rate of 34.6%. Of the cases that underwent Caesarean sections, 40 (74.07%) were for failed induction and 14 (25.9%) were for foetal distress. No case of uterine hyperstimulation was noted. The total number of Caesarean deliveries during the study period was 228 giving an overall operative delivery rate of 28.8%. In the study group, the operative delivery rate was higher (n=54, Caesarean section rate: 34.6%) compared with women who were not induced (n=174 Caesarean section rate: 27.44%).

The predominant indication for induction was post term pregnancy (n=80, 51.28%). The timing of induction was variable and included all cases induced at or beyond 40 completed weeks of gestation. Premature rupture of membranes was the second leading indication seen in 27 (17.3%) cases followed by isolated oligohydramnios in 8.97% (n=14) and hypertensive disorders of pregnancy with or without IUGR and oligohydramnios in 8.33% (n=13). Maternal perception of decreased foetal movements was the indication in 7.69% (n=12) and isolated IUGR in 3.84% (n=6) while 1.92% (n=3) had a history of unexplained stillbirth at term and there was one (0.64%) case of gestational diabetes in the study group as is shown in Table 1.

Nulliparas (n=97) formed the larger part of the study group with a higher incidence of failed induction (41.2%) compared to multiparas (n=59, 23.7%), as shown in Fig. 1. Maternal age was another variable analyzed as a risk factor for failed induction. Women above 30 years (n=39) had a higher failure rate (n=21, 53.84%) compared to those aged 30 years or less (n=117) in whom 28.2% (n=33) had failed induction underscoring advanced maternal age as a risk factor for unsuccessful induction.

The study group was classified according to their BMI as normal (BMI <25kg/m²), overweight (BMI 25-29.9kg/m²) and obese (BMI >30kg/m²). Women with normal BMI (n=43) had a failure rate of 25.6% (n=11)

as compared to women in the overweight category (n=86) in which 36% (n=31) had a failed induction and in the obese category (n=27), the failure rate was 44.4% (n=12) as illustrated in Fig. 2. Here too, a strong association between high BMI and unsuccessful induction is demonstrated.

In the group with a Bishop score of less than 5 (n=98) at the initiation of induction, 40.8% (n=40) underwent Caesarean section while those with a score of more than 5 (n=58) required Caesarean section in 24.1% (n=14). Hence, out of the 54 failures, the 0-5 Bishop score group accounted for the majority of failures viz. 70.1%. This is illustrated in Fig.3.

The outcome of induction was also analyzed according to gestational age of the patients. Failed induction was higher in the 37-38 weeks (n=6; failure rate: 50%) and >41 weeks gestational age group (n=32; failure rate: 56.3%) respectively. At 38-39 weeks pregnancy (n=38), the failure rate was 28.9% (n=11), while at 39-40 weeks pregnancy (n=32), 28.1% (n=9) had failed induction and at 40-41 weeks pregnancy (n=48), 31.25% (n=13) required Caesarean delivery. Hence, successful induction was noted to be higher between 38-41 weeks gestational age in this study.

The interval from induction of labour to caesarean section was <4 hours in 7.4% (n=4) cases, 4-12 hours in 20.4% (n=11) cases, 12-24 hours in 29.6% cases (n=16) and >24 hours in 42.6% (n=23) cases as shown in Fig 4. indicating that most patients were allowed reasonably adequate time before deeming that induction had failed. Analyzing the phase of labour when the decision was taken for Caesarean section, it was found that 48.2% (n=26) were in the latent phase, 14.8% (n=8) in the active phase while in 37% (n=20) women there was failure to establish either any cervical dilatation or even uterine contractions.

Foetal birth weight of the study group was also analyzed and is shown in Fig 5. The most favourable outcome was seen between 2500-2900g (n=82) where 77.5% (n=60) were born vaginally. Of the babies with <2500g birth weight (n=12), 58.4% (n=7) were delivered vaginally and of the babies with 3000-3400g birth weight (n=51) 58.8% (n=30) were born vaginally. Only 27.3% (n=3) out of the 11 babies with birth weight 3500-4000g (n=11) were born vaginally and there were no babies with birth weight >4000g in the study group.

Table 1: Indications for induction of labour

Indications	(n)	%
Post term pregnancy	80	51.28%
PROM	27	17.30%
Oligohydroamnios (isolated)	14	8.97%
Hypertensive disorders of pregnancy with or without oligohydramnios and IUGR	13	8.33%
Maternal perception of decreased fetal movements IUGR (isolated)	12	7.69%
IUGR (isolated)	6	3.84%
H/O stillbirth at term	3	1.92%
Gestational diabetes	1	0.64%

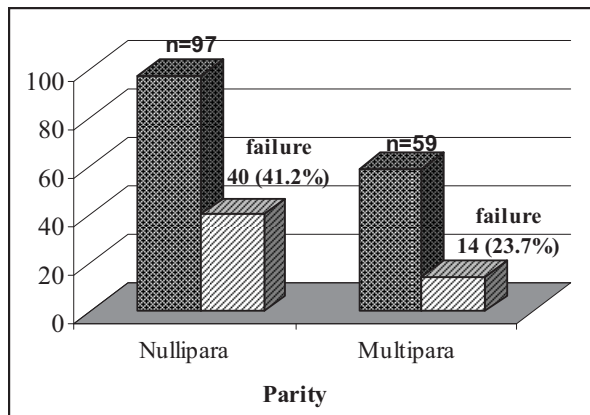


Fig 1: Association between parity and failed induction

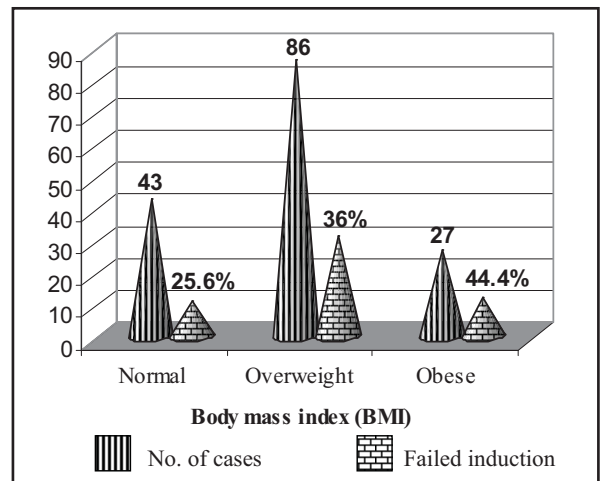


Fig 2: Association between BMI and failed induction

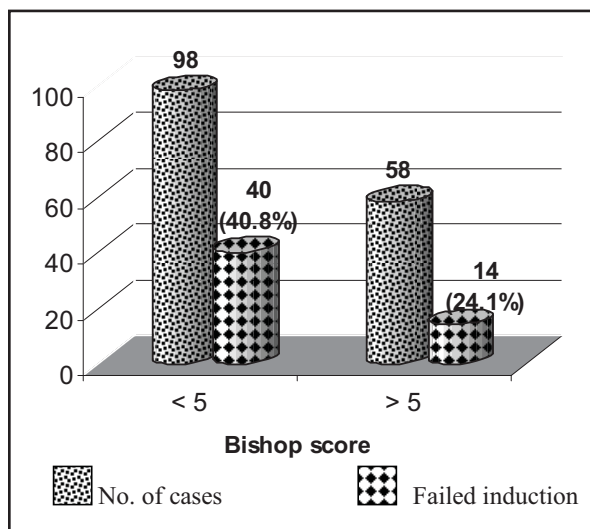


Fig 3: Association between Bishop score and failed induction

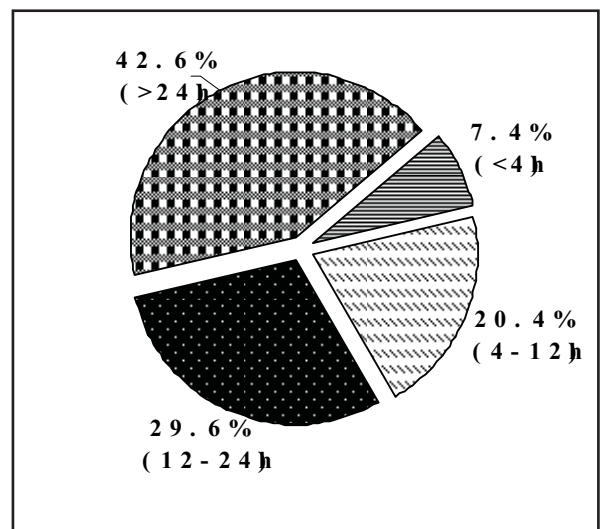


Fig 4: Interval from induction to caesarean section

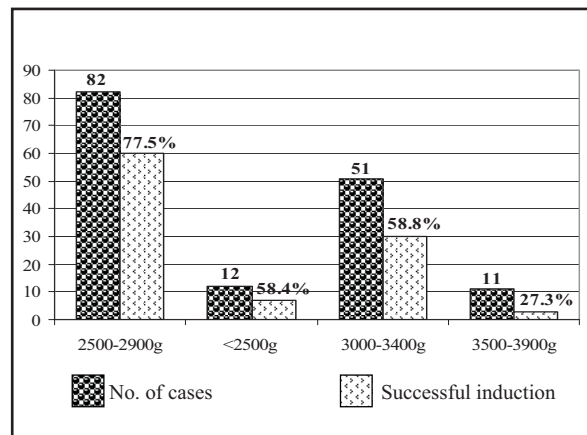


Fig 5: Successful induction in relation to birth weight

Discussion

Induction of labour is one of the fastest growing medical procedures in current obstetric practice. American studies have documented a nationwide more than doubling of induction rates between the late eighties and the late nineties.^{1,2} Although induction of labour has been efficacious in the management of post term pregnancy and in expediting delivery when the condition of the mother or infant makes continuation of pregnancy hazardous, the recent rapid increase in inductions particularly for debatable indications has generated concern among clinicians. As in our study, there is ample evidence that operative delivery is significantly higher with induced labour compared with those who enter labour spontaneously with especially high failure rates in the nullipara with an unfavourable cervix.^{3,4,5,6} Buist and Ranchhod³ have reported an operative delivery rate with induced labour to be 21.5% versus 14.9% for those with spontaneous onset of labour whereas Seyb et al⁵ quoted a 17.5% caesarean delivery rate in the induction group compared to 7.8% in those experiencing spontaneous labour. Our study shows comparatively higher operative delivery rates which maybe a consequence of its smaller sample size or a more liberal approach towards caesarean section. Hence tailoring induction of labour to the cervical score and indication might reduce the caesarean section rate for failed induction.

While the induction rate in our series was 19.7%, larger studies have also reported similar rates with American authors^{1, 2, 4} citing rates of around 19%. A Singapore based study⁷ has reported a rate of 10% while a Finnish study⁶ has reported that induction rates were lower in specialised central hospital (17.7%) compared with units of lowest level of specialisation like health centres (29.4%) and local hospitals (23.6%). While the rate of failed induction was 34.6% in our series, it was reported to be 23.4% in a Dutch study⁸, 16.8% in a UK based study⁹, 12% in a Turkish study¹⁰ and 37.6% in a

Nigerian study¹¹. This may point towards the need to define guidelines to initiate labour induction avoiding it in settings of unproved benefit which may aid efforts to reduce the primary caesarean delivery rate. While the common indications for induction in our study, were post term pregnancy, PROM, decreased maternal perception of foetal movements, hypertensive disorders of pregnancy and oligohydramnios, Mackenzie¹² has reported post term pregnancy and maternal hypertensive disorders as the major indications in the last 50-60 years and an Irish study¹³ has likewise cited prolonged pregnancy as the chief indication while Seyb et al⁵ have documented a rising trend in elective labour inductions viz. "obstetric conveniences" in the US.

Most authors have noted that increasing parity had a favourable bearing on the outcome of induction. Compared to failure rates in nulliparas of 41.2% and in multiparas of 23.7% in our study, Alberico et al¹⁴ have reported a failure rate in multiparas to be as low as 5.7% with significantly shorter labour while an Austrian¹⁵ and a US based study¹⁶ also cite primiparity as significantly reducing the probability of successful induction compared with multiparity. As in our study, maternal age and obesity were also found to be independent risk factors for failed induction^{8,17}. An unfavourable Bishop score has been amply documented^{7,8,10,16,18,19} as being the predominant risk factor for a caesarean delivery for failed induction as was seen in our series. Berhan and Dwivedi¹⁹ have reported 45.7% induction failures in the 0-5 Bishop Score group accounting for 67.5% of total failures compared to 40.8% failures in our study which constituted 70.1% of total failures. Likewise, increasing gestational age and birth weight of 3500g or higher are other variables documented to significantly increase the risk for caesarean delivery^{8,10} as was supported by our findings. A US based study²⁰ has established that a latent phase of up to 18 hours in nulliparous women allows the majority to achieve a vaginal delivery without any

hazard to the mother or neonate. In our study 42.6% of the women were taken for caesarean section after >24hours of trial of induction although we have not included data of the duration of latent phase in those with successful inductions.

Conclusion

Induction in the setting of an unfavourable cervix especially in the nulliparous woman can result in prolonged labour, failed induction and an increased caesarean delivery rate with foetal distress accounting for only a minority of failures. Other variables which increased the likelihood of failed induction were advanced maternal age, maternal BMI in the overweight and obese range and foetal birth weight more than 3500g. Successful induction was more likely when initiated between 38-41 weeks and almost half of the women required more than 24 hours of induction. The common indications for induction were post term pregnancy, PROM, isolated oligohydramnios, hypertensive disorders of pregnancy and maternal perception of decreased foetal movements. Indications aside, induction of labour correlates with higher operative delivery rates compared with those with spontaneous onset of labour. Hence it would seem prudent to maintain a cautious approach when deciding for an induction, avoiding the procedure unless it is definitely warranted in order to prevent unnecessary increase in operative deliveries.

References

1. Rayburn WF, Zhang J. Rising rates of labor induction: present concerns and future strategies. *Obstet Gynecol.* 2002 Jul;100(1):164-7.
2. Macdorman MF, Mathews TJ et al. Trends and characteristics of induced labour in the United States, 1989-98. *Paediatr Perinat Epidemiol.* 2002 Jul;16(3):263-73.
3. Buist R, Nemisha R. Induction of Labour: Indications and Obstetric Outcomes in a tertiary referral hospital. *N Z Med J* 1999;112:251-3.
4. Moore LE, Rayburn WF. Elective induction of labour. *Clin Obstet Gynecol.* 2006 Sep;49(3):698-704.
5. Seyb ST, Berka RJ et al. Risk of caesarean delivery with elective induction of labour at term in nulliparous women. *Obstet Gynecol.* 1999 Oct;94(4):600-7.
6. Jarvelin MR, Hartikainen-Sorri A, Rantakallio P. Labour induction policy in hospitals of different levels of specialization. *BJOG* 2005 Aug;100(4):310-315.
7. Arulkumaran S, Tambyraja RL, Heng S, Rathnam SS. Failed induction of labour. *Aust N Z J Obstet Gynaecol.* 2008 Jun;25(3):190-3.
8. Vrouenraets FP, Roumen FJ, Dehing CJ et al. Bishop score and risk of Caesarean delivery after induction of labour in nulliparous women. *Obstet Gynecol.* 2005 Apr;105(4):688-9.
9. Nooh A, Baghdadi S, Raouf S. Induction of labour: how close to the evidence-based guidelines are we? *J Obstet Gynaecol.* 2005 Jul;25(5):451-4.
10. Caliskan E, Dilbaz S, Gelisen O et al. Unsuccessful labour induction in women with unfavourable cervical scores: predictors and management. *Aust N Z J Obstet Gynaecol.* 2004 Dec;44(6):562-7.
11. Oboro VO, Isawumi AI, Akinola SE et al. Factors predicting failure of labour induction. *Niger Postgrad Med J.* 2007 Jun;14(2):137-9.
12. Mackenzie IZ Induction of labour at the start of the millennium *Reproduction* 2006 Jun;131(6):989-98.
13. Duff C, Sinclair M. Exploring the risks associated with induction of labour: a retrospective study using the NIMATS database. Northern Ireland Maternity System. *J Adv Nurs.* 2000 Feb;31(2):410-7.
14. Alberico s, Fadalti M, Grimaldi E et al. Eligibility criteria for labour induction with prostaglandins. *Clin Exp Obstet Gynecol.* 1997;24(2):61-6.
15. Rouse DJ, Owen J, Hauth JC. Criteria for failed labour induction: prospective evaluation of a standardized protocol. *Obstet Gynecol.* 2000 Nov;96(5):671-7.
16. Bodner-Adler B, Bodner K, Patelsky N. Influence of labor induction on obstetric outcomes in patients with prolonged pregnancy: a comparison between elective labour induction and spontaneous onset of labor beyond term. *Wien Klin Wochenschr.* 2005 Apr;117(7-8):287-92.
17. Goodall PT, Ahn JT, Chapa JB, Hibbard JU. Obesity as a risk factor for failed trial of labour in patients with previous caesarean delivery. *Am J Obstet Gynecol.* 2005 May;192(5):1423-6.
18. Xenakis EM, Piper JM, Conway DL, Langer O. Induction of labour in the nineties: conquering the unfavourable cervix. *Obstet Gynecol.* 1997 Aug;90(2):235-9.
19. Berhan Y, Dwivedi AD. Currently used oxytocin regimen outcome measures at term and postterm: Outcome indicators in relation to Bishop Score and other covariates. *Ethiop Med J.* 2007 Jul;45(3):243-50.
20. Simon CE, Grobman WA. When has an induction failed? *Obstet Gynecol.* 2005 Apr;105(4):705-9.