

Review Articles

Paradigm Shift in Clinical Practice of Induction of Labor: A Single Centre Experience and Literature Review

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Abstract:

The burden of induction of labor is rising globally. The clinical practice guidelines on induction of labor is time bound and must be built on evidence based practice. The scope of update must be contextual to the local setting with expected positive implications. Any recommendations or change in practice must ensure feasibility, accessibility and practicality. We present a review on IOL adapted to our setting.

Keywords: *Induction of labor; Evidence based practice; Artificial sweeping of membrane; Amniotomy.*

Introduction:

Induction of labor (IOL) is defined as the artificial stimulation of the process of labor. The ultimate goal is to have optimal maternal, fetal and neonatal outcome in line with Millennium Development Goal 4 & 5. Globally the rate of IOL differs from country to country; 20% in the US¹ to 4.4% and 12 % in Africa and Asia respectively². Sri Lanka has the highest rate in the south Asian region with over 35% of the labor induced². Overall, 1 in every 4 pregnant women undergo induction of labor¹.

Bhutan, by constitution mandates free health care to all her citizens. The lower middle income country (LMIC) in the Himalayas has progressed steadily over the last 3 decades in terms of maternal health despite the limited human resources. The current MMR and NMR stands at 89/100000 live births and 16/100000 live births respectively³ in this country. The institutional delivery rate has crossed over 90% and this has put further constraint on the already overburdened functional capacity in terms of skilled manpower and logistic support.

The maternity ward at JDWNRH with the capacity of 36 beds bear the maximum burden of obstetric referral in the country. The existing manpower of 5 obstetricians, 6 residents and 12 nurses on shift duty

barely meet the minimum skilled health care workers requirement^{4,5}. At any given point of time, the ward has 8-10 women on induction of labor. The hospital recorded 4522 deliveries in 2019 and 1104 induction of labour corresponding to 25% rate of IOL⁵. Overcrowding and high patient turnover has inadvertently compromised the quality of obstetric care in recently.

The current practice of low risk formal IOL is based on NICE/RCOG guidelines 2013 which states 41 weeks as the minimum period of gestation⁶. The commonly used methods of IOL are vaginal misoprostol 25 micrograms 6 hourly for 4 doses based on FIGO recommendation 2017⁷. The oxytocin infusion in nullipara initially starts at 5 mIU/minute with every 30 minutes incremental dose of 5mIU/minute to maximum of 35 mIU/minute. A second cycle with 10 mIU/minute is initiated which ends at 60 mIU/minute with cumulative duration of 6 hours. Using the same condition in multipara, the initial dose is set at 2.5 mIU/minute with a maximum of 17.5mIU/minute and the second cycle initiated at 5 mIU/minute and reaching a maximum of 35 mIU/minute. Oxytocin break is observed overnight and the same protocol is repeated in the next morning. Failed IOL is diagnosed once the second day oxytocin infusion is

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complete in the absence of initiation of labor. The IOL pre requisites and safety checklist are followed as per the hospital protocol.

Can evidence based practice in IOL come as a rescue?

Gating at the entry point.

Performing IOL at the obstetrics & gynecology outpatient department and mother & child health unit with artificial separation of membrane (ASM) / membrane sweeping is a safe option in low risk mothers at term^{8,9}. Those in the ASM / membrane sweeping group had 20% likelihood of entering labor compared to the expectant group. The intervention group also had approximately 50% less chance of undergoing formal induction. The other method such as vaginal misoprostol could be too early to initiate in view of inconclusive evidence in terms of maternal and neonatal outcome¹⁰.

Formal induction in the ward: The methods

A systematic review by Alferivic et al has reported vaginal misoprostol 50 microgram and IV oxytocin with amniotomy/artificial rupture of membrane as the best induction method to hasten vaginal delivery within 24 hours¹¹. In view of limited intra procedural care and safety profile, 50 microgram vaginal misoprostol has been replaced with 25 microgram dose in our setting¹². Amniotomy alone would not be an option to induce labor as there is paucity of evidence on its effects and its association with higher rate of oxytocin requirement and longer I-D interval¹³. Moreover, the simultaneous application of oxytocin and amniotomy may not be practical in unfavorable cervix and lead to increased rate of cesarean section especially in nulliparous and obese women¹⁴. Although early amniotomy with ripened cervix would reduce induction to delivery (I-D) interval without significant adverse maternal and neonatal outcome, the issue of 24 hour standby operation room (OR) facility and human resources has been a detrimental factor^{14,15}. Amniotomy as a single or combined method of induction especially in an unengaged head requires a double set up which is not available every time in our setting.

The use of high versus low dose oxytocin regimen in IOL is entirely optional. The primary outcome of cesarean section or vaginal birth did not differ between the two groups but had a higher rate of uterine hyperstimulation in the high dose group^{16,17}.

An attractive option to reduce uterine hyperstimulation would be to discontinue oxytocin infusion once the active stage of labor has been achieved^{18,19}. The recent use of an infusion pump has improved accurate dosing of IV oxytocin in mIU/min or its equivalent in drops/min. Preparation of oxytocin infusion and dose calculation must be standardized. This is of paramount importance as oxytocin is labelled by ISMP as a "high alert" drug with unpredictable side effects leading to many medico legal issues. The incremental interval has been set at 30-45 minutes based on pharmacokinetic evidence although 30 minutes is being used in most settings due to practical convenience²⁰.

Combined method of IOL has shown promising results in terms of I-D interval without significant adverse maternal and neonatal outcome. The combination groups were twice as likely to deliver when compared to the single method with shorter I-D interval^{15,21,22}. Simultaneous Foley catheter and oxytocin combination is known to reduce I-D interval compared to the sequential combination²³

Elective induction at 39 week gestation

Contrary to previous guidelines, the ARRIVE trial has showed new light into the safety of induction at 39 weeks in low risk mothers. Women in the induction group had 20% less risk compared to expectant management group in terms of primary perinatal outcome. There was a significant reduction in gestational hypertension and cesarean delivery in the induction group. Although the duration from induction to delivery was higher in the induction group, it was offset by the longer postoperative hospital stay in the expectant group²⁴. Subsequent studies supported the findings²⁵⁻²⁷. Souter et al in their retrospective cohort study reported elective induction at 39 weeks has more favorable outcomes both in nulliparous and multiparous mothers apart from the higher rate of operative vaginal delivery noted in nulliparous women²⁸. However, meta analysis by Sotiriadis et al found very low quality evidence to support the higher rate of operative vaginal deliveries in the 39 weeks induction group compared to the expectant group while maintaining the positive findings of other studies²⁹. The indirect benefit with this elective induction would be reducing the rate of cesarean section which currently stands at eighteen percent³⁰. The crux of ARRIVE trial lies in calculating the accurate gestation lest we fail to reap the maximal benefit from this intervention.

Mitigating failed induction

The concept of failed induction in contemporary obstetrics is a grey area. Time bound practical definition with onset of latent phase to active stage of labor seems to bear in the ultimate goal of induction in terms of safety. A safe time frame of at least 12-15 hours of latent phase be allowed before diagnosing failed induction. In practice, latent phase starts with IV oxytocin, artificial or spontaneous rupture of membrane whichever occurs later. This has been shown by Banos et al and Grobman et al that maximum time be allowed for probability of normal vaginal delivery without compromising the maternal and neonatal outcome^{31,32}. Kawakita et al has shown that at 18 hours of latent phase defined as start of oxytocin or rupture of membrane, only 1.4% and 0.3% of nulliparous and multiparous women remain in latent phase. However, the upper limit of latent phase is brought down to 12 and 15 hours for nulliparous and multiparous respectively in view of the escalating rate of adverse neonatal outcome after these time periods³³. We need to follow this practical approach in defining the failure of induction rather than judging by convenience. Perhaps, this would be an attractive option to reduce the burden of the primary cesarean section due to failed induction in the country which stands at eleven percents³⁰.

Conclusion

Recommendations on clinical practice guidelines must be built on evidence based practice. ASM/membrane sweeping as outpatient strategy is safe and effective intervention to reduce inpatient admission for formal IOL. Low risk mothers should be offered the choice of IOL by 39 weeks. A failed single method of IOL must be followed by a combination method. Feasible combinations such as amniotomy-oxytocin and Foley catheter-oxytocin must be tried in the right candidates within the safe time frame to mitigate the diagnosis of failed IOL.

References:

- Martin JA, Hamilton BE, Osterman MJK, Driscoll AK. Births: Final data for 2018. Natl Vital Stat Reports. 2019;68(13):1980–2018.
- Vogel JP, Souza JP, Gülmezoglu AM. Patterns and Outcomes of Induction of Labour in Africa and Asia: A Secondary Analysis of the WHO Global Survey on Maternal and Neonatal Health. PLoS One. 2013;8(6).
- Ministry of Health. Annual Health Bulletin 2020. Thimphu: Ministry of Health, Royal Government of Bhutan; 2020.
- Stones W, Visser GHA, Theron G, Di Renzo GC, Ayres-de-Campos D, Escobar MF, et al. FIGO Statement: Staffing requirements for delivery care, with special reference to low- and middle-income countries. Int J Gynecol Obstet. 2019;146(1):3–7.
- Jigme Dorji Wangchuck National Referral Hospital. Annual Report. Thimphu: QASD, JDWNRH; 2019.
- NICE Guidance: Induction of labour Evidence Update July 2013. Evidence [Internet]. 2013;44(July):1–124.
- Morris JL, Winikoff B, Dabash R, Weeks A, Faundes A, Gemzell-Danielsson K, et al. FIGO's updated recommendations for misoprostol used alone in gynecology and obstetrics. Int J Gynecol Obstet. 2017;138(3):363–6.
- Avdiyovski H, Haith-Cooper M, Scally A. Membrane sweeping at term to promote spontaneous labour and reduce the likelihood of a formal induction of labour for postmaturity: a systematic review and meta-analysis. J Obstet Gynaecol (Lahore). 2019;39(1):54–62.
- Finucane EM, Murphy DJ, Biesty LM, Gyte GML, Cotter AM, Ryan EM, et al. Membrane sweeping for induction of labour. Cochrane Database Syst Rev. 2020;2020(2).
- Jp V, Ao O, Aj K, Livio S, Je N, Alfirevic Z, et al. in outpatient settings (Review). 2017;
- Alfirevic Z, Keeney E, Dowswell T, Welton NJ, Medley N, Dias S, et al. Which method is best for the induction of labour? A systematic review, network meta-analysis and cost-effectiveness analysis. Health Technol Assess (Rockv). 2016;20(65):1–583.
- McMaster K, Sanchez-Ramos L, Kaunitz AM. Balancing the efficacy and safety of misoprostol: A meta-analysis comparing 25 versus 50 micrograms of intravaginal misoprostol for the induction of labour. BJOG An Int J Obstet Gynaecol. 2015;122(4):468–76.
- Bricker L, Luckas M. Amniotomy alone for induction of labour. Cochrane Database Syst Rev. 2000;
- Battarbee AN, Glover A V., Stamilio DM. Association between early amniotomy in labour

- induction and severe maternal and neonatal morbidity. *Aust New Zeal J Obstet Gynaecol*. 2020;60(1):108–14.
15. De Vivo V, Carbone L, Saccone G, Magoga G, De Vivo G, Locci M, et al. Early amniotomy after cervical ripening for induction of labor: a systematic review and meta-analysis of randomized controlled trials. *Am J Obstet Gynecol*. 2020;222(4):320–9.
 16. Budden A, Ljy C, Henry A, Budden A, Ljy C, Henry A. of labour at term (Review). *Cochrane Database Syst Rev High-dose*. 2014;(10).
 17. Prichard N, Lindquist A, Hiscock R, Ruff S, Tong S, Brownfoot FC. High-dose compared with low-dose oxytocin for induction of labour of nulliparous women at term. *J Matern Neonatal Med*. 2019;32(3):362–8.
 18. Saccone G, Ciardulli A, Baxter JK, Quiñones JN, Diven LC, Pinar B, et al. Discontinuing oxytocin infusion in the active phase of labor: A systematic review and meta-analysis. *Obstet Gynecol*. 2017;130(5):1090–6.
 19. Boie S, Glavind J, Velu AV., Mol BWJ, Ulbjerg N, de Graaf I, et al. Discontinuation of intravenous oxytocin in the active phase of induced labour. *Cochrane database Syst Rev*. 2018;8:CD012274.
 20. Gonser M. Labor induction and augmentation with oxytocin: pharmacokinetic considerations. *Arch Gynecol Obstet*. 1995;256(2):63–6.
 21. Osoti A, Kibii DK, Tong TMK, Maranga I. Effect of extra-amniotic Foley's catheter and vaginal misoprostol versus vaginal misoprostol alone on cervical ripening and induction of labor in Kenya, a randomized controlled trial. *BMC Pregnancy Childbirth*. 2018;18(1):1–8.
 22. Bauer AM, Lappen JR, Gecki KS, Hackney DN. Cervical ripening balloon with and without oxytocin in multiparas: a randomized controlled trial. *Am J Obstet Gynecol*. 2018;219(3):294.e1-294.e6.
 23. Schoen CN, Grant G, Berghella V, Hoffman MK, Sciscione A. Intracervical Foley Catheter With and Without Oxytocin for Labor Induction: A Randomized Controlled Trial. *Obstet Gynecol*. 2017;129(6):1046–53.
 24. Grobman WA, Rice MM, Reddy UM, Tita ATN, Silver RM, Mallett G, et al. Labor Induction versus Expectant Management in Low-Risk Nulliparous Women. *N Engl J Med*. 2018;379(6):513–23.
 25. Saccone G, Della Corte L, Maruotti GM, Quist-Nelson J, Raffone A, De Vivo V, et al. Induction of labor at full-term pregnant women with uncomplicated singleton pregnancy: A systematic review and meta-analysis of randomized trials. *Acta Obstet Gynecol Scand*. 2019;98(8):958–66.
 26. Chen HY, Grobman WA, Blackwell SC, Chauhan SP. Neonatal and Maternal Adverse Outcomes Among Low-Risk Parous Women at 39-41 Weeks of Gestation. *Obstet Gynecol*. 2019;134(2):288–94.
 27. Grobman WA, Caughey AB. Elective Induction of Labor at 39 Weeks Compared With Expectant Management: A Meta-analysis of Cohort Studies. *Obstet Anesth Dig*. 2020;40(3):140–1.
 28. Souter V, Painter I, Sitcov K, Caughey AB. Maternal and newborn outcomes with elective induction of labor at term. *Am J Obstet Gynecol [Internet]*. 2019;220(3):273.e1-273.e11.
 29. Sotiriadis A, Petousis S, Thilaganathan B, Figueras F, Martins WP, Odibo AO, et al. Maternal and perinatal outcomes after elective induction of labor at 39 weeks in uncomplicated singleton pregnancy: a meta-analysis. *Ultrasound Obstet Gynecol*. 2019;53(1):26–35.
 30. Dorji T, Wangmo K, Dorjey Y, Dorji N, Chhetri DK, Tshering S, et al. Indications and factors associated with cesarean section in Bhutan: A hospital based study. *Int J Gynecol Obstet*. 2020;
 31. Banõs N, Migliorelli F, Posadas E, Ferreri J, Palacio M. Definition of Failed Induction of Labor and Its Predictive Factors: Two Unsolved Issues of an Everyday Clinical Situation. *Fetal Diagn Ther*. 2015;38(3):161–9.
 32. Grobman WA, Bailit J, Lai Y, Reddy UM, Wapner RJ, Varner MW, et al. Defining Failed Induction of Labor. *Obstet Anesth Dig*. 2018;38(4):215.
 33. Kawakita T, Reddy UM, Iqbal SN, Landy HJ, Huang CC, Hoffman M, et al. Duration of Oxytocin and Rupture of the Membranes before Diagnosing a Failed Induction of Labor. *Obstet Gynecol*. 2016;128(2):373–80.