Induction of labour practices at Botshabelo District Hospital: Assessing the institutional guidelines

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Abstract

Induction of labour (IOL) is defined as an artificial stimulation administered to initiate the delivery process before the onset of spontaneous labour. Setting-adapted guidelines need to be developed to promote safe maternal and neonatal care in line with the needs of a specific institution. This study aimed to describe and assess the current IOL practices at Botshabelo District Hospital, focusing on incidence, indications, induction methods, complications, and outcomes. A retrospective-descriptive study included all relevant data from IOL cases over six months between July and December 2017. From 168 attempted inductions of labour, 153 files were retrieved. The majority of cases (69.7%) were for post-dates. Normal vaginal delivery (NVD) was achieved in most patients (69.3%), while one patient had an assisted delivery. Thus, 30.1% of inductions failed and required caesarean sections. The incidence, indications, methods of induction, complications, and outcomes of IOL in BDH are in line with international guidelines; however, including the sweeping of membranes at term and balloon catheters as methods could improve the current guidelines.

Introduction

Induction of Labour (IOL) is defined as an artificial stimulation administered to initiate the delivery process before the onset of spontaneous labour.[1–3] This intervention intends to achieve vaginal delivery when significant health risks endanger the pregnancy.[4,5] Some of the reasons to consider IOL include prolonged pregnancy, high blood pressure disorders, ruptured membranes, gestational diabetes, foetal growth issues, *etc*.[6–8]

Different methods for IOL are available. Commonly used mechanical methods include balloon catheters and the artificial rupturing of membranes. Pharmacological methods include oral misoprostol, vaginal prostaglandin E2, intravenous oxytocin, and herbal and traditional remedies. Induction methods can also be combined. Although membrane sweeping is a recommended procedure in an attempt to commence labour, it is not classified as an IOL method. Still, it is a prophylactic method to prevent the necessity for IOL. Choosing a method depends on the following factors: resources, setting, clinical assessment of the patient, and the patient's preferences.[2,3]

A proper clinical assessment and judgement are necessary before the induction of labour is considered. A successful induction cannot be guaranteed, but factors like the method of induction, previous vaginal delivery, cervical ripeness (measured with a Bishop score) may contribute to the outcome of the induction.[1,3,8]

According to the NICE guidelines, induction is considered failed if the patient is not in labour after one cycle of treatment. After the initial attempt fails, the situation should be re-assessed; the method may be repeated, another method may be used, or the baby could be delivered with a caesarean section.[7]

There are, however, risks associated with IOL; thus, labour should only be induced when the anticipated delivery will be more beneficial than the continuation of the pregnancy.[6] The risks associated with IOL include – but are not limited to – uterine rupture, uterine hyperstimulation, prematurity, abruptio placenta, cord prolapse, foetal distress and a higher incidence of assisted deliveries (with its complications).[1–3,8] Maternal satisfaction with the delivery has also been found to be lower with IOL.[3,8]

To promote safe maternal and neonatal care, the WHO published guidelines on the IOL in 2011, with minor updates in 2018. This guideline addresses the settings, indications, complications, and methods for the induction of labour. They recommend that each country and setting adapt these guidelines by considering local factors, including the availability of accurate gestational age determination or theatre facilities.[1,6,9]

Botshabelo District Hospital (BDH) uses setting-adapted WHO guidelines for IOL. The indications are also supported by a systematic review of guidelines published in 2020.[6,8] Decisions to perform IOL are made on the clinical assessment and judgement of the treating doctor, and the patient cannot request the intervention herself. No routine sonar investigations are performed prior to the initiation. Oral misoprostol is the preferred method used. According to the current guidelines, the following patients can be safely induced at BDH, provided

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there is no contra-indication for vaginal delivery and no previous uterine surgery: i) Post-term pregnancy (>41 weeks) in an otherwise healthy mother with no complications; ii) Pre-labour rupture of membranes at ≥34 weeks' gestation in an otherwise healthy mother with no complications; iii) Mild to moderate pregnancy-induced hypertension (PIH) at a gestation of 38 weeks or more; iv) Intrauterine foetal death (uncomplicated); v) Patients with logistic problems: living a considerable distance from the hospital and having a precipitous labour history.

Aim

This study aimed to describe and assess the current IOL practices at BDH, focusing on incidence, indications, induction methods, complications, and outcomes. Our goal was to provide information to help adapt the current IOL guidelines to be more evidence-based and setting specific.

Materials and methods

Ethical considerations

The Health Sciences Research Ethics Committee of the University of the Free State provided ethical clearance (Ethics HSREC: UFS-HSD2019/0649/3006), while the Free State Department of Health gave permission to conduct the study at BDH. All data retrieved from patient files were treated confidentially, and all identifiable information were excluded.

Study design and setting

A retrospective-descriptive study design was used.

Botshabelo is a community with an estimated 210,000 people, about 60 km from Bloemfontein – the referral centre for regional and tertiary obstetric services in the Free State Province of South Africa. BDH is one of the three district hospitals in the Mangaung Metropolitan Municipality. It is a 135-bed government-funded hospital, while the maternity ward has 20 beds. On average, 2500 births are conducted yearly with a 35% caesarean section rate. The hospital serves as the referral centre for the 13 primary health care clinics in the Botshabelo community and the towns of Theunissen and Verkeerdevlei.

Study sample

The study sample included all IOL cases over a six-month period between 1 July and 31 December 2017. The sample size was estimated at 164.

Data collection

A datasheet was designed based on the information necessary to answer the research question. Previous studies and input from experts in the field were also considered.

Patients who had IOL during the study period were identified from the maternity ward register, and their files were retrieved from the records department for data capturing. The information was captured on the datasheet, and each record was allocated a study number. The recorded data were then transferred to a Microsoft Excel spreadsheet, checked for accuracy, and submitted for analysis.

Data analysis

The Department of Biostatistics, Faculty of Health Sciences, University of the Free State (UFS), did the data analysis using SAS version 9. Results were summarised by frequencies and percentages (categorical variables) and means, standard deviations, or percentiles (numerical variables, based on data distribution). Associations between demographic data, indications for induction, complications, and outcome were assessed using chi-squared or Fisher's exact tests. A p-value of <0.05 was considered statistically significant.

Results

During the 6-month study period, 1264 births occurred, of whom 442 were caesarean sections. In 168 cases, induction of labour was attempted. From these, 153 (91.1%) files could be retrieved. The IOL rate was 13.3%.

Demographics of induction of labour patients

The ages of the mothers varied between 15 and 42 years. Half (49.7%) were in the age group 21 to 30 years, with a median age of 27. The gravidity varied between one and five, with 41.8% primigravidae. Four per cent of the mothers were underweight, 25.3% normal weight, 28.7% overweight, and 42.0% obese.

Most mothers (65.6%) attended antenatal clinics from early in pregnancy (before 20 weeks), with only 1.3% that never attended antenatal clinics before they arrived for the delivery. The birth weights of the babies varied between 1.97 kg and 4.16 kg. The babies' median weight was 3.15 kg, with 23.3% of the babies weighing more than 3.50 kg.

Indications for induction of labour

The indications for IOL were available for 152 of the cases. The majority of cases were either for post-dates (69.7%) or PIH (27.0%), with pre-labour rupture of membranes contributing to 3.3%.

Method of induction of labour, time of induction, and time in labour

Oral Misoprostol was the method used for IOL in all the patients. Slightly more than half (54.2%) of the patients were induced in the morning and 45.6% in the afternoon or evening.

The time from induction to delivery varied between 2 and 168 hours, with a median of 22 hours. In cases where the patient was not in labour after two induction cycles and both the mother and foetus were stable, a planned caesarean section was performed. One patient refused the caesarean section and delivered after 148 hours, and two patients went home and only came back after two days for their caesarean sections. None of the mothers or babies in this planned caesarean section group experienced any complications.

Complications during induction of labour

The maternal complications included: post-partum haemorrhage due to cervical lacerations, shoulder dystocia, and placenta abruption. The neonatal complications established were hypoxic-ischaemic encephalopathy (HIE), respiratory distress syndrome (RDS), and hypoglycaemia. In seven cases, complications developed during or after the induction of labour. These cases are listed in Table 1.

Outcome of induction of labour

Normal vaginal delivery (NVD) was achieved in most of the patients (69.3%), while one patient had an assisted delivery, and 30.1% ended up with caesarean sections. Using the agreed definition, 30.1% of inductions failed.

From the 46 failed induction cases that required caesarean section, the recorded indications included: adequate labour not established (47.8%), foetal distress (39.1%), and cephalon-pelvic disproportion (13%). A diagnosis of foetal distress was made based on a pathological cardiotocography (CTG) and/or meconium-stained liquor grades 2 and 3.

When comparing the normal deliveries with caesarean sections, no factors could be identified that contributed to the failed inductions. The factors investigated included primigravidae vs. multigravida (p=0.24); Maternal BMI <30 *vs* ≥30 (p=0.28);

Indication for induction post-dates vs. PIH (p=0.78); Birth weight <3.5 kg *vs* >3.5 kg (p=0.93), Daytime vs. after-hour inductions (p=0.09). If the baby was not born within 24 hours, there was a statistically significant higher chance for a caesarean section (p<0.01).

The reason for a caesarean section differed statistically significantly when compared with the indication for the induction of labour. Most post-date cases developed foetal distress, and PIH cases did not go into labour (p=0.003) (Table 2).

Discussion

With 91.1% of the intended patients included in the study, the study results can be considered representative and can be used for setting specific recommendations for BDH. Due to the unique setting and small numbers, these results and recommendations are not necessarily generalisable for all district hospitals.

During the study period, the IOL rate was 13.3%. This figure is comparable with figures of Asia, Latin America, and South Africa, where the IOL rates varied between 12.1% and 15.8%.[10–12] This rate is lower than developed world countries, with rates as high as 31% reported in Australia,[13] and 34.1% in the United States of America.[14] A possible reason for the lower rates in this study may be that only a medical indication rather than a maternal request is used to make decisions on IOL in this setting.

The patients' demographic data showed a wide spread of age, parity, BMI, antenatal clinic attendance, and babies' birth weight. The high incidence of overweight (28.7%) and obesity (42.0%) was expected, as similar figures for overweight and obesity in females in rural Free State province were reported.[15] Overweight and obesity have many implications for pregnancy. Various studies showed statistically significantly more PIH, and prolonged pregnancies – both indications for IOL – in overweight and obese patients.[16–18] Overweight and obesity also increase the incidence of IOL due to medical problems.[19] Obesity, PIH, and post-dates are all associated with the poorer foetal outcome due to placental insufficiency.[20] In the majority of cases, the indication for IOL was post-dates (69.7%) and PIH (27.0%). These indications for IOL are supported by the WHO (2011),[2] the NICE guidelines (2018),[7] and various other guidelines for IOL.[21] A reliable gestational age is necessary for decisions to perform IOL for both indications; however, accurate gestational age determination is not always possible due to unsure dates and late bookings. In resource-limited settings without neonatal intensive care facilities, like BHD, a premature baby's delivery may pose problems.

Oral misoprostol was the only method used for the induction of labour in BDH, which is according to the institutional protocol - probably because it is a cheaper alternative.[22] Sweeping membranes to stimulate labour at term is a safe method that may decrease post-term pregnancies and the necessity of IOL.[3] Although oral misoprostol is a safe method for IOL, other methods like balloon catheters and rupture of the membrane with or without oxytocin have a definite place in IOL and should be considered.[2,3,22–24]

International guidelines include patient satisfaction and patient preference as components to consider when decisions on IOL are made. Patients were more satisfied with IOL in the morning than in the evening. The patient request alone should not be considered an indication for IOL.[7] In this study, just more than half (54.2%) of IOL took place in the morning, and patient satisfac-

Table 1. Summary of maternal and neonatal complications.

S/N	History	Complications Maternal outcome	Neonatal outcome
1	29-year-old G5P4, BMI 37, late booker, induced on account of PIH	NVD, had shoulder dystocia	Birth weight of 3.9 kg, HIE, referred for specialised care
2	24-year-old G3P2, BMI 30, early booker, induced on account of PIH	NVD, vaginal laceration with PPH	Uneventful Birth weight of 3.03 kg
3	32-year-old G4P3, BMI 36 early booker, induced on account of PIH.	CS for failed IOL, uneventful	Birth weight of 2.48 kg, RDS, referred for specialised care
4	31-year-old G2P1, BMI 19, early booker, induced on account of post-date	NVD, cervical laceration with PPH	Uneventful Birth weight 3.4 kg
5	16-year-old G1P0, BMI 23, late booker, induced on account of PIH	NVD, uneventful	Birth weight of 2.6 kg, hypoglycaemia, admitted at BDH
6	19-year-old G1P0, BMI 24.5, early booker, induced on account of post-date	NVD, uneventful	Birth weight of 3.69 kg, HIE, referred for specialised care
7	28-year-old G2P1, BMI 37, early booker, induced on account of post-date	NVD, uneventful	Birth weight of 3.49 kg, RDS, referred for specialised care

BMI=body mass index, G=gravidity, P=parity, PIH=pregnancy-induced hypertension, NVD=normal vaginal delivery, HIE=hypoxic ischaemic encephalopathy, PPH=post-partum haemorrhage, CS=caesarean section, IOL=induction of labour, RDS=respiratory distress syndrome, BDH=Botshabelo district hospital. Early booker: the first ante-natal visit was before 20 weeks gestation. Late booker: the first ante-natal visit was after 20 weeks of gestation.

Table 2. Reasons for induction compared with the reason for the caesarean section.

Reason for induction	Not in labour	Foetal distress	CPD	Total
Post-dates	10 (33.3%)	17 (56.7%)	3 (10%)	30
Pregnancy induced hypertension	11 (84.6%)	1 (7.7%)	1 (7.7%)	13
Pre-labour rupture of membranes	1 (50.0%)	0 (0.0%)	1 (50.0%)	2
Total	22	18	5	45

*Missing value=1.

tion was not measured or considered as an indication for IOL.

No maternal or foetal deaths occurred in the study sample, while 4.6% developed complications that varied in severity. Two mothers developed post-partum haemorrhages that were managed immediately and resolved without further complications. Four babies (2.6%) were referred for further management due to poor outcomes – two with HIE and two with RDS. Both the neonates that developed HIE had birth weights of ≥3.69 kg, and one also had shoulder dystocia. Both the mothers of the babies that developed RDS had a BMI of ≥36. The causes of HIE and RDS are multifactorial and include maternal obesity, post maturity, and high birth weight.[25,26]

IOL failed in 30.1% of cases and ended up with caesarean sections. One patient had an assisted delivery, and 69.3% had a normal vaginal delivery. The IOL failure rate is comparable with other studies with failure rates of between 22.8 and 35.8%, depending on the definition used and the method of IOL.[4,21,27]

Randomised controlled trials in developed world countries found an increased assisted delivery rate of around 15% after IOL.[1] Only one patient (0.7%) had an assisted delivery in our study, compared with developing countries with rates lower than 2%.[18,21] A possible reason may be the availability and expertise to perform caesarean sections 24-hours a day, the low threshold for caesarean sections, and lack of experience with assisted deliveries in the BDH setting.

Three reasons were identified for the failure of IOL. Almost half of the patients (47.8%) did not go into labour despite artificial measures to stimulate labour, 13% went into labour, but developed cephalopelvic disproportion that halted progress to delivery, and 39.1% developed foetal distress that resulted in emergency CS. When the reason for IOL is compared with the reason for CS, a statistically significant difference occurs between post-date and PIH cases. Most post-date cases developed foetal distress – possibly due to placental insufficiency – while 85.6% of those that did not go into labour were in the PIH group.

Despite evidence-based guidelines, it is essential to assess current practices and adjust IOL guidelines according to your specific setting. From the results of this study, recommendations are proposed for implementation at BDH.

Conclusions

The incidence, indications, methods of induction, complications, and outcomes of IOL in BDH are in line with international guidelines. However, by including sweeping of membranes at term and balloon catheters as methods for induction, the current guidelines can be improved. Performing a routine sonar investigation before IOL should also be considered.

References

1. Ryan R, McCarthy F. Induction of labour. Obstet Gynaecol Reprod Med. 2016;26(10):304–310.
2. WHO recommendations: Induction of labour at or beyond term. 2011. [cited 30 September 2020] Available from: https://apps.who.int/iris/bitstream/handle/10665/277233/9789241550413-eng.pdf
3. NICE Pathways – 2019 Induction of labour. Available from: http://pathways.nice.org.uk/pathways/induction-of-labour
4. Tarimo CS, Mahande MJ, Obure J. Prevalence and risk factors for caesarean delivery following labor induction at a tertiary hospital in North Tanzania: a retrospective cohort study (2000–2015). BMC Pregnancy Childbirth. 2020;20(1):a173.
5. Leduc D, Biringer A, Lee L, et al. Induction of labour. J Obstet Gynaecol Can. 2013;35(9):840–857.
6. World Health Organization. WHO recommendations: induction of labour at or beyond term. World Health Organization; 2018. [cited 30 September 2020] Available at:
7. NICE. Clinical Guideline 70. Issue date July 2008 Updated 2017. [cited 30 September 2020] Available from: http://www.nice.org.uk/CG070.
8. Coates D, Homer C, Wilson A, et al. Induction of labour indications and timing: A systematic analysis of clinical guidelines. Women Birth. 2020; 33(3):219–230.
9. World Health Organisation. WHO Handbook for guideline development. Geneva: WHO; 2012. [cited 30 September 2020] Available from: https://apps.who.int/iris/bitstream/handle/10665/75146/9789241548441_eng.pdf
10. 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):e65612.
11. Boshomane JM, Sebitloane HM. Factors associated with successful induction of labour with oral misoprostol in term or post-term pregnancies. Obstet Gynaecol Forum. 2019;29(3): 25–28.
12. Ndovie L. Maternal and fetal outcomes of induction of labour using oral misoprostol at New Somerset Hospital (Doctoral dissertation, University of Cape Town). 2018. [cited 30 September 2020] Available from: https://open.uct.ac.za/handle/11427/28074
13. AIHW. Australia's mothers and babies 2016 – in brief. Canberra: Australian Institute of Health and Welfare; 2018. [cited 30 September 2020] Available from: https://www.aihw.gov.au/reports/mothers-babies/australias-mothers-babies-2016-in-brief/summary
14. Kjerulff KH, Attanasio LB, Edmonds JK, et al. Labor induction and cesarean delivery: A prospective cohort study of first births in Pennsylvania, USA. Birth. 2017;44(3):252–261.
15. Tydeman-Edwards R, Van Rooyen FC, Walsh CM. Obesity, undernutrition and the double burden of malnutrition in the urban and rural southern Free State, South Africa. Heliyon. 2018;4(12):e00983.
16. Narayani BH, Shalini B. First trimester maternal BMI and pregnancy outcome. Int J Clin Obstet Gynaecol. 2018;2(4): 72–75.
17. Ding XX, Xu SJ, Hao JH, et al. Maternal pre-pregnancy BMI and adverse pregnancy outcomes among Chinese women: results from the C-ABCS. J Obstet Gynaecol. 2016;36(3): 328–332.
18. Deshmukh VL, Jadhav M, Yelikar K. Impact of HIGH BMI on pregnancy: maternal and foetal outcome. J Obstet Gynaecol India. 2016;66(1):192–197.
19. Yousuf F, Naru T, Sheikh S. Effect of body mass index on outcome of labour induction. J Pak Med Assoc. 2016; 66(5):598–601.
20. Audette MC, Kingdom JC. Screening for fetal growth restriction and placental insufficiency. Semin Fetal Neonatal Med. 2018;23(2):119–125.
21. Acharya T, Devkota R, Bhattarai B, Acharya R. Outcome of misoprostol and oxytocin in induction of labour. SAGE Open Med. 2017;5: 2050312117700809–2050312117700809.
22. Leigh S, Granby P, Haycox A, et al. Foley catheter vs. oral misoprostol to induce labour among hypertensive women in India: a cost-consequence

analysis alongside a clinical trial. BJOG. 2018;125(13):1734–1742.
23. Alfirevic Z, Keeney E, Dowswell T, et al. Methods to induce labour: a systematic review, network meta-analysis and cost-effectiveness analysis. BJOG. 2016;123(9):1462–1470
24. Chatsis V, Frey N. Misoprostol for Cervical Ripening and Induction of Labour: A Review of Clinical Effectiveness, Cost-Effectiveness and Guidelines. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018.
25. Liljestrom L, Wikstrom AK, Agren J, Jonsson M. Antepartum risk factors for moderate to severe neonatal hypoxic ischemic encephalopathy: a Swedish national cohort study. Acta Obstet Gynecol Scand. 2018;97(5):615–623.
26. Kim SS, Zhu Y, Grantz KL, et al. Obstetric and neonatal risks among obese women without chronic disease. Obstet Gynecol. 2016;128(1):104–112.
27. Pimentel VM, Arabkhazaeli M, Moon JY, et al. Induction of labor using one dose vs multiple doses of misoprostol: a randomized controlled trial. Am J Obstet Gynecol. 2018;218(6):614.e1-614.e8.