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Induction of Labor on Maternal Request: Do Not Refuse This Option to Women

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Abstract

Objective: To describe perinatal outcomes in a population of labour induction on maternal request, whatever the obstetrical conditions.

Methods: This retrospective single-centre study included all women who underwent labour induction on maternal request between January 2019 and May 2020. The primary outcome was perinatal outcomes: data about maternal and fetal morbidity were collected. The secondary outcome was the cesarean rate. Data were compared according to the delivery outcome ("vaginal delivery" Vs "cesarean section" group) to identify risk factors for cesarean delivery. Multivariate analysis was performed by adjusting for confounding factors such as Bishop score, prior cesarean section, parity, BMI, maternal, fetal presentation, gestational age, method of ripening, and the number of ripening's stages needed.

Results: We included 86 women. There was no risk factor for poor perinatal outcomes. Vaginal delivery occurs in 96,3 % (n=78/86) of all women. In primiparous women and the "prior cesarean-section group", this rate was 92,9% and 76,9%, respectively. We didn't find any statistical difference between the "vaginal delivery" and "cesarean section" groups.

Conclusion: Induction of labour on maternal request should be widely accepted regarding the low risk of cesarean section and the absence of predictive risk factor of it.

Keywords: Induction of labour; Maternal Request; Delivery; Elective

Introduction

For a long time, it was a commonly held belief that labour induction was associated with poor obstetrical outcomes, such as fetal cardiac abnormalities and increased risk of cesarean section, compared with those in spontaneous labour [1]. That's why labour induction was exclusively performed for medical reasons to prevent potential maternal or fetal harm related to pregnancy or delivery [2-5]. However, the comparison with spontaneous labour at the same gestational age in some studies was inaccurate. With expectant management, spontaneous labour may occur, but as gestation advances, pregnancy complications may occur, or women may progress post-term, requiring induction at a later gestation. Recently, using the proper comparison group, studies such as the ARRIVE trial highlights that

labour induction is associated with a slightly decreased risk of cesarean delivery [6,7]. These news findings don't have a significant impact on the medical indication of labour induction but raise the question of the potential extension to all women. Among these indications, labour induction on maternal request is a part of it; however, it's a controversial practice. One other question is the external validity of the ARRIVE trial to a French population, due to different obstetrical procedures and women's characteristics [7].

The Haute Autorité de Santé (HAS), the French high council of health, published in 2018 guidelines for induction of labour on maternal request, strongly restricting its use by excluding prior cesarean section and unfavourable cervix [2]. The international recommendations are not unanimous when it comes to the exclusion criteria, but they all tend to be more restrictive [6-9]. Regarding the results of Grobman's study, elective induction on maternal request shouldn't be so restrictive as denounced in an editorial published in the BJOG by JE Norman in 2016 [10].

The rate of labour induction on maternal request in France differs from one centre to the other, even within the same area [11]. In 2010 in France, 1.4% of all births followed the induction of labour requested by women; this is influenced by parity and organizational factors [12]. It has been reported that about 50% of women with uncomplicated pregnancies opted for elective induction when offered the opportunity [9].

Our team provide an induction of labour to all women who ask because pregnant women have expected increasing involvement in decision-making about their care. In our university maternity, the cesarean rate was 15.0 % after 36 weeks of gestation, and induction labour on maternal request was about 3.4% of all deliveries in 2020. We allow women with one previous cesarean section and with a breech presentation to benefit from induction of labour because it does not result in a significant increase in adverse maternal and neonatal outcomes as compared with planned cesarean section [13,14].

We aimed to describe perinatal outcomes in a population of labour induction on maternal request regardless of obstetrical conditions. As secondary objectives, we have identified risk factors of the cesarean section.

Material and methods

Subjects

This retrospective cohort study included all consecutive women who underwent elective induction of labour on maternal request between 01/01/2019 and 30/05/2020 in a single centre (Lorraine Center for Maternal-Fetal and Neonatal Medicine at Nancy University Hospital, France).

After being informed of the procedure, the medical staff assessed and validated women's requests for elective induction of labour. Elective induction of labour was planned from 38 weeks onwards according to the woman's wishes. We also included and performed elective induction for women with prior cesarean section, breech and unfavourable cervix (defined by Bishop Score < 6). Unreliable dating of the beginning of the pregnancy was a criterion for non-inclusion. Women with multiple prior cesarean sections did not undergo elective induction of labour in our centre. Women who underwent labour induction for medical reasons were non-included, such as preterm prelabour rupture of membranes, intrauterine growth restriction, uncontrolled gestational diabetes or gestational diabetes associated with suspicion for fetal macrosomia, pre-eclampsia or hypertensive disorders of pregnancy.

Management

Women with a favourable cervix (Bishop score ≥ 6) went through labour induction by using oxytocin perfusion in the delivery room. In case of an unfavourable Bishop score, a cervix ripening was performed. The method of cervical ripening was left to the discretion of the doctor on duty: Foley catheter or vaginal prostaglandins (PROPESS® or PROSTINE®). Only the Foley catheter was available for women with prior cesarean section in accordance with the French guidelines [2]. Women remained at the hospital for the whole process, and fetal heart rate monitoring was implemented 2 hours after the beginning of cervical ripening, regardless of the method chosen. The other aspects were similar to the spontaneous labour protocol.

Outcomes

The primary outcome was perinatal outcomes. Data about maternal morbidity collected were: the need for a vaginal instrumental delivery, fetal cardiac heart abnormalities, need for a fetal scalp blood test, chorioamnionitis, postpartum haemorrhage (defined by blood loss higher than 500 ml in the 2 hours following delivery). Data about perinatal outcomes were: fetal weight, Apgar score <7 at 5 minutes, arterial blood pH and admission in the intensive care unit. The secondary outcome was the cesarean rate, and we performed multivariate analysis and subgroup analysis to identify potential risk factors for cesarean delivery. Data were compared according to the delivery outcome to identify risk factors for cesarean delivery. Multivariate analysis was performed by adjusting for confounding factors such as Bishop score before induction (<6 Vs≥6), prior cesarean section, parity, BMI (≥30 Vs <30 kg/m^2), maternal (age ≥35

Vs <35 years old), fetal presentation (cephalic Vs breech), gestational age, method of ripening, number of ripening's stages needed. The analyses will be performed with R software.

Results

A total of 86 of the 3070 deliveries (2,8%) after 36 gestational weeks were included in the study. The population characteristics are summarized in table 1. We didn't find any risk factor of poor perinatal outcomes (Tables 1-4).

Vaginal delivery occurs in 96.3 % (n=78/86) of all women, in primiparous women and in the "prior cesarean-section group" this rate was respectively 92,9% and 76,9% (table 1). We didn't find any statistical or clinical difference between the "vaginal delivery" and "cesarean section" groups (table 1). We note that all women with prior cesarean section needed a second line method of induction and 37,5% a third one (Vs 62,8% and 9% for the non-prior cesarean group) (Table 1). The risk of cesarean was five times higher in the subgroup "2 or 3 stages of cervical ripening" compared to "one stage of cervical ripening", but the difference was not statistically significant (p=0.4) (Table 1).

	Global	"Vaginal delivery" Group	"Cesarean section" Group	P value
	No (%)	(N=78)	(N=8)	
		No (%)	No (%)	
Age (years)	30.9 ± 5.5	30.5 ± 5.2	34.3 ± 6.8	0.2
Gestational age (weeks ± days)	39.1 ± 0.4	38.9 ± 2.3	39.0 ± 1.6	0.94
Nulliparous no.(%)	16 (18.6)	13 (16.7)	3 (37.5)	0.37
BMI (kg/m, ^{2}, mean)	25.9 ± 6.3	25.9 ± 5.9	26.5 ± 8.9	0.86
Previous cesarean section no. (%)	13 (15.1)	9 (11.5)	3 (37.5)	0.13
Breech presentation	7 (8,1%)	5	1	0,47
Bishop score at the admission no. (%)				
Bishop score between 0 and 3	47 (54.7)	40 (51.2)	7 (87.5)	0.39
Bishop score between 4-5	27 (31.4)	26 (33.3)	1 (12.5)	0.68
Bishop score between >5	12 (14.0)	12 (15.3)	0 (0)	0.59
Induction method no. (%)				
First line method	86 (100)	78 (100)	8 (100)	>0.99
Foley catheter	27 (31.4)	22 (28.2)	5 (62.5)	0.29
Dinoprostone	50 (58.1)	47 (60.3)	3 (37.5)	0.749
Oxytocin	9 (10.5)	9 (11.5)	0 (0)	0.05
Second line method (if necessary)	57 (66.3)	49 (62.8)	8 (100)	0.42
Foley catheter	2 (2.3)	1 (1.3)	1 (12.5)	
Dinoprostone	9 (10.5)	7 (9.0)	2 (25.0)	
Oxytocin	46 (53.5)	41 (52.6)	-62.5	
Third line method (if necessary)	10 (11.6)	7 (9.0)	3 (37.5)	0.08
Foley catheter	1 (1.2)	0 (0)	1 (12.5)	
Dinoprostone	1 (1.2)	1 (1.3)	0 (0)	
Oxytocin	8 (9.3)	6 (7.7)	2 (25)	
Fourth line method (if necessary)	2 (2.3)	1 (1.3)	1 (12.5)	0.19
Foley catheter	0 (0)	0 (0)	0 (0)	
Dinoprostone	0 (0)	0 (0)	0 (0)	
Oxytocin	2 (2.3)	1 (1.3)	1 (12.5)	

Table 1: Global and subgroups characteristics of women undergoing an induction of labor on maternal request

Compared to women with a favourable cervix before ripening (Bishop Score ≥6), women with an unfavourable cervix showed a significantly longer time between cervical ripening and delivery (23 ± 14.1 hours vs 8.7 ± 4.4 hours, CI95% [10.0; 18.5], p<0.001) but without difference in cesarean section rate (Table 2). Parity also impacted the duration of labour, which was significantly shorter for multiparous women (9.7 ± 4.5 vs 13.5 ± 8.9 hours 95% CI [1.2; 11.2], p=0.02), without any other statistical difference (Table 2).

Outcomes	Bishop score <6	Bishop score ≥6	P Value	Nulliparous women	Multiparous women	P Value
	(N=74)	(N=12)		(N=16)	(N=70)	
	No (%)	No (%)		No (%)	No (%)	
Maternal outcomes						
Cesarean section	8 (10.8)	0 (0)	0.35	3 (18.8)	5 (7.1)	0.16
Vaginal instrumental delivery	7 (9.5)	0 (0)	0.59	3 (18.8)	4 (5.7)	0.12
Mean duration between the induction and the delivery (hours)	23 ± 14.1 (N=69)	8.7 ± 4.4	<0.001*	26.3 ± 14.7 (N=15)	19.7 ± 13.8 (N=66)	0.13
Fetal cardiac heart abnormalities	23 (31.1)	5 (41.7)	0.51	6 (37.5)	22 (31.4)	0.35
Need for a fetal scalp blood test	6 (8.1)	2 (16.7)	0.31	2 (12.5)	6 (8.6)	0.64
Post partum haemorrhage	10 (13.5)	0 (0)	0.34	1 (6.3)	9 (12.9)	0.68
Chorioamnionitis	3 (4.1)	0 (0)	>0.99	1 (6.3)	2 (2.9)	0.47
Perinatal outcomes						
Mean fetal weight (grams)	3401 ± 339	3283 ± 307	0.24	3383 ± 333	3385 ± 338	0.98
Apgar score <7 at 5 minutes of birth	0 (0)	0 (0)	>0.99	0 (0)	0 (0)	>0.99
Arterial cord blood pH				0 (0)		1
Number of pH <7,0	0 (0)	0 (0)	>0.99	7.32 ± 0.04 (N=14)	0 (0)	0,45
Mean pH	7.31 ± 0.07)	0 (0)	>0.99		7.31 ± 0.07 (N=68)	
Admission to the neonatal intensive care unit	1 (1.4)	0 (0)	>0.99	1 (6.3)	0 (0)	0.15

Table 2: Maternal and fetal outcomes of induction of labor on maternal request depending of initial Bishop score and comparing nulliparous and multiparous women.

This statistical difference remained significant in the unfavorable cervix subgroup (Bishop Score <6) (7.4 ± 4.8 hours vs. 13.5 ± 8.9 hours 95% CI [1.1; 11.2], p = 0.02). Adjusting for parity and previous cesarean section showed a statistically significant relationship between the initial Bishop score and the time between cervical repining and delivery (p<0,01). There was no difference according to women's BMI, previous cesarean section, or gestational age (Tables 3 and 4).

Outcomes	BMI≥ 30 (N=23) No (%)	BMI < 30 (N=63) No (%)	P value	Previous c-section (N=12) No (%)	No previous c-section (N=73) No (%)	P Value
Maternal outcomes						
Cesarean section	2 (8.7)	6 (9.5)	1	3 (25)	5 (6.8)	0.08
Vaginal instrumental delivery	2 (8.7)	5 (7.9)	1	1 (8.3)	6 (8.2)	>0.99
Mean duration between the induction and the delivery (hours)	18 ± 9.4 (N=21)	22 ± 15.3 (N=60)	0.17	23.1 ± 9.6 (N=10)	20.1 ± 14.7 (N=70)	0.5
Fetal cardiac heart abnormalities	11 (47.8)	17 (27.0)	0.08	4 (33.3)	24 (32.8)	>0.99
Need for a fetal scalp blood test	4 (17.4)	4 (6.3)	0.2	2 (16.7)	6 (8.1)	0.31
Post partum haemorrhage	2 (8.7)	8 (12.7)	>0.99	0 (0)	10 (13.7)	0.34
Chorioamnionitis	1 (4.3)	2 (3.2)	1	1 (8.3)	2 (2.7)	0.37
Perinatal outcomes						
Mean fetal weight (grams)	3372 ± 257	3389 ± 361	0.81	3345 ± 239	3388 ± 351	0.6
Apgar score <7 at 5 minutes of birth	0 (0)	0 (0)	>0.99	0 (0)	0 (0)	>0.99
Arterial cord blood pH				0 (0)	0 (0)	>0.99
				7.29 ± 0.08	7,31 ± 0.06	>0.99
Number of pH < 7.0	0 (0)	0 (0)	>0.99	0 (0)	0 (0)	>0.99
Mean pH	7.32 ± 0.07	7.31 ± 0.06 (N=59)	0.4	0 (0)	1 (1.4)	>0.99
Admission to the neonatal intensive care unit	0 (0)	1 (1.6)	>0.99			

Table 3: Maternal and fetal outcomes of induction of labor on maternal request depending of women's BMI and previous c-section or no

Outcomes	38 weeks - 38 weeks and 6 days (N = 13) No (%)	39 weeks - 39 weeks and 6 days (N= 66) No (%)	40 weeks - 40 weeks and 6 days (N = 7) No (%)	P Value (38-38+6 wk Vs 39-39+6)	P Value (39- 39+6 wk Vs 40-40+6)	P Value (38-38+6 Vs 40-40+6)
Maternal outcomes						
Cesarean section	1 (7.7)	6 (9.1)	1 (14.3)	>0.99	>0.99	>0.99
Vaginal instrumental delivery	2 (15.3)	5 (7.6)	0 (0)	0.32	>0.99	>0.99
Mean duration between the induction and the delivery (hours)	16.9 ± 10.4	21.1 ± 14.3	26.3 ± 17.9	0.57	0.48	0,24
Fetal cardiac heart abnormalities	3 (23.1)	21 (31.8)	4 (57.1)	0.74	0.17	0,39
Need for a fetal scalp blood test	2 (15.4)	5 (7.6)	1 (14.3)	0.32	>0.99	>0.99

Post partum haemorrhage	1 (7.7)	7 (10.6)	2 (28.6)	>0.99	0.27	0,53
Chorioamnionitis	0 (0)	2 (3.0)	1 (14.3)	0 (0)	0.38	0,38
Perinatal outcomes						
Mean fetal weight (grams)	3272 ± 358	3406 ± 332	3391 ± 327	0.23	0.92	0,46
Apgar score <7 at 5 minutes of birth	0 (0)	0 (0)	0 (0)	>0.99	>0.99	>0.99
Arterial cord blood pH						
Number of pH < 7.0	0 (0)	0 (0)	0 (0)	>0.99	>0.99	>0.99
Mean pH	7.31 ± 0.08	7.31 ± 0.06	7.28 ± 0.05	0.84	0.17	0,39
Admission to the neonatal intensive care unit	0 (0)	1 (1.5)	0 (0)	>0.99	>0.99	>0.99

Table 4: Maternal and fetal outcomes of induction of labor on maternal request depending of gestational age.

Discussion

In our team, we allow all women to benefit from induction of labour on request because we believe in the involvement of women in their care. It concerns about 3 % of all deliveries each year in our university-maternity. First, we observe that 96.3% of the women had a vaginal delivery, in primiparous women and in the "prior cesarean-section group" this rate was 92,9% and 76,9%. We didn't find any risk factors of c-section in our study, including prior cesarean section and unfavourable cervix. According to the latest French HAS recommendations published in 2008, elective labour induction on maternal request is restricted to women at least 39 weeks at least, with a favourable cervix and no prior cesarean section [2].

The main strength of this study is the inclusion of usually excluded women (prior cesarean section, breech presentation and unfavourable cervix). In this retrospective cohort, 15.1% of the patients had had a previous cesarean section. No case of uterine rupture was observed. Indeed, there is an increase in uterine rupture risk in this particular population because of uterine fragility [15]. In the case of induced labour for medical reasons, the HAS points that the uterine rupture risk can be decreased by selecting women with a high probability of vaginal delivery and by avoiding the use of prostaglandins [2]. No study focused on elective induction on maternal request in this particular population. The HAS justification for this restriction to favourable cervix is the increase of cesarean risk related to elective induction on unfavourable cervix compared to spontaneous labour [2]. However, the ARRIVE TRIAL, using a more appropriate control group ("expectative"), showed no risk increase related to unfavourable cervix even a decrease of cesarean risk, even if associated with nulliparous status [7]. About nulliparous women, besides an increase in the duration of labour, there was no statistical difference in comparison to multiparous women in neonatal and maternal outcomes.Outcomes in the "prior cesarean" subgroup were not significantly different from the patients without prior cesarean section. However, it might be due to a lack of statistical power. The number of subjects required to show a significant difference in cesarean risk in the subgroup "prior cesarean" vs "no prior cesarean" was 164, which is far more than our actual population (86 with 12 prior cesareans and 74 no prior cesarean).

Concerning the 12.7% of the women who had an unfavourable cervix and needed two or three cervical ripening stages to reach a cervix favourable for induction, there was an increase of cervical ripening time with no change of labour time and a non-significant increase of the cesarean risk. However, once again, it might be due to the small sample of the study. None study focused on the maternal and fetal impact of repeated cervical ripening stages in elective induction of labour. Continuing collection of data may improve statistical power and show a significant statistical difference in cesarean risk by repeating cervical ripening stages in the context of elective induction of labour. In this population, it may be reasonable to stop the cervical ripening procedure and privilege spontaneous labour in accordance with the patient.

Maternal experience of labour seems altered with induced labour because of the increase in labour time [16-18]. For French women, the independent criteria to reach a high satisfaction score in induced labour are a high maternal age [OR = 1.6], induction of labour for non-medical reasons [OR = 2.4], and a favourable cervix [OR=2.4] [11]. Women have to be informed of these elements .Women have the right to decide what happens to their own body, to take

control over their delivery, including its planning. Full involvement of patients in their delivery is an essential part of empowerment, and the option of elective induction of labour on request shouldn't be denied to women.

Conclusion

The ARRIVE trial show a lower frequency of cesarean delivery in a low-risk population of nulliparous women. However, French obstetrical practices and women's characteristics limited its external validity. The results of our study show a low cesarean rate in a population of induction of labour for the maternal request [3.7%]. We didn't show any risk factor of elective induction-related issues, including prior cesarean, parity and low Bishop Score before cervical ripening. Full involvement of patients in their delivery is an essential part of empowerment, and the option of elective induction of labour on request shouldn't be denied to women.

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