

PREGNANCY OUTCOME AFTER LABOR INDUCTION IN NULLIPAROUS WOMEN

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ABSTRACT

The aim of the study is to determine whether induction of labor in nulliparous women is associated with changes in fetomaternal outcome when compared to labor of spontaneous onset. This randomized case control study included nulliparous women with induced and spontaneous labor in Al-Batool Teaching Hospital from 1 of February to 1st of August 2004. Intrauterine death, deliveries outside the hospital, and preterm deliveries were excluded. Patients with induced and spontaneous labor were compared with respect to demographic characteristics, time span of labor, route of delivery, and neonatal outcome. A 249 women included in the study. 144 women had labor induced and 150 women with spontaneous onset of labor. Time span of labor and analgesic requirement were significantly more common in induced labor. Cesarean delivery was statistically significantly higher in induced labor 36(25%) versus 11 (7%) in spontaneous labor (p. value < 0.05). No significant difference in instrument delivery while babies born after induced labor admitted more to NICU (44% versus 19%) and the difference was statistically significant (p. value < 0.05). When compared with labor of spontaneous onset, Labor induction in nulliparous women was associated with statically significant more; prolonged labors, operative deliveries, and babies need admission to neonatal care unit.



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1. INTRODUCTION

Induction of labor: refers to iatrogenic stimulation of uterine contractions prior to the onset of spontaneous labor to accomplish an early delivery [1- 3]. Induction of labor merit as a therapeutic option when the benefit of expeditious delivery outweighs the risks of continuing the pregnancy [4], [5]. It is one of the most commonly performed obstetrical procedures in the United States., between 1990 and 1998 the frequency of labor induction was doubled approximately 10 to 20 percent. [6], [7] The reason for this increase include the availability of better cervical ripening agents, the desire to arrange a convenient time of delivery, and more relaxed attitudes toward marginal indications for induction [3], [8], [9] Benefits of labor induction

must be weighed against the potential maternal or fetal risks associated with this procedure.

2. Patients and methods

Case control study selected randomly in Al Batool Maternity Teaching Hospital from 1st of January to 1st of August 2021. During the study period 294 women were included, women with labor induction were 144 and 150 women with spontaneous onset of labor. A full history was obtained from each woman and subjected to full physical and obstetric examination.

2.1 Maternal Demographics

Demographic characteristics of maternal age, antenatal care, gravidity, parity gestational age at delivery, the indication for induction, Bishop score at admission. Null parity was regarded, as a patient not had delivered before even if she Gestational age was based on last menstrual periods confirmed by first trimester ultrasound or early second trimester ultrasound (at 16-20 weeks) when available, if last menstrual period dates were not believed to be accurate, the gestational age was based on the first trimester or early second trimester ultrasonography findings:

2.2 Investigations

Hemoglobin and hematocrit, general urine examination and blood grouping.

2.3 The inclusion criteria

Women were nulliparous, with singleton pregnancy, cephalic presentation, some of them had normal pregnancy, other had medical, obstetrical or combined problems. The women were divided into two groups, the 1st group who underwent labor induction and 2nd group with spontaneous onset of labor. Both groups were matched for maternal age, antenatal care and gestational age. In both groups the gestational age ranged between 259 and 294 days i.e. 37-42 weeks. The presentation and position of the fetus were checked and pelvic examination with assessment of Bishop score were performed by the same attendants.

2.4 Methods

The main methods of labor induction performed in the study were the methods practiced in Al-Batool Maternity Teaching Hospital including:

- * Sweeping the membranes and this simple procedure is performed with gloved finger lubricated with antiseptic cream and inserted gently up the cervical canal.
- * Rupturing the membranes: by using a pair of kockers forceps and under aseptic technique the for waters were snagged, watching the color and volume of amniotic fluid released. The fetal heart rate was checked immediately afterwards to ensure no fetal compromise.

If there was no contraindication for induction then: *Oxytocin infusion started in concentration of 2 IU in 500 ml of Dextrose water, commencing by 10 drops /minute and increasing rate of drops every 10 minutes' till reaching the effective uterine contractions. if after 2 (hours we failed to achieve this the dose of oxytocin increased to 4 IU in 500 ml of dextrose water and monitor the dose according to myometrial response and contractions observed.

2.5 Variables monitored

The time span of labor was recorded since the onset of regular efficient uterine contractions on the partograph for both study groups. In both groups, we determined the incidence of cesarean delivery, instrumental delivery, and the use of analgesia mainly pethidin. Caesarean delivery for first stage dystocia means that the main reason for performing a cesarean was a failure to progress to full dilatation, second

stage dystocia diagnosed as failure of descend of presenting part. Fetal distress diagnosed according to abnormalities in fetal heart monitored by fetal stethoscope, sonicaid and by changes in color of liquor. Cesarean section performed under general anesthesia with endotracheal intubation while the instrument delivery mainly vacuum extractor had been done under local anesthesia by using pudendal block or perineal infiltration by 5% xylocaine.

2.6 Neonatal parameters

After delivery whether by operative or normal vaginal delivery: birth weight, sex and apgar score at first minute and five minutes were measured. The admission for neonatal intensive care unit, indication and duration of stay were recorded, any congenital abnormality or early neonatal death also recorded.

2.7 Statistical analysis

Data were analyzed using chi-square (χ^2) test to determine the statistically significant difference between the induced labor and spontaneous labors. A probability value < 0.05 was considered to be statistically significant while value > 0.05 was not significant.

3. Results

During the study period, 294 nulliparous women were selected randomly, 144 women underwent labor induction and 150 women with spontaneous onset of labor. Table (3.1) shows the demographic characteristics of both groups with respect to maternal age, birth weight, and gestational age, the mean gestational age was higher among the induction group 40.5 ± 0.8 versus 39.8 ± 0.9 in spontaneous labor.

Table (3.2) and figure (3.1) show the major indications for induction and their percentages, it revealed that the most common indication was PROM 44(31%) and postdate 34(24%). Table (3) and figure (2) show the distribution of patients in the induced group according to Bishop score assessed by pelvic examination at admission, which showed that patients with Bishop score < 5 were 66(46%). patients with Bishop score 5- 8 were 73 (51 %) and patients with Bishop score ≥ 8 were 5 (3%), Table (3.4) shows the parameters occurred during labor in both groups. Women whose labor was induced need more often analgesia, and the difference was significant (p.value = 0.000). there was no significant difference between both groups in respect to maternal pyrexia, and there was significant difference in time of labor, as the induced labors had more prolonged duration, and the time ranged between 6-12 h was significantly more in induced labor (p.value=0.000). In the assessment of mode of delivery as shown in table (3.5) induced labor was associated with significantly more rate of cesarean deliveries 36 (25%) versus 11 (7%) in spontaneous labor (p.value = 0.036), and more but not significantly different instrumental deliveries. The increased frequency of cesarean deliveries in induced group was predominantly the result of a higher incidence of first-stage dystocia (figure 3.3) Fetal distress as a reason for cesarean delivery was more frequently encountered when labor was induced, maternal distress was the main cause for instrument delivery while in spontaneous labor fetal distress was the main cause as shown in figure (3.4). Table (6) the analysis of neonatal outcome. Babies who were born after induced labor were transferred more often to NICU, and the difference of admission was significant (p value=0.037). this increased rate in neonatal admission of the babies who were born after induced labor was only seen during the first 48 h (figure 3.5) Reasons for transfer to the neonatal ward were comparable in both groups, RDS was the most common cause for admission to NICU, but it was higher in the induced group 27 (42%) the spontaneous labor 19(66%). Infection and sepsis were more common in the induced group 21 (33%) versus 3(10%) in spontaneous labor Birth asphyxia 3 (4%) and 2(7%) in induced and spontaneous labor respectively, one case of shoulder dystocia reported in induced labor and one case of hypoglycemia in spontaneous labor. Maternal condition as a sole reason for admission to NICU was only mentioned for babies who were born after induced labor 6 (9%). The neonates were similar according to

their birth weight and ages. Two cases of congenital abnormality and two cases of early neonatal death reported in babies born after induced labor (figure 3.5 and figure 3.6), while no case of congenital abnormality and one case of early neonatal death in babies born after spontaneous labor. Babies whose apgar score <7 in 1st minute were more in induced labor. 45(31%) while 28 (19%) in spontaneous labor and the difference was statistically significant (p.value=0.013).

Table 1: Demographical characterizes of patient in both groups.

Characteristic	Induced labor n=144	Spontaneous labor n=150
Maternal age	27 ± 4.1	27.2 ± 4
Birth weight	3460 ± 264	3456 ± 264
Gestational age (week ±SD)	40.5 ± 0.8	39.8 ± 0.9
Bishop score	Number of patients	%
< 5	66	46
5-8	73	51
> 5	5	3

Table 2: the parameters occurred during labor in both induce and spontaneous groups

Parameters	Induced labor no. 144 (%)	Spontaneous labor no. 150 (%)	P-value
Analgesia	75 (52)		0.000
Maternal pyrexia	18 (13)		N. S
Time span of labor			
< 6 h	32 (22)	89 (59)	0.000
6-12 h	106 (74)	57 (38)	0.000
> 12h	6 (4)	4 (3)	N. S
Mode of delivery	Induced labor n=144 (%)	Spontaneous labor n= 150 (%)	P-value
NVD	96 (67)	134 (89)	0.000
Cesarean delivery	36 (25)	11 (7)	0.036
1 st stage delivery	15 (42)	1 (9)	0.046
2 nd stage delivery	10 (28)	2 (18)	N.S
Fetal distress	11 (30)	8 (73)	0.013
Other	-	-	-
Instrument delivery	12 (8)	8 (5)	N. S
Maternal distress	8 (67)	2 (25)	N. S
Fetal distress	2 (17)	5 (63)	0.035
Prolonged second stage	2 (16)	1 (12)	N.S
Others	-	-	-

Table 4: neonatal outcome

Outcome	Induced labor n= 144 (%)	Spontaneous labor n= 150 (%)	p- value
Birth weight			
< 2.5	3 (2)	3 (2)	N. S
2.5 - 4	140 (97.4)	145 (97)	N. S
> 4	1 (0.7)	2 (1)	N. S
Sex			
Male	69 (48)	79 (53)	N. S
Female	75 (52)	71 (47)	N. S
Apgare score			
1 st minute < 7	45 (31)	28 (19)	0.013
5 minutes > 7	38 (26)	16 (11)	0.001
Admission to NICU	64	29	0.037
Indicator for admission			

RDS	27 (42)	19 (66)	N. S
Jaundice	2 (3)	0	N. S
Maternal condition	6 (9)	0	
Birth asphyxia	3 (4)	2 (7)	N.S
Congenital anomaly	1 (2)	0	
Shoulder dystocia	1 (2)	0	
LBGA	1 (2)	2(7)	
Hypoglycemia	0	1 (3)	
Duration of admission			
0-48 h	40 (63)	18 (62)	N. S
48 – 7 days	19 (30)	10 (35)	N. S
> 7 day	2 (4)	1 (3)	0.7
Unknown	2 (3)	0	-
Congenital anomaly	2 (3)	0	-
Neonatal death	2 (3)	1	N.S

4. Discussion

The major factors influencing the outcome of induced labor are parity and the state of the cervix. Failed induction should be a rarity in parous women, and is uncommon in nulliparous provided the cervix is favorable (a Bishop score of 6 or more). In a study post maturity still heads the list of indications for induction, followed by suspected fetal growth retardation and maternal hypertension. Social factors such, as the woman's own wishes play a part these days. In a met analysis of 10 randomized controlled trials comparing induction at 41-42 weeks with conservative treatment, [10] showed the increased risk of prenatal deaths associated with prolonged pregnancy. the risk is reduced by induction at 41 weeks (Cochran collaboration), Also a study by [11] postdate pregnancy was the most common indication for induction, although few patients were at or beyond 42 weeks' gestation. In our study, the most common two indications were PROM and postdate pregnancy 44(31%) and 34(24%) respectively, this is explained by the desire to decrease the complications caused by these two conditions. Labor induction is considered elective when it is undertaken for the purpose of convenience and in the absence of any maternal or fetal condition that Justifies delivery. The elective labor induction is commonly practiced in Flanders (North Belgium), in a study by [12] from January 1, 1996, through December 31, 1997, 124680 deliveries took place in flanders. labor was induced in 30% of the deliveries, and elective labor induction took place in 21% of the deliveries, of the deliveries 46% were nulliparous, social factors played a larger part in those cases. In our study 4 patients were induced according to their wishes without other indication, the major cause was the desire to accomplish labor in a special time appropriate for the patient. The state of the cervix at the time of induction is one of the most important determinants of the subsequent course of events. An unripe cervix (one which is not ready for induction of labor) fails to dilate adequately in response to uterine contractions. Attempted when the cervix in not ripe may result in high rates of induction failure, protracted and exhausting hours, a high cesarean section rate, and other complications, such as intrauterine infection when amniotomy is employed. Several scoring systems have been developed in attempts to establish more comparable guidelines for cervical assessment, the best known of these is the score proposed by Bishop, which rated five different qualities, effacement, dilatation, consistency of the cervix, position of the cervix relative to the axis of the pelvis, and descent of the fetal presenting part (21). In a study by [13] which was conducted on nulliparous patients and in which cesarean delivery routes were calculated for patients in spontaneous labor and patients underwent labor induction, an important variable affected the delivery route was the Bishop score at the initiation of the induction. The cesarean delivery rate was 31.5 % among patients whose Bishop score was 5 at induction versus 18.1% for patients with a score? 5. and he concluded that induction of labor in nulliparous patients, especially those with an unfavorable cervix as measured by Bishop score, is associated with a significantly increased risk of cesarean delivery.

In our study the distribution of patients in the induced group according to Bishop score assessed by pelvic examination at admission, which showed that patients with Bishop score <5 were 66 (46%), patients with Bishop score 5-8 were 73 (51%), and patients with Bishop score ≥ 8 were 5 (3%). The high rate of patients with an unfavorable cervix may explain the high incidence of failed induction that ended with operative intervention. Pain relief is to some extent dependent on the previous obstetric record of women, the course of labor and also the estimated length of labor, pain relief is provided by several methods, non pharmacological methods as relaxation and breathing exercises, transcuteaneous nerve stimulation pharmacological methods as opiates in which the most popular is pethidin. other types are inhalation analgesia and epidural analgesia the later is the commonest nowadays (1) In study. He found that women whose labor had been induced more often received an epidural analgesia, this agree with a study by [14] Who found that nulliparous women had high usage of epidural analgesia during labor induction regardless of their preen tensions. In our study women whose labor were induced required more analgesia, which was provided by opiates (pethidin) and the difference was statistically significant, this can be explained by the prolonged duration of labor in the induction group. More than any other objective measurement, the duration of labor determines the impact of child birth, particularly on mothers and on babies, and also on those who care for both of them. Prolonged labor is associated with a greater incidence of fetal hypoxia and often a greater incidence of operative deliveries. [15] found in a study performed on induced nulliparous patients that the admission duration in induced group was longer than that in spontaneous labor (11.1 h versus 5.7 h). This was the same finding in a study by [16] in which the average maternal length of stay was higher among women with induced labor than among women with spontaneous labor. In our study the induced labors had more prolonged duration of labor, the time ranged between 6-12 h was more in induced labor and the difference was statistically significant (p . value < 0.05). Cesarean section is a major operation, with great potential benefit, but also with substantial risks for mother and baby, dystocia and fetal distress are the most common reasons for performing a cesarean section in induced labors (2) In a study by [6] they founded that nulliparous women are at a significant increased risk of cesarean delivery if elective induction is performed. 19 % of nulliparous women with induced labor versus 10 % of those with spontaneous labor underwent cesarean delivery. Another study by [17] labor induction in nulliparous was associated with an increase in cesarean delivery from 13.7% to 24.7%.

Other researchers as founded that (178) elective induction of labor at term results in excess of cesarean deliveries. In our study, the rate of delivery by cesarean section was higher in the induced labors (25%) versus (7%) in spontaneous labors and the difference was statistically significant, this can be explained by the high rate of patients with an unfavorable cervix at initiation of induction, in addition to the unavailability of cervical ripening agents. Poor progress in first stage is diagnosed when there is slow dilatation of the cervix in spite of efficient uterine contractions (2), delay in the second stage has been arbitrarily fixed at more than 2 h without a regional or epidural analgesic or 3 h with such an an aesthetic in nulliparous women. (88) The most common risks to the fetus during labor are hypoxia and trauma, intrapartum risk factors include oligohydramnios, meconium, labor of more than 8 h, the use of epidurals and oxytocin, and induced labors. (82) A study by [18] cesarean delivery rates were higher with induced labors, failure to progress and fetal distress were more frequent in induced labor and rates rose directly and continuously with maternal age. [12] in his study found that the main reasons for the higher frequency of cesarean delivery is the more common failure to progress in the first stage (5.9%) in induced labor versus (3.3%) in spontaneous labors, he found also that fetal distress as a reason for cesarean delivery was frequently encountered when labor had been electively induced. Those findings were also confirmed by [19] in a study conducted on patients induced due to postdate pregnancy. In study, the increased frequency of cesarean deliveries in induced group was predominantly the result of a higher incidence of first - stage dystocia with significant difference between them (42%) versus (9%) respectively, and fetal distress as

indication for cesarean section was more in induction group. Maternal indications for assisted vaginal delivery are most commonly those of maternal distress, maternal exhaustion and undue prolongation of the second stage of labor. (8) In a study by [6] there was a modest increase in instrumental delivery (90% in induced labor versus 15% in spontaneous labor) This was also found in our study in which there was no statistically different value between instrument delivery in induced and spontaneous labors but the main indication in induced labor was maternal while in spontaneous labors fetal distress was the cause, this can be explained by the more exposure of induced group to stress due to the long period of labor. In our study, babies born after induced labors were transferred more to NICU. (44% versus 29%) in spontaneous labor and difference was statistically significant (p. value = 0.037), respiratory distress syndrome was the main cause of admission in both groups (27% and 19%) in induced and spontaneous labor respectively. This was found also by [20] who found that, there was increased rate in neonatal admission of the babies who were born after induced labor, and the reasons for transfer to NICU was comparable in both groups as asphyxia and respiratory problems in (41% and 40% induced labor) (spontaneous labor), respectively.

5. Conclusion and Recommendation

Induction of labor in nulliparous women is associated with increased rates of cesarean section, instrumental deliveries, prolonged labors, use of analgesic agents, and admittance of the neonates into the neonatal intensive care ward. Avoiding labor induction in settings of unproved benefit, may aid efforts to reduce the primary cesarean delivery rate, and offering early cesarean delivery for patients at highest risk especially nulliparous with unfavorable cervix, reducing the potential long labor or operative vaginal delivery followed by a later cesarean delivery.

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