Factors Affecting Labor Induction in Late-Term Pregnancies

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ABSTRACT

Objective: We retrospectively evaluated the factors affecting labor induction success in the management of pregnancies at or beyond 41 weeks of gestation.

Material and Methods: Gestational and obstetric records of 113 patients delivered at or beyond 41 weeks of gestation were retrospectively reviewed.

Results: The rate of induced vaginal delivery was 93.1% (n=27) in patients with Bishop score ≥7 and 60.7% in patients with Bishop score <7 (n=84) and was significantly higher in patients with Bishop score ≥7 (p=0.003; p<0.01). The rate of induced vaginal delivery was 79.7% in multiparous women and 57.4% in nulliparous women and the rate was significantly higher in multiparous women (p=0.019; p<0.05). The rate of induced vaginal delivery was 73.2% in patients with normal AFI and 43.8% in patients with oligohydramnios and the rate was significantly higher in patients with normal AFI (p=0.037; p<0.05). Apgar score was significantly higher in the infants of the patients with normal AFI compared to patients with oligohydramnios (p=0.008; p<0.01) and the rate of NICU admission was higher in patients with oligohydramnios than in patients with normal AFI (p=0.028; p<0.05).

Conclusion: Bishop score, parity, amniotic fluid index influence labor induction success in pregnancies at or beyond 41 weeks of gestation. Fetal distress and cesarean section rate was higher at patients with Bishop score <7 who were nulliparous and with oligohydramnios.

Keywords: induction, late-term, pregnancy

INTRAduction

Post-term pregnancy is defined as a pregnancy that persists ≥42 weeks of gestation (≥294 days) and late-term pregnancy refers to a pregnancy that reaches between 41 and 42 weeks of gestation according to the last menstrual period (LMP) date (1). According to the 2007 data on U.S. births, the pregnancies that re-
ach between 41 and 42 weeks of gestation constitute 14% of all pregnancies and the pregnancies that continue beyond 42 completed weeks of gestation account for 6% of all pregnancies (1). Epidemiological studies have shown that the pregnancies that continue at or beyond 41 weeks of gestation are associated with increased fetal, neonatal, and maternal complications (1,2). Pregnancies that continue beyond 41 weeks of gestation lead to an increased risk for non-anomalous stillbirth and early neonatal death (3-5). These pregnancies have also been shown to cause a number of fetal complications including intrauterine infection, placental insufficiency, umbilical cord compression, fetal hypoxia, asphyxia, and meconium aspiration, all of which may ultimately result in perinatal death (3-6) and maternal complications including labor abnormalities, failed induction of labor, third- or fourth-degree perineal laceration, and postpartum hemorrhage (4,5).

Induction of labor at 41-week of gestation can be performed by using mechanical or medical methods. In patients with a Bishop score of <7, cervical ripening agents are preferred (12). It has been noted that the rate of successful labor induction is remarkably high in patients with a Bishop score of ≥7, whereas the rate of successful labor induction is low and the rate of cesarean delivery is remarkably high in patients with a Bishop score of <7 (12). It has also been shown that labor induction leads to an increased risk for cesarean delivery in patients with oligohydramnios (single deepest pocket<2 cm) (15,16).

In this study, we aimed to evaluate the factors affecting the success of elective labor induction in patients with late-term pregnancy and to analyze the relationship between these factors and Apgar score and admission to NICU.

MATERIAL and METHODS

The retrospective study evaluated 113 patients that were admitted to Elazig Research and Training Hospital Gynecology and Obstetrics Department and were monitored and delivered at or beyond 41 weeks of gestation between 2011 and 2013. The patients that underwent antenatal testing for a minimum of 3 times were accepted as patients with serial antenatal testing and were included in the study. Gestational age of the infants was estimated based on the last menstrual period (LMP) date and was either confirmed or corrected by first- or second-trimester ultrasonography (USG) findings. These findings included crown-rump length (CRL), which was measured in the first-trimester ultrasonographic examination, and biparietal diameter (BPD), which was measured in the second-trimester ultrasonographic examination.

Depending on the LMP date, the pregnancies at or beyond 42 weeks (≥294) were accepted as post-term pregnancies and the pregnancies between 41 and 42 weeks were accepted as late-term pregnancies. The patients with a gestational age of 41 weeks or more were evaluated with USG and nonstress testing (NST) and then hospitalized at the obstetrics clinic. Fetal biometry and amniotic fluid were evaluated on USG, and fetal well-being was evaluated with NST. In the evaluation of amniotic fluid, amniotic fluid index (AFI) was measured by using the four-quadrant technique and oligohydramnios was defined as AFI<5 cm. During the first presentation, gynecologic examination for Bishop score was performed in each patient. Depending on the Bishop score, the patients were divided as patients with Bishop score <7 and ≥7. Labor induction was initiated with the use of oxytocin in patients with Bishop score ≥7 and with the initial administration of vaginal 10 mg dinoprostone (Propess) in patients with Bishop score <7 in order to achieve cervical ripening. In the patients that initially received Propess, vaginal Propess was removed in the active phase of the labor and induction was initiated with oxytocin and oxytocin infusion was continued until delivery. All the patients underwent barium enema.

All the patients were evaluated for age, parity, number of deliveries and abortions, gestational age at delivery, mode of delivery, indications for cesarean delivery, infant birth weight, Apgar score, admission to NICU, and obstetric and postpartum complications (intrauterine growth restriction, oligohydramnios, prematurity, placental abnormalities, chromosomal anomalies, preeclampsia, placental detachment, stillbirth, and deep vaginal tear).

A written informed consent was obtained from each patient. The study protocol was approved by the local Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.
Statistical Analysis

All data were analyzed using IBM SPSS Statistics Version 22.0 (IBM SPSS, Turkey). Normal distribution of data was tested using Shapiro-Wilk test. Descriptive statistics including Mean, Standard Deviation, and Frequencies were used for the analysis of the data. Mann Whitney U test was used for comparing nonnormally distributed variables for two groups. Kruskal Wallis test was used for comparing nonnormally distributed variables for more than two groups and Mann Whitney U test was used for testing the difference in means. Qualitative data were compared by using chi-square test, followed by Yates Correction for Continuity and Fisher’s Exact Test. A p value of <0.05 was accepted statistically significant.

RESULTS

Mean age was 26.5±5.48 years. Mean gravida was 2.22±1.57. Of the 113 women, 54 (47.8%) were nulliparous and 59 (52.2%) were multiparous. Mean parity was 1.01±1.21. Mean infant birth weight was 3,370.8±247.1 g. Mean Apgar score was 8.16±0.89 (Table 1). Bishop score was <7 in 84 (74.3%) and ≥7 in 29 (25.7%) women. Amniotic fluid index (AFI) was normal in 97 (85.8%) women and oligohydramnios was seen in 16 (14.2%) women (Table 1). Admission to NICU was not required in 99 (87.6%) neonates but 14 (12.4%) neonates were admitted to NICU (Table 1).

Table 2 presents the association between parity and mode of delivery, Apgar score, and admission to NICU. Induced vaginal delivery was performed in 79.7% (n=59) of multiparous women and in 57.4% (n=54) of nulliparous women. The rate of induced vaginal delivery was significantly higher in multiparous women (p=0.019; p<0.05). However, no significant correlation was found between parity and Apgar score and admission to NICU (p>0.05; p>0.05).

Table 3 presents the association between Bishop score and mode of delivery, Apgar score, and admission to NICU. Induced vaginal delivery was performed in 93.1% (n=27) of patients with Bishop score ≥7 (n=29) and 60.7% (n=51) of patients with Bishop score <7 (n=84). In addition, the rate of induced vaginal delivery was significantly higher in patients with Bishop score ≥7 compared to patients with Bishop score <7 (p=0.003; p<0.01). Although no significant...
Table 4 presents the association between AFI and mode of delivery, Apgar score, and admission to NICU. Induced vaginal delivery was performed in 71 (73.2%) out of 97 women with normal AFI and in 7 (43.8%) out of 16 women with oligohydramnios. The rate of induced vaginal delivery was significantly higher in patients with normal AFI compared to patients with oligohydramnios (p=0.037; p<0.05). Neonatal Apgar score was significantly higher in patients with normal AFI compared to patients with oligohydramnios (p=0.008; p<0.01). Moreover, the rate of NICU admission was significantly higher in patients with oligohydramnios compared to patients with normal AFI (p=0.028; p<0.05). Moreover labor induction success in patients with normal AFI is influenced by the Bishop score of the patients. In patients with Bishop score <7 induced vaginal delivery was performed in 45 (80.7%) of the patients with normal AFI and in 6 (40%) of the patients with oligohydramnios and a significant difference was established between these two groups.

Table 4. Evaluation of pregnancy outcomes according to Amniotic Fluid Index (AFI).

<table>
<thead>
<tr>
<th>Mode of delivery, n (%)</th>
<th>Normal</th>
<th>Oligohydramnios</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICU admission, n (%)</td>
<td>88 (%)</td>
<td>11 (68.8)</td>
<td>&lt;0.028*</td>
</tr>
<tr>
<td>Non-required</td>
<td>90.7%</td>
<td>11 (68.8)</td>
<td>&lt;0.028*</td>
</tr>
<tr>
<td>Normal</td>
<td>71 (%)</td>
<td>7 (43.8)</td>
<td>&lt;0.037*</td>
</tr>
<tr>
<td>Cesarean section</td>
<td>26 (%)</td>
<td>9 (56.3)</td>
<td></td>
</tr>
<tr>
<td>Apgar score, Mean±SD (median)</td>
<td>8.26±0.83 (8)</td>
<td>7.56±1.03 (7)</td>
<td>&lt;0.008**</td>
</tr>
</tbody>
</table>

Although labor induction success is hard to determine, there are numerous factors affecting the probability of vaginal delivery following induction of labor. These factors include parity, Bishop score, advanced maternal age, gestational age, maternal body mass index, and maternal weight gain during pregnancy (3-5).

Parity is a powerful predictor of labor induction success. Previous studies have shown that the rate of induced vaginal delivery is significantly higher in multiparous women compared to nulliparous women (4-7). In addition, some other studies have reported that no significant difference was found between the patients delivered by vaginal delivery and cesarean section (8,9). In our study, the rate of induced vaginal delivery was significantly higher in multiparous women compared to nulliparous women (p=0.019; p<0.05). However, parity established no significant correlation with Apgar score and admission to NICU (p>0.05, p>0.05).

Bishop score is another useful predictor of labor induction success. Cervical examination is of prime importance for elective labor induction (4-6). The primary aim in this method is to predict whether labor will commence spontaneously. Moreover, this method also enables gynecologists to evaluate the success of elective labor induction. In addition to Bishop score, there are some other modalities used for predicting preterm birth, such as ultrasonographic assessment of cervical length and fetal fibronectin testing. Although these two methods have been shown to yield more objective outcomes compared to Bishop score, superiority of these methods over each other or over Bishop score remains controversial (6,7).

Previous studies indicate that the pregnant women with favorable Bishop scores have low cesarean delivery rate and parity, whereas neonatal demise, shoulder dystocia, meconium aspiration syndrome, and severe perineal lacerations were significantly lower (4).

Gulmezoglu et al. (5) published a Cochrane Review in 2012, in which they evaluated 22 studies and a total of 9,383 pregnant women. The authors found that perinatal mortality, meconium aspiration, cesarean delivery rate, and parity were significantly lower in the women that underwent induction of labor at 41 weeks as compared to women that underwent induction of labor at 42 weeks.

DISCUSSION

Expectant management of post-term pregnancies is a controversial issue in obstetric practice due to increased maternal and neonatal risks. Studies have shown that performing labor induction at 41 weeks of gestation yields better perinatal outcomes. Kaimal et al. (4) investigated cost-effectiveness of labor induction at 41 weeks in nulliparous women and found that there was no significant difference in cesarean delivery

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In our study, the rate of induced vaginal delivery was significantly higher in multiparous women compared to nulliparous women (p=0.019; p<0.05). However, parity established no significant correlation with Apgar score and admission to NICU (p>0.05, p>0.05).
tion rates. In addition, these patients have been shown to have high rates of successful labor induction; however, an unfavorable Bishop score does not suggest that vaginal delivery is not likely. Teixeira et al. conducted a meta-analysis and suggested that there is a strong relationship between favorable Bishop scores and successful labor induction and that Bishop score is the most accurate and cost-effective method in the prediction of the success of vaginal delivery and labor induction. In our study, in line with the literature, the rate of induced vaginal delivery was significantly higher in patients with Bishop score ≥7 than in patients with Bishop score <7 (p=0.019; p<0.05). Moreover, a significant correlation was found between Bishop score and Apgar score (p<0.05), and admission to NICU was significantly higher in patients with Bishop score <7 (p=0.003; p<0.01). Moreover, Bishop score, parity, and amniotic fluid index indicate labor induction success as well as Apgar score and neonatal intensive care unit admission.

**Conflict of Interest**
The authors have no conflict of interests

**REFERENCES**


