Effect of the timing of delivery on perinatal outcomes at gestational hypertension

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Abstract: Objective: We aimed to evaluate the perinatal outcomes of women diagnosed with gestational hypertension and no proteinuria according to the gestational weeks. Methods: We included women diagnosed with gestational hypertension between 2010 and 2014 at our institution and excluded the patients with preeclampsia and chronic hypertension. Women with gestational hypertension were grouped according to the gestational weeks. One group consisted of the pregnancies between 37 and 38*6, whereas the other group included pregnancies between 39 and 41 weeks. Then the outcomes of these pregnancies were compared with healthy women who had delivery between the same weeks (37–38*6 weeks and 39–41 weeks). We analyzed the mode of delivery, birth weight, and neonatal outcomes of these pregnancies. Results: First and fifth minute Apgar scores were significantly decreased in women with gestational hypertension who had delivery between 39 and 41 weeks compared to healthy subjects (respectively, \( p = 0.005 \) and \( p = 0.033 \)). Perinatal outcomes were adversely affected if the time of delivery was beyond 39 weeks in pregnancies complicated with gestational hypertension. Conclusion: We concluded that perinatal outcomes were adversely affected if the time of delivery was beyond 39 weeks in pregnancies complicated with gestational hypertension, and outcomes of such pregnancies can be improved if time for delivery is <39 weeks.

Keywords: pregnancy induced hypertension, birth week, perinatal outcome

Introduction

Pregnancy-induced hypertension (gestational hypertension [GH] and preeclampsia) is one of the most common medical disorders in pregnancy, and it is recognized as a topic of concern because of the severe obstetrical complications that may lead to both maternal and neonatal morbidity and mortality. Hypertensive disorders are reported to occur in 6% to 8% of pregnancies in the United States [1]. Sibai et al. [2] found an overall rate of hypertensive disorders in singleton pregnancies of 11.6% (gestational hypertension; preeclampsia; eclampsia; and hemolysis, elevated liver enzymes, and low platelet count [HELLP] syndrome) across all gestational ages.

Gestational hypertension can be defined as de novo hypertension with elevation in blood pressure (BP) \( \geq 140 \) mm Hg systolic or \( \geq 90 \) mm Hg diastolic after 20 weeks of pregnancy without proteinuria or end organ damage [3]. Another point about the definition of gestational hypertension is that it should not last for more than 12 weeks postpartum. Pathophysiology is not clear, yet we do not know whether it is an early manifestation of preeclampsia or a completely different clinical presentation.

Gestational hypertension or preeclampsia may lead to important complications that cause maternal and neonatal morbidity and mortality. Gestational age at onset, severity of disease, maternal and fetal conditions at the time of diagnosis, and timing of delivery are the main factors associated with the risk of these complications [4].

Saudan et al. [5] estimated that the rate of progression from GH to preeclampsia was 15% to 25%. Optimal time for delivery has been a subject of controversial discussion for a long time. In some of the investigations done so far, it has been suggested that at gestational hypertension and mild preeclampsia, induction of labor must be considered between 37th and 38th weeks rather than postponing it until the development of either a maternal or fetal indication for delivery [6]. On the other hand, delivery at \( \geq 34 \) weeks was the recommend-
ed gestational age for severe preeclampsia [7]. Although time of delivery at preeclampsia has been a matter of discussion for a long time, it has been rarely discussed at gestational hypertension. Therefore, no clear gestational week for delivery has been stated for gestational hypertension.

In this study, we aimed to compare perinatal outcomes of pregnancies complicated with gestational hypertension managed with either labor induction or vaginal/caesarean delivery after expectant monitoring versus pregnancies without hypertensive disorders beyond 39 gestational weeks.

Materials and Methods

We conducted a retrospective case control study among patients who presented at Department of Gynecology and Obstetrics, Ankara University Hospital, with the complaint of elevation in blood pressure over a four-year period. This retrospective study was exempt from ethical approval by Ankara University Ethics committee. We retrospectively analyzed the data of patients diagnosed with pregnancy-induced hypertension within the last 4 years and compared the outcomes with the healthy pregnancies whose follow-up was held at our clinic within the last year. We included gravidas who met the definition for gestational hypertension ≥24 gestational weeks. Gestational hypertension was defined as elevation in blood pressure ≥140 mm Hg systolic or ≥90 mm Hg diastolic with proteinuria ≥300 mg. Patients included had delivery between 37 and 41 gestational weeks. Patients with elevated blood pressure before 24 weeks or preeclampsia were excluded. None of the pregnancies was complicated by diabetes mellitus, cardiac, pulmonary, or renal disease. Evaluated baseline maternal characteristics were age, gravidity, parity, and age. Perinatal and neonatal outcomes analyzed for the study were mode of delivery, indication for caesarean section, labor induction, gestational age at delivery, Apgar scores of neonates, and admission to neonatal intensive care unit. Patients were grouped according to gestational weeks. Time of delivery ranged between 37 and 38*6 weeks for one group and ranged between 39 and 41 gestational weeks for the other. Control groups consisting of pregnancies not complicated with gestational hypertension were also grouped according to the gestational weeks. Hence, there were two control groups within the range of 37–38*6 and 39–41 gestational weeks. We compared outcomes of pregnancies complicated with gestational hypertension between 37–38*6 and 39–41 weeks versus control groups of healthy pregnancies at 37–38*6 and 39–41 gestational weeks.

The statistical analysis of the differences between the patient and control groups for the parameters showing normal distribution was done with “independent-sam-

tests were performed to test statistical significance of the differences in proportions. A value of $p < 0.05$ was considered to be statistically significant.

Results

A total of 6500 patients who had delivery during this four-year period at our clinic underwent evaluation. Of these patients, 392 showed up at our hospital for elevated blood pressure. Among these, 92 women had chronic hypertension. One hundred and twelve women had preeclampsia and eclampsia. Fifty-six women's pregnancies were complicated with gestational diabetes mellitus in addition to gestational hypertension. Of the remaining 132, 6 had coexisting morbidities like autoimmune diseases or cardiac pathologies. Therefore, during the study period, a total of 126 deliveries were made at our hospital. Our search for gestational hypertension among 126 deliveries displayed 79 positive cases after the dropouts. Of these deliveries performed within the last year of this period, 575 were identified as the controls. Although prevalence of GH was 2.9% at our clinic, only 1.9% met the inclusion criteria of our study.

Outcomes of 34 patients diagnosed with gestational hypertension who had delivery between 37 and 38*6 gestational weeks were compared versus 260 controls who had delivery between the same weeks. The rest 45 pregnancies whose time for delivery ranged between 39 and 41 gestational weeks were compared versus 315 controls of the same weeks in a similar way. There was no significant difference at median age, parity, gravidity, and duration of pregnancy between women with gestational hypertension and healthy subjects in either the group who had delivery at 37–38*6 weeks or the group who had delivery at 39–41 weeks.

In the group of patients for whom the time of delivery ranged between 39 and 41 weeks of pregnancy, there was no difference at mode of delivery between hypertensive and healthy subjects. There was also no significant difference between two groups by means of the number of patients who had labor induction. There was no significant difference either in the birth weights of the neonates or days in the neonatal intensive care unit between two groups. However, Apgar scores of first and fifth minutes were significantly lower for neonates of the women with gestational hypertension (Table I).

When studying the mode of delivery in the group of patients who had delivery between 37 and 38*6 gestational weeks, we found that there was no significant difference either in the number of patients who underwent caesarean section or the number of patients who had labor induction between two groups. There was also no
Timing of delivery at gestational hypertension

In this retrospective study, we found that, in pregnancies complicated with gestational hypertension, neonatal outcomes were better, almost the same with unaffected pregnancies if the time of delivery was between 37 and 38*6 gestational weeks. Contrary to what is expected, gestational hypertension did not affect the mode of delivery in favor of caesarean section.

Some limitations of our study need to be addressed. In the first place, our findings may have been distorted by incidental bias due to the small size of the study population. We tried to overcome this problem by prolonging the study period. Another weak point that must be addressed is the lack of uniform criteria among the patients in our study group as there has been no data regarding the factors (age, existence of comorbidities like metabolic syndrome or use of anti-hypertensive agents) which may alter the prognosis. However, the retrospective character of the study makes it vulnerable to missing data. Once again, a larger study population would better assess the optimal timing.

So far, there have been few studies regarding the outcomes and management of pregnancies complicated with mild preeclampsia and gestational hypertension. HYPLITAT trial, which is the most extensive study about the subject, suggests that delivery is indicated in pregnancies complicated with gestational hypertension or mild preeclampsia once 37 weeks is achieved [8]. HYPLITAT (hypertension and preeclampsia intervention trial at term), which was designed to compare induction of labor versus expectant management at pregnancy-induced hyper-

**Table 1** Characteristics and perinatal outcomes of women with gestational hypertension and healthy controls

<table>
<thead>
<tr>
<th>Perinatal and neonatal outcomes</th>
<th>37–38* weeks</th>
<th>39–41 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gestational hypertension</td>
<td>Normotensive</td>
</tr>
<tr>
<td></td>
<td>( n = 34 )</td>
<td>( n = 260 )</td>
</tr>
<tr>
<td>Age (mean ± SD)</td>
<td>30.47 ± 5.8</td>
<td>28.7 ± 5.3</td>
</tr>
<tr>
<td>Gravidity (min–max, median)</td>
<td>1–4 (2)</td>
<td>1–5 (2)</td>
</tr>
<tr>
<td>Parity (min–max, median)</td>
<td>0–2 (1)</td>
<td>0–4 (1)</td>
</tr>
<tr>
<td>Gestational week (min–max, median) (days)</td>
<td>259–272 (268.5)</td>
<td>259–272 (269)</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal (%)</td>
<td>17 (50%)</td>
<td>120 (23.1%)</td>
</tr>
<tr>
<td>Caesarean section (%)</td>
<td>17 (50%)</td>
<td>140 (76.9%)</td>
</tr>
<tr>
<td>Labor induction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (%)</td>
<td>21 (38.2%)</td>
<td>200 (92.3%)</td>
</tr>
<tr>
<td>Oxytocin (%)</td>
<td>13 (61.8%)</td>
<td>60 (7.7%)</td>
</tr>
<tr>
<td>Indication for caesarean section</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPD (%)</td>
<td>7 (%52.9)</td>
<td>55 (%25)</td>
</tr>
<tr>
<td>Fetal distress (%)</td>
<td>6 (%41.2)</td>
<td>25 (%15)</td>
</tr>
<tr>
<td>Arrest of labor (%)</td>
<td>1 (%5.9)</td>
<td>20 (%2.5)</td>
</tr>
<tr>
<td>Previous caesarean section (%)</td>
<td>3</td>
<td>40 (%57.5)</td>
</tr>
<tr>
<td>Birth weight (mean ± SD)</td>
<td>3196 ± 541</td>
<td>3220 ± 409</td>
</tr>
<tr>
<td>APGAR 1 (min–max, median)</td>
<td>2–9 (8)*</td>
<td>1–9 (8)*</td>
</tr>
<tr>
<td>APGAR 5 (min–max, median)</td>
<td>4–10 (10)*</td>
<td>7–10 (10)*</td>
</tr>
<tr>
<td>Admission to NICU (%)</td>
<td>4 (%11.8)</td>
<td>20 (%4.7)</td>
</tr>
</tbody>
</table>

NICU: neonatal intensive care unit, CPD: cerebro pelvic disproportion, NS: not significant
* Comparison of between 37 and 38*6 weeks, ** Comparison of between 39 and 41 weeks

**Discussion**

In this retrospective study, we found that, in pregnancies complicated with gestational hypertension, neonatal outcomes were better, almost the same with unaffected pregnancies if the time of delivery was between 37 and 38*6 gestational weeks. Contrary to what is expected, gestational hypertension did not affect the mode of delivery in favor of caesarean section.

Some limitations of our study need to be addressed. In the first place, our findings may have been distorted by incidental bias due to the small size of the study population. We tried to overcome this problem by prolonging the study period. Another weak point that must be addressed is the lack of uniform criteria among the patients in our study group as there has been no data regarding the factors (age, existence of comorbidities like metabolic syndrome or use of anti-hypertensive agents) which may alter the prognosis. However, the retrospective character of the study makes it vulnerable to missing data. Once again, a larger study population would better assess the optimal timing.

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**Note:**

The table provides a detailed comparison of perinatal and neonatal outcomes between women with gestational hypertension and healthy controls, including age, gravidity, parity, gestational weeks, mode of delivery, labor induction, indication for caesarean section, birth weight, and APGAR scores, with statistical significance indicated for comparisons between 37 and 38*6 weeks and between 39 and 41 weeks.
tension, revealed that relative risk was 0.71 for composite adverse maternal outcome and 0.75 for composite adverse neonatal outcome. In addition, HYPITAT addressed that labor induction was not related with either increased caesarean rates or adverse perinatal outcomes. However, in this study, gestational hypertension was not separated from mild preeclampsia, which was subject to the pitfalls of this large retrospective study, as it did not make clear whether morbidities and risk of adverse maternal and neonatal outcomes were the same in both. In another study which evaluated optimal time for delivery only in pregnancies complicated with gestational hypertension, Cruz et al. postulated that labor induction between 38 and 39 weeks results in lower neonatal and maternal morbidity and mortality [9]. Gofton et al. found that Apgar scores in women with gestational hypertension were not significantly different from those of control subjects [10].

However, the studies which evaluated the patients with gestational hypertension alone are even less. To the best of our knowledge, our study is one of these studies by means of analyzing the outcomes of pregnancies complicated with gestational hypertension alone. In this study, we evaluated the outcomes with a different approach since we compared women with gestational hypertension versus healthy controls.

In none of the aforementioned studies, expectant management was supported. In managing a patient with gestational hypertension, the burden is on the clinician due to the responsibility of weighing the risks and benefits of the preferred management. One can argue that the threshold of risks for maternal and neonatal outcomes justifies the necessity of defining a cutoff for the time of delivery. Although there are variations among practice patterns among obstetricians, combined results of these studies suggest that, at gestational hypertension, labor induction is reasonable once 37 weeks is achieved.

Barton et al. also addressed that, if delivery is earlier than 37 weeks, neonatal complications and length of neonatal intensive care unit stay will increase [11]. It is usually assumed that obstetricians lead such patients for delivery rather than expectant management because of the beneficial effects on both maternal and perinatal outcomes as well as diminishing the medicolegal concerns.

To conclude that we recommend that in pregnancies complicated with gestational hypertension, labor induction between 37*6 and 39 weeks will prevent deterioration in maternal condition and minimize the risks for the neonates. Results of this study showed that obstetricians’ tendency must be labor induction rather than expectant management in gestational hypertension. Until controlled randomized trials are performed, optimal time for delivery in pregnancies complicated with gestational hypertension will continue to challenge the obstetricians.

* * *

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References