Mini Review

Risk Factors Associated with the Occurrence of Preeclampsia in Women with Twin Pregnanacies: Mini Review

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Abstract

Aim: To summarize recent articles on the risk factors of preeclampsia in twin pregnancies from 2002 to 2014.

Methods: Recent articles from 2002 to 2014 were searched using PubMed.

Results: We found 8 articles analyzing the risk factors of preeclampsia in twin pregnancies and focused on the following three risk factors: i) egg (oocyte) donation, ii) chorionicity (dichorionic (DC) twins vs. monochorionic (MC) twins), iii) assisted reproductive technology (ART) (in vitro fertilization (IVF)/intracytoplasmic sperm injection (ICSI) vs. no-IVF/ICSI). Two articles evaluated the risk of egg (oocyte) donation for developing preeclampsia in twin pregnancies, and both reported that egg (oocyte) donation was a significant risk factor for the occurrence of PE in twin pregnancies. However, the effects of chorionicity and ART on the occurrence of PE in twins are still controversial.

Conclusions: We attempted a mini-review on the risk factors of preeclampsia in women with twin pregnancies. Egg (oocyte) donation was a risk factor of preeclampsia in twin pregnancies. Since women with twin pregnancies have an almost three-fold increased risk of PE compared with those with singleton pregnancy, egg (oocyte) donor recipients with multiple pregnancies might face an extremely high risk of preeclampsia.

INTRODUCTION

The risk of preeclampsia (PE) in women with twin pregnancies is nearly triple [1]. Neither the chorionicity nor zygosity of the pregnancies alters this increased risk [1]. Krotz et al. [2] reviewed hypertensive disease in twin pregnancies in 2002; the relative risks of gestational hypertension (GH), PE and eclampsia in twin pregnancies were significantly higher than in singleton pregnancy; parity, African-American ethnicity, young maternal age were risk factors; however, maternal smoking, income level and zygosity were not. To the best of our knowledge, since the review of Krotz et al. [2], there have been no reviews on the risk factors of PE in twin pregnancies. We searched PubMed and performed a mini-review of the risk factors of PE in twin pregnancies.

METHODS

We searched articles on PE risk in twins in PubMed from 2002 to 2014 using the following key words: twins AND ((PE OR “pregnancy induced hypertension” OR “hypertension in pregnancy” OR “gestational hypertension” OR “EPH gestosis” OR “toxemia of pregnancy” OR edema) AND (predict* OR predicting OR prediction OR (cohort OR prospective OR retrospective OR “nested case control”) AND study) OR “risk factor” OR meta-analysis OR “systematic review” OR combination OR multivariate OR “logistic regression”)) (n = 112, on March 6th, 2014). The author checked the titles and abstracts, extracted eligible articles analyzing the risk factors of pregnancies in twin pregnancies. Superimposed PE was included in the category of PE in this review.

We identified 8 articles published from 2002 to 2014 in which risk factors of PE in twin pregnancies were analyzed [3-10]. All the risk factors of PE in twin pregnancies are extracted in (Table 1). If multivariate logistic regression analyses were performed, we only described the adjusted odds ratio (aOR), while if multivariate analyses were not performed, we described the crude odds ratio (cOR).

RESULTS

We could not integrated the results of these articles, and only listed all the risk factors of PE evaluated in the 8 articles. Thus, we summarized the following risk factors: i) egg (oocyte) donation, ii) dichorionic (DC) twins vs. monochorionic (MC) twins, iii) in vitro fertilization (IVF)/intracytoplasmic sperm injection (ICSI) vs. no-IVF/ICSI.

Egg (oocyte) donation

Two articles evaluated the risk of egg (oocyte) donation for developing PE in twin pregnancies [3,4], and both reported that it was a significant risk factor.

Table 1: Risk factors of developing PE in twin pregnancies.

<table>
<thead>
<tr>
<th>Authors (Published year)</th>
<th>Reference</th>
<th>Study design</th>
<th>Numbers of twins</th>
<th>All PE num (%)</th>
<th>Risk factors of developing PE</th>
<th>Relative risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fox et al. (2014) [3]</td>
<td>Case-control study</td>
<td>513</td>
<td>76 (14.8%)</td>
<td>Egg donation aOR: 2.409 (1.051-5.524)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malchau et al. (2013) [4]</td>
<td>Cohort study</td>
<td>38228</td>
<td>-</td>
<td>Prepregnancy obesity aOR: 2.367 (1.079-5.192)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sparks et al. (2013) [5]</td>
<td>Cohort study</td>
<td>695</td>
<td>126 (18.1%)</td>
<td>DC twins vs. MC twins For mild PE, aOR: 5.85 (1.31-26.13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suzuki et al. (2009) [6]</td>
<td>Cohort study</td>
<td>593</td>
<td>45 (7.6%)</td>
<td>Maternal age ≥35 vs. &lt;25 aOR: 0.91 (0.45-1.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erez et al. (2006) [7]</td>
<td>Cohort study</td>
<td>2628</td>
<td>244 (9.3%)</td>
<td>Primiparity aOR: 3.37 (2.6-4.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinborg et al. (2004) [8]</td>
<td>Case-control study</td>
<td>802</td>
<td>-</td>
<td>IVF/ICSI vs. no-IVF/ICSI aOR: 1.6 (1.1-2.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luke et al. (2003) [10]</td>
<td>Cohort study</td>
<td>529</td>
<td>-</td>
<td>Specialized prenatal care aOR: 0.41 (0.23-0.75)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: PE, preeclampsia; aOR, adjusted odds ratio; IVF, in vitro fertilization; ICSI, intracytoplasmic sperm injection; DC, dichorionic; MC, monochorionic; cOR, crude odds ratio; BMI, body mass index.

Chorionicity

Two articles evaluated the role of DC/MC twins for developing PE [5,6]. One study reported that mild PE occurred significantly more frequently with DC twins than MC twins, although severe PE was not affected by chorionicity [5]. However, the other study reported that a significant difference was not shown in the frequency of PE between DC twins and MC twins [6].

ART

Three articles evaluated the role of IVF/ICSI in developing PE in twin pregnancies [6-8]. Two studies reported that the occurrence of PE was not significantly higher in women with...
IVF treatment than in those with spontaneous pregnancy [6,7]. However, the other study reported that the occurrence rate of PE was significantly higher in women with IVF/ICSI treatment than in those without IVF/ICSI [8].

**DISCUSSION**

In a previous review of hypertensive disease in twin pregnancies by Krotz et al. [2] in 2002, they summarized that parity, African-American ethnicity, and young maternal age were all factors that increased the relative risk of acquiring hypertensive disease to 4.0, 1.8 and 1.5 in mothers of twin gestations, and factors such as maternal smoking, income level and zygosity had a negligible effect on the relative risk of acquiring hypertensive disease in twin gestations. In the current mini-review from 2002 to 2014, 8 novel articles analyzing the effects of various risk factors on developing PE in twin pregnancies were summarized. Although the roles of chorionicity and ART in developing PE in twin pregnancies are still controversial, two studies reported consistent results that egg (oocyte) donation was a risk factor.

Egg (oocyte) donation was a risk factor for the occurrence of PE in twins. In two studies, multivariate analyses were performed and the PE risk in women with egg (oocyte) donation was 2.3-2.4-fold higher than in those with spontaneous twins. Klatsky et al. [11] compared the risk of GH and PE in pregnancies conceived through standard IVF using autologous oocytes with donated oocytes while maternal age and multiple gestation were matched in the two groups; the incidence of GH and PE in ovum donor recipients was almost three-folds high as in women undergoing autologous IVF (24.7% vs. 7.4%, 16.9% vs. 4.9%, respectively). Klatsky et al. [11] also reviewed previous reports on pregnancy-induced hypertension in ovum donor recipients and suggested that the incidence of pregnancy-induced hypertension and PE were increased in ovum donor recipients in 4 relevant articles, although these articles did not match the maternal age and multiple gestation. Taken together, it appears that egg (oocyte) donation increases the risk of PE almost two- to three-fold in pregnant women.

In conclusion, we attempted a mini-review on the risk factors of PE in twin pregnancies. Egg (oocyte) donation was a risk factor. Since women with twin pregnancies have an almost three-fold increased risk of PE than those with a singleton pregnancy, egg (oocyte) donor recipients with multiple pregnancies might face a very high risk of PE.

**FINANCIAL DISCLOSURE**

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**REFERENCES**


Cite this article