Twin gestation surveillance in a single tertiary center: Two decades of experience

ARISTIDES ANTSAKLIS, PANAGIOTIS ANTSAKLIS, VASILEIOS PERGYALIOTIS

Abstract
Twin gestation poses in our time a great challenge for obstetricians as it is accompanied by various pathology including abortion, preterm labor, IUGR, preeclampsia, TTTS and other entities. Pregnancies of twins are considered as high risk and need intensive antenatal monitoring and care. The purpose of the present study was to retrospectively assess twin gestation rates among women delivered in our center as well as other demographic indices and mean Apgar scores at five minutes of neonates. We conducted a retrospective 20-year study of all pregnancies from January 1991 to December 2010, and collected 1954 twin gestations in a sum of 67 148 pregnancies (2.91%). Twin pregnancy rates delivered at our institution didn’t change despite the steady increment in use of ART the last five years. Furthermore gestational age at delivery and mean birth weight of neonates were also unchanged despite advances in antenatal care. However the percentage of first twins born with fifth minute Apgar scores less than seven has changed significantly. Lastly cesarean section rates are kept high throughout the last two decades.

Key words: twin gestation, twin rates, cesarean section

Introduction
Twin gestation refers to the simultaneous existence of two fetuses in utero. Twin gestations can either be monozygotic (resulting from one zygote that eventually splits, thus forming two embryos) or dizygotic (resulting from the fertilization of two separate ova). Twin gestation rates are rapidly ascending from a mean of 18.9 per 1000 births during the early 80’s to 33.3 at 2009, as reported recently by Martin et al. [1]. The causes resulting in the formation of a twin pregnancy are multifactorial as depicted by Bortolus et al. with maternal age and a first degree relative with a history of twin gestation being the best determinants of risk of multiple gestation [2]. It is important also to emphasize that among certain populations the incidence of twin gestation is significantly increased such as the Yoruba that seem to have the highest incidence worldwide, reaching 45-50 twin gestations per 1000 births.

Assisted reproduction techniques (ART) are gaining ground nowadays as more women in western societies become pregnant in advanced age (> 35 years old). Women who undergo ART are more likely to deliver a high order pregnancy and especially twin pregnancies than those conceiving naturally. Moreover it seems that women conceiving with ART are more prone to deliver preterm [3].

Twin gestation is considered as high risk, whether conceived naturally or with ART, as it is prone to various complications such as abortion, congenital malformations, hyperemesis gravidarum, preterm labor, intrauterine growth restriction (IUGR), twin-twin transfusion syndrome (TTTS), premature prelabor rupture of the membranes (PPROM), bleeding and hypertensive disorders of pregnancy including preeclampsia [4-6]. Prematurity seems to pose the greatest threat among twins, with a mortality rate threefold to eightfold that of singletons [3].

Materials and methods
We conducted a retrospective 20-year study of all pregnancies from January 1991 to December 2010, managed at the first department of obstetrics and gynecology, at “Alexandra” university maternity hospital, Athens, Greece. Our institution is a tertiary hospital covering a wide spectrum of normal and high risk pregnancies as a referral center for the Greek population. The source that provided the spectrum of information covered in this study was the patient’s record. The information were tabulated to a structured form and analyzed using IBM SPSS statistics v. 20. The level of significance was set at \( p \leq 0.05 \).

Results
During the 20 year follow-up period there were 1954 twin gestations in a sum of 67 148 pregnancies (2.91%). This percentile ranged from 1.41% to 2.71%.

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Fig. 1. Number of twins delivered by year enrolled in this study (dotted line) and percentage of twin deliveries per total deliveries (continuous line).

Fig. 2. Mean age of mothers giving birth to twin analyzed by year enrolled in this study.

Fig. 3. Mean gestational age at delivery (continuous line) and mean birth weight of infants (dotted line) by year enrolled in this study.

Fig. 4. Mean number of first twins (continuous line) and second twins (dotted line) born with Apgar scores less than 7 at 5 minutes, per year enrolled in this study.

Fig. 5. Number of women giving birth to twins that conceived with ART, per year enrolled in this study. Notice the steady increasing rates the last 5 years.

Fig. 6. Absolute cesarean section rate for twin gestations performed in our institution per year enrolled in this study (continuous line) and percentage of them among delivering of twins (dotted line).
Table 1. Comparison of maternal demographics and neonatal outcome between the two decades examined in this study

<table>
<thead>
<tr>
<th></th>
<th>1991-2000</th>
<th></th>
<th>2001-2010</th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>29.52</td>
<td>1.23</td>
<td>30.68</td>
<td>1.57</td>
<td>0.081</td>
</tr>
<tr>
<td>Birth weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean gestational age</td>
<td>240.06</td>
<td>1.57</td>
<td>240.31</td>
<td>1.56</td>
<td>0.725</td>
</tr>
<tr>
<td>5° pH &lt; 7 (1st twin)</td>
<td>17.77</td>
<td>1.28</td>
<td>16.39</td>
<td>0.55</td>
<td>0.009</td>
</tr>
<tr>
<td>5° pH &lt; 7 (2nd twin)</td>
<td>27.19</td>
<td>1.30</td>
<td>26.22</td>
<td>1.71</td>
<td>0.170</td>
</tr>
<tr>
<td>C/S rate</td>
<td>82.47</td>
<td>9.84</td>
<td>91.96</td>
<td>3.72</td>
<td>0.015</td>
</tr>
<tr>
<td>ART</td>
<td>23.89</td>
<td>6.03</td>
<td>26.28</td>
<td>4.28</td>
<td>0.324</td>
</tr>
</tbody>
</table>

The absolute numbers of twin gestation as well as their corresponding percentiles during these years are depicted in figure 1. The mean age of mothers delivering twins was 30.75 years old ranging between 16 and 47 years (Fig. 2). During the last 2 years it seems that the mean gestational age raised by 2-2.5 years. Mean gestational age at delivery was measured in days and did not seem to be affected during the observed period (Fig. 3). The same was observed with mean birth weight of neonates that seemed to average at 2100-2200 grams with the exception of the period between 2002 and 2004 (Fig. 3). Mean percentage of first twins born with Apgar score less than seven at five minutes declined the last years, whereas the same was not observed for second twins (Fig. 4). Assisted reproduction techniques varied greatly between years (mean ART conceived twin pregnancies ranging from 17.24% to 34.84%), however the last 5 years it seemed that a pattern of more than 25% of twin gestations were the result of ART (Fig. 5). Finally cesarean section rates were kept well above 80% with the exception of the three first years included in this study (Fig. 6).

We aimed to assess the difference of mean measured demographic indices and neonatal outcomes between the two decades included in the present study. Results are shown in table 1 and seem to indicate no statistically significant changes with the exception of cesarean section rates and percentage of first twins that had a five minute Apgar score less than seven.

Discussion

The twin gestation rate of 29 per 1000 births reported in our study is in accordance with that reported by Martin et al. [1]. However although the last years the assisted reproduction techniques are gaining ground in Greece the extracted information did not showed an additional penetration of ART in the percentage of twin gestations that gave labor in our institution. One possible explanation for this observation is the fact that as more immigrants are entering Greece, especially from places that have higher rates of multiple gestations such as Africa and Asia, more multiple gestations are expected without the participation of ART. Moreover most Greek institutions that provide ART fertilization, as well as Alexandra hospital, follow strict rules regarding the number of fertilized ova or embryos that are transferred, in order to reduce the incidence of high order pregnancies. Furthermore as we experience in our center, a significant number of pregnant women using ART wish to reduce the number of embryos, reaching in many circumstances a singleton pregnancy (data not available in this study).

Mean maternal age remained constant during the last 20 years and when we analyzed its discrepancy between the last two decades we found that although very close it did not reach statistical significance (29.52 ± 1.23 vs 30.68 ± 1.57 p = 0.081). Mean gestational age at delivery has not changed significantly during the same period nor did the mean birth weight of neonates (240.06 ± 1.57 vs 240.31 ± 1.56 p = 0.725). Although significant improvements have been applied in antenatal care in the same period of time (better antenatal screening of embryos and pregnant women, advances in tocolytic therapy etc) it seems that their penetration in reducing preterm birth among twins is not as advantageous as expected. In a previous study conducted by the neonatal department of our hospital based on Hellenic vital statistic records (between 1980 and 2008) we specifically discussed this steep rise in preterm births in the general population during the final years [7].

Mean birth weight of the first twin wasn’t significantly higher when compared with that of the second twin (2137.30 ± 92.39 vs 2100.09 ± 91.9 p = 0.209). However the mean percentage of neonates born with Apgar score less than 7 at five minutes was significantly higher among first twins (17.77 ± 1.28 vs 26.22 ± 1.71 p ≤ 0.01).

Cesarean section rates for twin pregnancy were kept high in our institution during the study period with the exception of the first two years (Figure 5). Specifically when we examined this index we found that this aug-
mentation was statistically significant between the two decades included in this study (82.47 ± 9.84 vs 91.96 ± 3.72 p = 0.015). This observation is in accordance with a large cross-sectional study performed by Lee et al. in the U.S. [8]. However we must state that the decision of cesarean section as method of delivering twins does not seem to be justified during our time as an augmenting number of studies suggest that perinatal outcome seems to be better when normal labor is opted. A recent systematic review suggests that this observation is reproduced even for fetuses that are non-cephalic [9]. More specifically it seems that although neonatal morbidity of the second twin is not significantly altered by normal labor, it is the first twin that is more favored, experiencing less neonatal respiratory distress than with the planned cesarean section [10]. Another French national database retrospective cohort study agreed with the aforementioned results [11]. Zipori et al. studied neonatal respiratory morbidity among twins that were delivered electively by C/S and found that this mode of delivery seems to be safe only when pregnancy has completed 37 weeks of gestation. However it seems to be both physician and patient disbelief regarding normal labor potentials that ultimately leads to the stable increment in cesarean sections when addressing twin pregnancy. Of course we should state that these practices should be addressed only term or late preterm twins, whereas for those weighing less than 1500 grams data seem to be compelling [12-15].

In conclusion it seems that the number of twin pregnancies carried out in our institution is not growing as expected by the increasing number of ART carried out the last years. Both strict protocols for the number of embryos transferred and the increasing number of immigrants followed up by our institution seem to participate in this observation. Furthermore, despite advances in perinatal monitoring and care, mean gestational age at delivery and neonatal birth weight have not changed the last two decades. Cesarean section still seems to be the preferred mode of delivery, although international studies seem to dictate that normal labor is far more advantageous at least for the first twin. We strongly recommend that the hospital should apply interventions that will minimize premature delivery and improve its policy regarding normal labor of twin gestations.

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References


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