Prognosis of the Babies Born from Placental Abruption - Difference between Intrauterine Fetal Death and Live-Born Infants

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Abstract

Objective: To investigate the fetal/neonatal prognosis and to compare Intrauterine Fetal Death (IUFD) with live-born infants in placental abruption.

Methods: A retrospective review of 355 pregnancies was performed. An adverse fetal/neonatal outcome was defined as IUFD on admission, neonatal/infantile death at discharge and cerebral palsy.

Results: Eighty-nine fetuses were cases of IUFD, while the remaining 266 fetuses were alive on admission. The significant factor for IUFD was blood transfusion (OR (odds ratio) 2.21, 95% CI 1.02 - 4.76). The interval from the onset of symptoms to the diagnosis was significantly longer for IUFD than for the live-born infants (median, 213 vs. 130 min, p<0.001) A logistic regression model showed bradycardia (28.25, 6.10 - 130.84), late decelerations (5.94, 1.02 - 34.61) and gestational age at less than 35 weeks of gestation (5.37, 1.94 - 14.85) were associated with adverse outcomes other than IUFD. The abortion prognosis score was calculated for the occurrence of an adverse neonatal outcome, using four items including gestational age, abdominal pain, bradycardia, and late decelerations.

Conclusions: The significant factor associated with IUFD was the interval to the diagnosis and the need for blood transfusion. Adverse outcomes other than IUFD were linked to the gestational age, bradycardia, or late decelerations.

Keywords: Placental abruption; Fetal/neonatal prognosis

Introduction

Placental abruption is potentially disastrous to the fetus, with a perinatal mortality rate as high as 60 % [1]. Although perinatal mortality includes both Intrauterine Fetal Death (IUFD) and early neonatal death, it is unclear whether there are differences in the risk factors for these outcomes in cases of placental abruption.

In the proceeding paper, we showed the prediction of fetal acidemia in placental abruption [2]. It is also necessary to identify the important risk factors concerning the neonatal outcome other than IUFD, because the umbilical artery pH data cannot be obtained from all patients due to the emergency nature of the situation.

The purpose of this study was therefore to investigate the fetal and neonatal outcomes including IUFD and to compare IUFD with live-born infants in cases of placental abruption, by evaluating the clinical assessments, as well as the results of adjunctive laboratory tests, such as the ultrasonographic findings and FHR patterns.

Methods

The approval of the institutional review board (Tokyo Women’s Medical University) was obtained before the start of this retrospective study. All singleton births, born between 24 and 40 weeks of gestation between January, 1, 2009, and December 31, 2009 were included. The medical records of mothers and neonates in the 94 institutes, comprising the Perinatal Research Network in Japan (PRNI) listed in the ‘Acknowledgements’ were reviewed.

Gestational age was determined based on the mother’s last menstrual period and first and second trimester obstetric ultrasonography. More than 30 variables were assessed, including pregestational and antenatal factors. The details of the diagnosis, onset place, time of onset of symptoms to admission/delivery, and the clinical management of any relevant condition were recorded. We also included background data of the institutes such as the 24-hour anesthetic availability, presence of more than two specialists, and rapid access to blood and blood products as items for the multilevel analyses (Table 1).

The diagnosis of placental abruption was based primarily on the one or more of the following clinical manifestations: vaginal bleeding, abdominal pain, uterine tenderness, with/without a nonreassuring FHR tracing and was confirmed by the placental detachment after delivery [3]. The presence of hematoma during a cesarean section or coagulation/massive genital bleeding during vaginal delivery was considered to indicate placental detachment. Women found to have a healthy placenta, and those with chronic abruption [4], were excluded from this study. Chronic Abruption-Oligohydramnions Sequence (CAOS) was defined by the following criteria: (1) clinically significant vaginal bleeding in the absence of placenta previa or any other identifiable source of bleeding, (2) amniotic fluid volume initially documented as normal and (3) oligohydramnions (amniotic fluid index ≤ 5) eventually developing without concurrent evidence of ruptured membranes [4].

Ultrasonographic findings were reported as follows: preplacental collection under the chorionic plate, increased heterogeneous placental thickness (more than 5 cm), retroplacental collection, marginal hematoma, subchorionic hematoma or intra-amniotic hemorrhage [5]. FHR patterns were defined as abnormal when one of the following patterns was detected: persistent late decelerations, severe atypical deceleration, prolonged deceleration, or bradycardia [6]. The same patterns were also used for the assessment of preterm fetuses. A baseline FHR of less than 100 bpm was noted as bradycardia (>3 min)

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Received November 16, 2013; Accepted December 16, 2013; Published December 23, 2013

Citation: Matsuda Y, Ogawa M, Konno J (2013) Prognosis of the Babies Born from Placental Abruption - Difference between Intrauterine Fetal Death and Live-Born Infants. Gynecol Obstet (Sunnyvale) 4: 191 doi:10.4172/2161-0932.1000191

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The mean gestational age at delivery was 34.3 ± 3.5 weeks (preterm: 266 patients, term: 89 patients).

Because the diagnosis of placental abruption in this study was based on clinical manifestations, and the placental detachment was confirmed after delivery, the clinical background of patients in the present study may be more severe than that in some other studies [7,8]. As a result, the percentage of maternal and fetal/neonatal morbidity and mortality was high.

Abnormal ultrasonographic findings were observed in 263 patients (74.1%), mainly indicating retroploental anechoicity (185 cases), and increased placental thickness (167 cases).

In the 266 fetuses that were alive on admission, abnormal FHR patterns were observed in 166 patients (62.4%). The main abnormal FHR results were persistent late decelerations in 51 cases and prolonged patterns were observed in 166 patients (62.4%). The main abnormal ultrasonographic finding was decreased fetal movements in 261 cases (78.9%), indicating retroplacental anechoicity in 185 cases (56.7%), and increased placental thickness in 167 cases (49.3%).

Differences between IUFD and live-born infants

The clinical demographics of IUFD and live-born infants are given in Table 2. In a comparison of IUFD and live-born infants, statistically significant differences were observed in the maternal age, maternal transfer, on set of symptom outside obstetric facilities, abnormal ultrasonographic findings, and blood transfusion. The frequency of vaginal bleeding, gestational age at delivery and birth weight were lower in the IUFD group. There were no significant differences in the frequencies of preeclampsia, chronic hypertension, abdominal pain and cesarean section between these two groups. Using a logistic regression model, a blood transfusion (OR 2.21, 95% CI 1.02 - 4.76) was the only significant factor associated with the occurrence of IUFD (Table 3).

Massive detachment of placenta induces not only the maternal consumptive coagulopathy, but also the decrease of fetal oxygenation. As the degree of placental separation increases, the risk of fetal death also increases [1]. In addition, the frequency of coagulopathy is much higher.
### Results of the univariate analysis in terms of risk factors of an adverse outcome.

Table 4: Results of the univariate analysis in terms of risk factors of an adverse outcome.

| Potential factors                                      | Odds ratio | 95%CI      | p       |
|--------------------------------------------------------|------------|------------|---------|
| Onset place of symptoms: outside obstetric facilities  | 8.01       | 0.94 – 67.77 | 0.056   |
| Maternal transfer                                      | 1.89       | 0.90 – 3.95 | 0.09    |
| Maternal age (> 40yrs)                                  | 2.05       | 0.63 – 6.60 | 0.23    |
| Abnormal ultrasonographic findings                     | 1.77       | 0.68 – 4.60 | 0.24    |
| Abdominal pain                                          | 1.96       | 0.85 – 4.51 | 0.12    |
| Genital bleeding                                        | 0.47       | 0.22 – 1.02 | 0.057   |
| Blood transfusion                                       | 2.21       | 1.02 – 4.76 | 0.042   |

* Represents median (min-max)

Table 3: Results of the multivariate analysis in terms of risk factors for Intrauterine Fetal Death (IUFD).

| Potential predictors | Odds ratio | 95%CI       | p       |
|----------------------|------------|-------------|---------|
| Gestational age at delivery (<35 weeks)                | 28.25      | 6.10 – 130.84 | <0.0001 |
| Late deceleration                                        | 5.94       | 1.02 – 34.61 | 0.04    |
| Abnormal ultrasonographic findings                      | 0.64       | 0.24 – 1.75  | 0.39    |
| Abdominal pain                                           | 2.33       | 0.91 – 5.99  | 0.08    |
| Genital bleeding                                         | 0.59       | 0.23 – 1.53  | 0.28    |
| Blood transfusion                                        | 1.94       | 1.44 – 8.65  | 0.001   |

The clinical demographics of case (group 2) and control infants are given in Table 4. Using a logistic regression model, bradycardia (OR 28.25, 95%CI 6.1 - 130.84), late decelerations (OR 5.94, 1.02 - 34.61) and gestational age at delivery < 35 weeks (OR 5.37, 1.94 - 14.85), were all found to be associated with the occurrence of an adverse outcome (Table 5).

In the proceeding paper, the potential predictors for fetal acidemia (umbilical artery pH less than 7.0) in cases of placental abruption were bradycardia and late decelerations. For an adverse outcome, 'gestational week at delivery < 35 weeks' was added as a significant factor. Allred and Batton previously reported a study of the short-term outcome of preterm infants (23 to 32 weeks) born from placental abruption, and concluded that abruption was not an independent risk factor for a poor outcome among infants born between 23 and 32 weeks gestation, but that the preterm delivery was the main determinant of outcome [10].

Figure 1: Relationship between the Abruption Prognosis Score (APS) and the probability of adverse outcome in the cases of placental abruption.
the statistically significant factors identified by the multiple logistic regression analysis were subjected to stepwise regression analysis to construct a linear discriminant function: A: 2+2×3.4+5D, where A was an abdominal pain (0, no; 1, yes), B was gestational age less than 35 weeks (0, no; 1, yes), C was late decelerations (0, no; 1, yes), and D was bradycardia (0, no; 1, yes), because we could not obtain the pH data from all patients due to the emergency nature of the situation. This discriminant function was called 'Abruption Prognosis Score' (APS). A logistic regression analysis was performed to make clear the relationship between the APS and the probability of an adverse outcome in Figure 1. The probability of this cut-off point of APS was calculated to be approximately 0.1. When this score was 8, the probability of an adverse outcome was almost 0.5.

We had established the score by using the above-mentioned concept and named it the 'Severe Abruption Score (SAS)' that could be used to predict the occurrence of fetal acidemia in cases of placental abruption [2]. Similar to the 'SAS', the amount of vaginal bleeding correlates poorly with the degree of placental separation and does not serve as a useful marker of an impending adverse outcome. On the other hand, different from SAS score, abnormal ultrasonographic findings were not an important item for the prediction of adverse outcomes in cases of placental abruption.

There are several limitations to the present study. First, this study was done in a retrospective fashion; therefore, further studies are warranted to confirm the usefulness of this score prospectively. Second, since the abruption prognosis score was based only on cases where a diagnosis of abruption was confirmed according to placental appearance just after delivery and was designed to be used immediately after delivery, this score should be used with caution.

Conclusions

In conclusion, the significant factors associated with IUFD in cases of placental abruption were the interval to the diagnosis and the needs for blood transfusion. Adverse outcomes other than IUFD were linked to the gestational age, bradycardia, or late decelerations, regardless of the presence of genital bleeding or abnormal ultrasonographic findings.

Acknowledgement

We thank Mr Sugimoto for kindly providing analyses of the database.

We wish to thank the institutions and representative physicians enrolled in the database for Perinatal Research Network in Japan, which include:

Aichi Medical University: S Kinoshita; Aki University: A Sato; Asahi-chuo-Hospital: H Udagawa, A Kurihara; Asahikawa Medical University: K Nishino; Aishikaga Red Cross Hospital: Y Kasuga, T Hiro; Ehime Prefectural Central Hospital: K Noda; Fukui University: T Yoshisato; Fukushima Medical University: H Takahashi; Gifu University: H Toyok; Haga Red Cross Hospital: A Ohkuchi; Hamamats University School of Medicine: K Suzuki; Hiroaki: Hiroshimia Hospital: T Higuchi; Hiroshimia Hospital: T Ishida; Hiroshimia General Hospital: Y Nakashima; Hiroshimia Hospital: H Mukai; Hokkaido University: Y Yamada; Hoiko College of Medicine: T Takenobu; Hiyo Prefectural Kobe Children's Hospital: T Fukun; Japanese Red Cross Fukuoka Hospital: M Nishida; Japanese Red Cross Kyotoya Daichii Hospital: H Yamamoto; Jichi Medical University: S Matsubara, R Usui; Juntendo University Arayasu Hospital: K Yoshida, A Taima; Kagawa University: H Tanaka; Kagoshima City Hospital; M Kaminotomo; Kagoshima University: Y Yonaihara; Kameda Medical Center: M Suzuki, H Takaya; Kanagawa Children's Medical Center; H Ishikawa; Kanazawa Medical University: T Fujita; Kinki University: M Shinohara, M Tsutani; Kunito University: S Kawano; Koyoto Fukuoka Prefectural Hospital: J Ishimatsu, J Akou; Kurashiki General Hospital: K Yamazaki, Kume University: D Hori, R Hayashi; Kyotov Prefectural University of Medicine: T Okubo, S Fujisawa; Kyotov University: J Hamazini; Kyushu University: K Fukushima; Maternal & Child Health Care AIKU HOSPITAL: T Adachi, Y Kawana; Mie University: T Sugiyama; Miyazaki University: J S Takahama; Nagasaki Municipal Hospital: K Kote; Nagasaki University: T Yoshimura; Nagoya Daini Red Cross Hospital: N Kato; Nagoya University: T Kotani; Nara Medical University: T Sado; National Center for Child Health and Development: H Sagou, H Aoki; National Center for Global Health and Medicine: J Kogakou; National Defense Medical College: Y Hasegawa; National Hospital Organization East Saga Hospital: M Nomiya; National Hospital Organization Nagasaki Medical Center: I Yasuhi, M Fukuda; National Hospital Organization Nishisaitama Chuo National Hospital: A Yoshida; National Hospital Organization Okayama Medical Center: Y Takeihi; National Hospital Organization Takasaki General Medical Center: I Ito; National Hospital Organization Yokohama Medical Center: A Nakamura; Niigata University: T Serikawa; Niigata Medical School: T Natsui; Niigata Prefectural Hospital: S Sato; Niigata University: Y Nishida; Okayama University: M Segawa; Osaka City University: T Ichibana, M Tsukita; Osaka Medical Center and Research Institute for Maternal and Child Health: N Mitsu, A Sasahae; Osaka University: S Fujita; Osaka University: M Muro; Saiseikaikyoukamashi Tobu Hospital: Y Konishi, Y Sakakibara; Shiga University of Medical Science: T Oono; Shimane University: S Aoki; Shinshu University: N Kikuchi; Shiga University: R Matsuoka; St. Marianna University School of Medicine, Yokohama City Seibu Hospital: J Saito; Takamatsu General Hospital: S Nakagou; Teikyo University Hospital: T Ayave, K Kito; The Japan Baptist Hospital: H Egawa, S Suzuki; The Jikei University: S Wada; The University of Tokyo: Y Kamei; Toho University: T Okuda; Toho University: T Ishikawa; Tokyo Medical and Dental University, University Hospital of Medicine: Y Morohara; Tokyo Women's Medical University: Y Matsuura, Y Makino; Tottori University: T Harada; University of Occupational and Environmental Health, Japan: K Yoshimura; University of Toyama: S Saito, A Shizaki; University of the Ryukyus: K Sakamoto; Wakayama Medical University: S Yagi; Yamagata University: S Tsutsumi; Yamaguchi Red Cross Hospital: T Takahashiki; Yokohama Chuo Hospital: M Okuda; Yokohama City University Medical Center: M Okuda; Yokohama Minami Kyoai Hospital: H Nagase; Yokohama Rosai Hospital: M Nakayama.

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Citation: Matsuda Y, Ogawa M, Konno J (2013) Prognosis of the Babies Born from Placental Abruption - Difference between Intrauterine Fetal Death and Live-Born Infants. Gynecol Obstet (Sunnyvale) 4: 191 doi:10.4172/2161-0932.1000191