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Obstetric and neonatal outcome following minor trauma in pregnancy. Is hospitalization warranted?☆

Eran Weiner[a,*], Ohad Gluck[a], Michal Levy[a], Maya Ram[b], Michael Divon[c], Jacob Bar[a], Michal Kovo[a]

[a] Department of Obstetrics & Gynecology, The Edith Wolfson Medical Center, Holon, Israel[1]
[b] Department of Obstetrics & Gynecology, Lis Maternity Hospital, Tel Aviv, Israel[1]
[c] Department of Obstetrics & Gynecology, New York University School of Medicine, Lenox Hill Hospital, New York, NY, USA

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ABSTRACT

Objective: To evaluate if hospitalization of pregnant women, involved in minor trauma, for 24 h of surveillance, is warranted.
Study Design: The medical files of pregnant women involved in minor trauma, during 2009–2014, at 22–42 gestational weeks, were reviewed. Minor trauma was defined as an injury severity score <3, no immediate complains, normal ultrasound evaluation, reactive non-stress test, and no regular contractions. Patients were divided into those who, according to our departmental protocol, were hospitalized for 24 h observation (hospitalized group), and those who refused to be hospitalized, (non-hospitalized group). Pregnancy, delivery and neonatal outcomes were compared between the groups.
Results: Included in the study were 946 minor trauma patients that met the inclusion criteria. Gestational age (GA) at the trauma event was lower in the non-hospitalized group ($n = 331$) compared to the hospitalized group ($n = 615$), 29.1 vs. 30.8 weeks, $p < 0.001$, respectively. There were no between-groups differences in the rate of preterm birth, vaginal bleeding, GA at delivery, or cesarean delivery. There were no cases of placental abruption or intrauterine fetal death in both groups. Neonatal outcome did not differ between the groups.
Conclusion: Minor trauma during pregnancy, with normal initial assessment, is not associated with adverse pregnancy outcomes. Therefore, routine hospitalization is probably not warranted.

Introduction

Trauma is estimated to complicate up to 8% of pregnancies worldwide [1,2]. Major trauma in pregnancy may be associated with adverse maternal and neonatal outcomes and it is one of the leading non-obstetric causes of maternal death [3]. Other pregnancy related complications may include spontaneous abortion, preterm premature rupture of membranes, preterm birth, uterine rupture, cesarean delivery, placental abruption, and stillbirth [4–8]. The risks for immediate complications are increased in cases of advanced maternal age, multiple pregnancies, when vaginal bleeding or uterine contractions develop adjacent to the event, or if it occurred prior to 32 weeks of gestation [7,9]. Moreover, long-term adverse pregnancy outcome has also been associated with trauma during pregnancy, possibly through the development of subclinical chronic placental abruption that eventually leads to placental insufficiently or may develop into an acute placental abruption [7,9].

It is obvious that the management of the pregnant trauma patients should be determined based on the maternal and fetal status. Diagnostic radiologic workup should be performed if clinically indicated. Fortunately, the vast majority of trauma cases during pregnancy is minor in nature, and probably does not carry the same risks and adverse outcome as major trauma does [4,7,10]. Nevertheless, several medical centers' policy, as ours, is to hospitalize pregnant patients with minor trauma after evaluation, for observation.

In a prospective trial of 317 patients with minor trauma, placental abruption occurred only in one patient, without any

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* Corresponding author at: Department of Obstetrics & Gynecology, The Edith Wolfson Medical Center, P.O. Box 5, Holon 58100, Israel. Tel.: +972 3 5028329; fax: +972 3 5028503.
E-mail address: masolbarak@gmail.com (E. Weiner).
[1] Affiliated with Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel.

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clinical or laboratory findings that could predict this complication [2]. This may suggest that in cases of minor trauma during pregnancy routine hospitalization is not justified. Therefore, we sought to compare pregnancy and neonatal outcomes of pregnant patients with minor trauma, that were hospitalized for 24 h surveillance, to the outcome of pregnant patients with minor trauma who were not hospitalized.

Materials and methods

The medical records of all patients who were involved in minor trauma during 2009–2014, and were assessed in the obstetric emergency room at the Wolfson Medical Center were reviewed.

According to our departmental protocol any pregnant patient involved in trauma, undergoes a full medical and physical examination, none stress test (NST), and an ultrasound scan for fetal well-being (biophysical profile score (BPP) and amniotic fluid index (AFI)), as well as evaluation of placental appearance. Laboratory blood tests and further consultations with trauma/orthopedics/surgery specialists are performed as necessary. Additionally, all pregnant trauma patients are hospitalized for further observation, for at least 24 h. Patients who refuse to be hospitalized are instructed to return in any case of change in their medical status, such as the appearance of uterine contractions, vaginal bleeding, or reduced fetal movements. Such patients are also instructed to have a full medical examination including an assessment of fetal well-being 24 h after discharge from the obstetric emergency room.

Included in the study were pregnant patients between 22 and 42 weeks of gestation who reported being involved in minor trauma. Minor trauma was defined as an injury severity score (ISS) between 0 and 3 [11], the patient indicating no immediate complaints; associated with reactive NST, without regular contractions and normal BPP, without vaginal bleeding and with normal maternal sensation of fetal movements. A normal BPP was defined as a score of 8/8 and included at least one episode of breathing lasting $\geq$30 s, three discrete body or limb movements, one episode of extremity flexion and extension, and a pocket of amniotic fluid that measured at least 2 centimeters in two planes. Reactive NST was documented separately [12]. We excluded from the study patients with life threatening trauma or any other injuries except minor lacerations.

For the purpose of the study the cohort was divided into two groups: patients who were hospitalized for observation, the hospitalized group, according to departmental protocol, and those who refused to be hospitalized for observation, the non-hospitalized group.

The following data were collected from the medical files: maternal characteristics including age, gestational age at the time of trauma, gravidity, parity, body mass index (BMI), multiple pregnancy, current drug abuse, smoking, maternal diseases as chronic hypertension, diabetes mellitus (gestational and pre-gestational) and thrombophilia (defined as inherited or acquired thrombophilia that necessitated thrombo-prophylaxis treatment) [13,14]. The mechanism of the trauma and the body part/s that were involved were also recorded.

Data on pregnancy, delivery and neonatal outcomes were collected at subsequent admission for delivery in our institution. Data concerning any of the following complications that followed the trauma were recorded: premature uterine contraction (PMC), vaginal bleeding, preterm birth <37 weeks of gestation, placental abruption, and intrauterine fetal death (IUFD). Delivery outcome included: gestational age at delivery, trauma-to-delivery interval, mode of delivery, postpartum hemorrhage (PPH, that necessitated blood transfusion), and chorioamnionitis.

Neonatal outcome parameters included: weight, Apgar score $\leq$7 at 5 min, days of hospitalization, and neonatal intensive care unit (NICU) admission. Composite adverse neonatal outcome was defined as one or more of the following complications: sepsis, blood transfusion, phototherapy respiratory distress syndrome, transient tachypnea of the newborn, mechanical ventilation, need for respiratory support, intra-ventricular hemorrhage, seizures, hypoxic–ischemic encephalopathy, or necrotizing enterocolitis. SGA was determined according to the birth-weight percentile for gestational age that was assigned using the updated Israeli growth charts [15].

Approval for the study was obtained from our institutional ethics comity.

Statistics

Data were analyzed with SPSS software, version 21.0. Continuous variables were calculated as mean ± SD or median and range, as appropriate. Categorical variables were calculated as rate (%). Student's *t*-test was used to compare continuous parameters between the groups; chi-square test was used to analyze categorical variables. A p value of <0.05 was considered statistically significant.

Results

During the study period a total of 946 pregnant patients were involved in minor trauma, of them 615 (65%) were hospitalized for 24 h surveillance (the hospitalized group) and 331 (35%) refused to be hospitalized (the non-hospitalized group). The main type of trauma in which patients were involved was fall/tumble (57.7%), followed by motor vehicle accidents (25.8%), and assaults (9.1%).

Maternal characteristics of the study groups are detailed in Table 1. Compared to the non-hospitalized group, patients in the hospitalized group were older 32.9 ± 5.5 vs. 31.9 ± 4.9 years, p = 0.005 respectively, and with a higher gestational age on the day of the trauma, 30.8 ± 4.9 vs. 29.1 ± 5.1 weeks, $p < 0.001$ respectively. There were no between groups differences in gravidity, parity, maternal BMI or maternal diseases during pregnancy.

Body parts that were involved in the trauma are detailed in Table 2. Patients in the hospitalized group were more likely to suffer from abdominal injury as compared to patients in the non-hospitalized group, ($p < 0.001$), while patients in the non-hospitalized group were more likely to have injuries to the back and spine, as compared to the hospitalized group ($p < 0.001$).

Pregnancy and labor outcomes are presented in Table 3. Data were retrieved from those patients who finally delivered in our institution: from the non-hospitalized, 270 (81.6%) patients and from the hospitalized group, 503 (81.9%) patients gave birth in our institute. There was a shorter trauma-to-delivery interval in the hospitalized as compared to the non-hospitalized group,

Table 1
Maternal characteristics of patients involved in minor trauma in pregnancy.

	Non-hospitalized group n = 331	Hospitalized group n = 615	p value
Maternal age (years)	31.9 ± 4.9	32.9 ± 5.5	0.005
Gestational age (weeks)	29.1 ± 5.1	30.8 ± 4.9	<0.001
Gravidity	2.5 ± 1.5	2.3 ± 1.5	0.060
Parity	1.01 ± 1	0.9 ± 1.1	0.170
BMI (kg/m^2)	23.32 ± 4.75	23.9 ± 5.6	0.110
Smoking (%)	42 (12.7)	70 (11.4)	0.598
Drug abuse (%)	1 (0.3)	3 (0.5)	1
Diabetes mellitus (%)	5 (1.5)	18 (2.9)	0.268
Chronic hypertension (%)	15 (4.5)	36 (5.8)	0.452
Multiple pregnancy (%)	5 (1.5)	18 (2.9)	0.268
Thrombophilia (%)	5 (1.5)	16 (2.6)	0.358

All data are shown as number (%) or mean ± standard deviation.
BMI – body mass index.