

Pregnancy and trauma: analysis of 139 cases

Gebelik ve Travma: 139 Olgunun Analizi

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Abstract

Objective: The aim of this study was to examine the diagnoses and treatment methods and demographical and clinical characteristics of pregnant women who were exposed to trauma and in addition, review of the literature was carried out in this regard.

Material and Methods: One hundred thirty-nine pregnant women who presented at the Yüzüncü Yıl University between January 2006 and September 2009 with local or general body trauma complaints were analysed retrospectively.

Results: The average age of the cases was 26.72±6.29 years and the age group ranging from 21-34 composed the majority. When they were studied according to their etiologies, falls during daily activities formed 43.9%. When they were analyzed in terms of their gestational weeks, 64.46% were in the 3rd trimester. Pregnant cases with trauma resulted in maternal (3 cases) and fetal (9 cases) loss. It was found that 19 cases who had imaging techniques involving radiation and whose gestation was continuing had a problem-free gestation period and healthy children.

Conclusion: It is mandatory to evaluate both mother and fetus together when trauma exposure is in question, the general well-being of the fetus should be provided and the mother should be informed about the presence of advanced trauma life support.

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Key words: Pregnancy, trauma, emergency department, radiation, etiology

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Özet

Amaç: Bu çalışmanın amacı travmaya maruz kalan gebe olguların demografik, klinik özelliklerini, tetkik ve tedavi yöntemlerini incelemek ve literatürü gözden geçirmektir.

Gereç ve Yöntemler: Ocak 2006-Eylül 2009 tarihleri arasında Yüzüncü Yıl Üniversitesi Acil servis' ine lokal veya genel vücut travması nedeniyle başvuran ve gebeliği olan 139 olgu geriye dönük olarak incelendi.

Bulgular: Olguların yaş ortalaması 26.72±6.29 yıl olup, çoğunluğunu 21-34 yaş arası grup oluşturmaktaydı. Etiyolojilerine göre incelendiğinde %43.9'u günlük aktiviteler sırasında düşme olup, trimestera göre değerlendirildiğinde %64.46'sı 3. trimester idi. Travmalı gebe olguların 3'ü maternal, 9'u fetal kayıpla sonuçlandı. Radyasyon içeren görüntüleme yöntemi kullanılan ve gebeliği devam eden 20 olgunun gebeliklerini sorunsuz sürdürdükleri ve çocuklarının sağlıklı olduğu öğrenildi.

Sonuç: Travmaya maruz kalan tüm gebelerde, anne ile birlikte fetusun değerlendirilmesi gerekli olup, fetusun iyilik halinin sağlanması, annenin ileri travma yaşam desteğine uyulmasına bağlıdır.

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Anahtar kelimeler: Gebelik, travma, acil servis, radyasyon, etiyoloji

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Introduction

The incidence of trauma during pregnancy is 5% and it is known to cause 6-7% of maternal deaths due to non-obstetric reasons. Although fetal mortality and morbidity increase in parallel with the severity of maternal injury, sometimes severe fetal injury may occur even with mild traumas, and trauma may lead to intrauterine fetal demise, abortions, pre-term delivery or ablatio placentae (1-4).

The approach to pregnant trauma patients is still a problem for health care providers due to the physiologic and anatomic

changes in pregnancy, drugs that are considered to negatively affect the fetus and anxiety about radiologic tests (4, 5).

This study aimed to retrospectively evaluate the pregnant trauma patients which were significant for both the mother and the fetus and require a multidisciplinary approach, and to obtain epidemiologic data in the light of the literature.

Material and Method

A total of 139 pregnant subjects who were admitted to the Emergency Department (ED) of Yüzüncü Yıl University

Medical Faculty due to local or multiple trauma (2 or/and other system injuries) between January 2006 and September 2009 were retrospectively screened using the ED registry. Age of the patients, gestational week, season of admission, etiology of the trauma, organ injuries, diagnostic methods like X-ray, computed tomography (CT), magnetic resonance imaging (MRI) and ultrasonography (USG), treatments, data about hospitalization, and maternal and fetal complications were evaluated. Contrast liquid for radiological evaluation was not used.

The analyses of treatments, surgical interventions, supportive therapies (fluids, blood and blood product replacements, tetanus prophylaxis, analgesics, steroids, antibiotic therapy, ice application, wound care, monitorization) were also performed. All patients were examined by the obstetric and gynecology department.

Statistical Analysis

Data analysis was performed using SPSS (Statistical Package for Social Science) 13.0 package program. Descriptive statistics for constant variables were defined as mean±standard deviation (SD), minimum and maximum values, and categorical variables were defined as number (n) and percent (%). Qui-square test was used to determine whether there was a statistically significant difference between groups in terms of categorical variables and student's t test was used to compare the mean values of constant variables.

Results

The mean age of the pregnant women exposed to trauma was 26.72 ± 6.29 years (range 15-45 years) and the majority of the patients were between 21-34 years. Distribution of the cases according to age groups and gestational weeks is shown in Figures 1 and 2, while distribution according to etiology of trauma is presented in Table 1.

The kind of trauma was classified as "local and multiple trauma". While 9 (6.4%) cases were multiple trauma, 130 (93.6%) cases were local.

When the cases were analyzed according to the season they applied to the hospital, it was seen that hospital admissions were most frequent in the summer (33.1%) (n=46) followed by spring (28.8%) (n=40), winter (23%) (n=32) and autumn (15.1%) (n=21). There was no statistically significant difference between the groups ($p > 0.05$).

When the subjects were evaluated according to the tests, it was seen that, while radiologic tests were not used for 110 (79.1%) subjects, radiologic tests for chest, pelvis, skull, vertebra and extremity, CT (cerebral, maxillofacial, lumbal, pelvis) and cerebral MRI were performed for 29 (20.9%) patients (Table 2). Radiation doses and postpartum outcomes of the subjects who had radiologic tests and whose pregnancies continued are shown in Table 3.

Consultations for all subjects were carried out in the Gynecology and Obstetrics Clinic and the fetus was evaluated with obstetric USG. While fetal or maternal complications were not detected in 133 (95.7%) cases, intrauterine fetal demise was detected in 6 cases.

Organ injuries and treatments are presented in Table 4.

Of the followed up pregnant subjects, 3 (2.2%) resulted in maternal and 9 resulted in fetal losses. While the etiology of trauma was a traffic accident in 5 of the fetal loss cases, falls

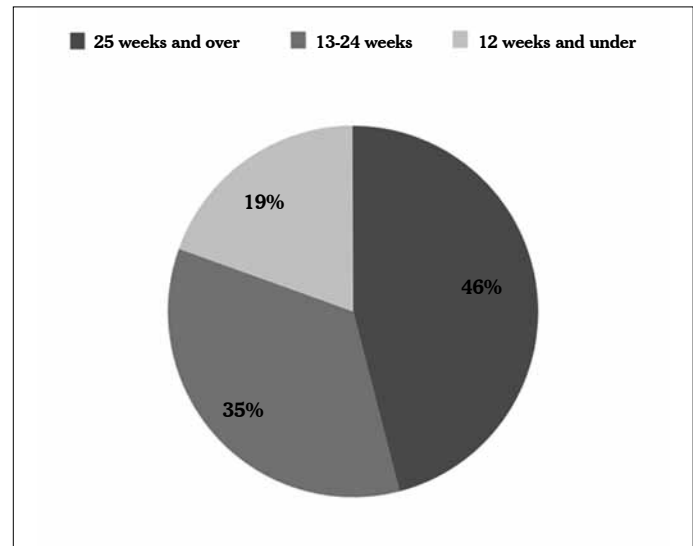


Figure 1. Distribution of the cases according to age groups

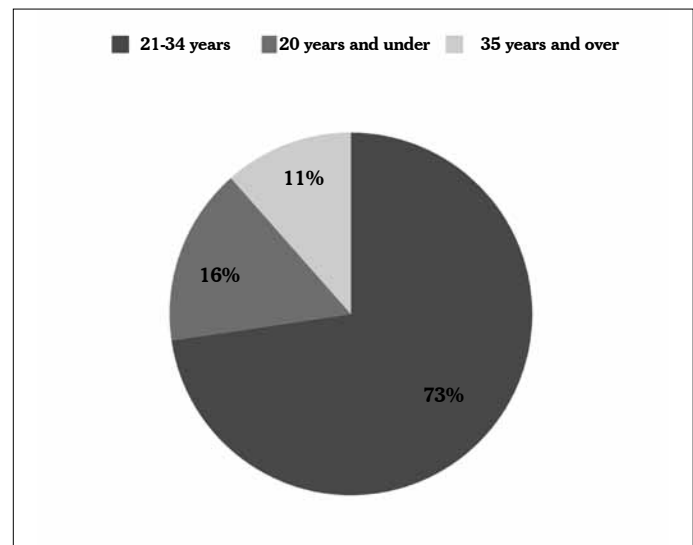


Figure 2. Distribution of the cases according to gestational weeks

Table 1. Distribution of the cases according to etiology

Etiology	n	%
Falls during daily activities	61	43.9
Motor vehicle accident	29	20.8
Falls off	17	12.2
Electrical shock	12	8.6
Pounding	9	6.5
Other	11	8
Total	139	100

were detected in 2, falls off were detected in 1 and burn in the genital area coexisting with spontaneous abortion was detected in 1 case. Causes of fetal exitus were direct fetal injury in 2, fetal hypoxia in 2, abortion in 3 and therapeutic abortion in 2. While the etiology of maternal deaths was traffic accident-related multi-organ injury and hemorrhagic shock in 2, cerebral edema due to cerebral trauma in the course of seizure in 1. While 2 of maternal deaths were 21-34 years group, 1 case was in the 20 years and under group. All three maternal death cases occurred in the third trimester of pregnancy. One of the cases resulting in maternal mortality passed away due to hemorrhagic shock while her operation was being planned and another died during the operation. The third case died owing to respiratory and circulatory failure during the patient's intensive care. There were no fetal heart beats determined in the course of first evaluation of all three cases ending in maternal mortality.

Table 2. Radiological tests

	n	%
USG	139	100
X-Ray	25	17.9
CT	6	4.3
MRI	2	1.4

Table 3. Fetal outcome of patients with radiation exposure during the trauma evaluation

Radiation dose cGy/Rad	Healthy delivery	Therapeutic abortion	Fetal complication
0.001-0.1	14		-
0.1-0.5	6		-
0.5-5		2	

Table 4. Affected organs and therapeutic approaches

Organ injuries	n (%)	Treatments
None	78 (56.1)	-
Soft tissue trauma	43 (30.9)	*
Vaginal bleeding and skin incision	3 (2.1)	*, Suture
Maxillofacial trauma	4 (2.7)	*, close reduction of mandible fracture (in 1 case)
Femur fracture	3 (2.1)	*, close reduction
Clavicle fracture	2 (1.4)	*, 8 bandage
Fracture of the tibiae and fibulae	2 (1.4)	*, close reduction
Fracture of pelvis and femur	1 (0.71)	*, pelvipedal splint, close IMN**
Pelvis Fracture	1 (0.71)	*, skeletal traction
1-2° burns	1 (0.71)	*
Cut wound of the hand	1 (0.71)	Suture
Vertebral fracture	1 (0.71)	*

* Analgesic, antibiotic, steroid treatment, tetanus prophylaxis, ice application, fluid and erythrocyte suspension replacement according to the indications, ** Intra-medullary nailing

When the cases were evaluated according to the Glasgow Coma Scale (GSK) scoring, the GSK in 134 cases was found to be 15 and between 9-14 in 5 cases.

When the cases were analyzed according to the clinics where they were followed up, it was seen that follow up and treatment of 117 (84.1%) were completed in the ED. One patient (0.7%) was referred to another hospital. Seven (5.1%) patients rejected follow up. Six (4.3%) patients were followed up in the Gynecology and Obstetrics Clinic, 8 (5.8%) patients were followed up in the other wards.

Mean duration of hospital stay was 24 hours.

Discussion

The incidence of trauma during pregnancy is increasing due to active participation in working life (6). However, trauma management in the gravida has been a continuous problem for centuries (2).

Trauma is reported to be seen in 3-7% of all pregnancies and 0.4% of these are reported to need hospitalization (2, 3).

El-Kady et al. (7) reported that motor vehicle accidents, falls and pounding were included in the etiology of trauma and more than half occurred during the last trimester, Tinker et al. (1) reported that the most common causes for trauma were falls (51.6%) followed by motor vehicle accidents, traumas most commonly occurred in the 2nd trimester and falls were more frequent during the 2nd and 3rd trimesters. Connolly et al. (8) and Nannini et al. (9) reported that the most frequent causes were motor vehicle accidents, falls, pounding and burns, respectively and especially falls were most frequent during the 2nd and 3rd trimesters.

The most common causes of trauma were reported as motor vehicle accidents (55%), falls (23%), assaults (21%) and burns (1%) (10, 11). The period when trauma is seen most frequently was the 3rd trimester in this study also, as in that of El-Kady et al. Trauma etiologies were detected as falls during daily activities

(43.9%) and motor vehicle accidents (20.8%) similarly to that of Tinker et al. (1). The main cause of frequent falls in the 2nd and 3rd trimesters may be the displacing of the center of gravity due to weight gain and enlargement of the uterus.

While Chang et al. (12) reported that the major causes of fatal traumas were motor vehicle accidents, homicide and suicide, Harper et al. (13) reported homicide, motor vehicle accidents, pounding and assaults (gunshot wounds, stab wounds, drownings), falls and suicide attempts as the major causes of fatal cases. Tinker et al. (1) reported that maternal and fetal deaths were most commonly caused by motor vehicles. In our study, all maternal deaths occurred during the 3rd trimester and the most common etiologic factor was motor vehicle accidents. The mortality in motor vehicle accidents is high as they lead to high energy trauma.

Weiss et al. (14) and McFarlane et al. (15) reported known risk factors for trauma during pregnancy as young maternal age, drug and alcohol use and domestic violence. Tinker et al. (1) reported risk factors as young maternal age, smoking and alcohol use, seizures, obesity and women's participation in working life. In this study, the mean age of the subjects was 26.72 ± 6.29 and alcohol and drug use were not detected. One of the dying subjects had a history of seizures. Absence of alcohol and drug use may be explained by the sociocultural properties of the region in which the study was conducted.

Risk factors for fetal deaths due to maternal trauma have been reported as high ISS (injury severity score), falling out of the motor vehicle, maternal pelvic fracture, crash, maternal alcohol use and smoking, young maternal age and motorbike accidents (7, 16). In the study presented here, the etiology of fetal losses was traffic accidents in 55.5% of the cases and complications like direct fetal injury, fetal hypoxia and therapeutic abortion related to traffic accident.

The ratio of trauma-related fetal mortality is 65%. While the most common cause of fetal losses had been accepted as maternal death in previous years, at present it is accepted as the result of developments in the approach to the trauma, the most common cause of fetal losses has been reported as fetal hypoxemia developing secondary to maternal shock (4, 17). Other causes of fetal losses have been reported as maternal hypotension, abruptio placentae, rupture of the uterus, direct uterine trauma and disseminated intravascular coagulation (DIC) in various studies (18-21). Ali et al. (18) hold DIC developing due to circulating placental products responsible for fetal losses. In our study, the ratio of fetal losses is 6.5% and is caused by spontaneous abortion (3 cases), fetal hypoxia (2 cases), direct fetal injury (2 cases) and therapeutic abortion (2 cases). Stafford (22) and Baed et al. (3) reported that the degree of maternal injury was not an important factor for permanent fetal injury and the ratio of trauma-related fetal losses was higher than the ratio of maternal deaths. Shah et al. (23) reported the maternal death rate as 3.5%, Esposito et al. (10) reported fetal death rate as at least 5%. In this study, while the ratio of fetal losses was 6.5%, maternal death rate was 2.2% and fetal losses were more than maternal deaths.

The ratio of hospitalization in pregnant trauma patients has been reported as 5-24% (24). In the United States, indications for

hospitalization due to trauma during pregnancy not resulting in delivery are fractures, dislocations, sprains and hurts (6). In our study, consistent with literature, the most common indication for hospitalization was bone fractures and the ratio of hospitalization was 10.8%.

Despite the absence of specific literature concerning pregnant trauma patients, obstetrics consultation is recommended. In clinical studies, the patients with normal examination and monitoring findings are recommended to be followed up for at least 2-6 hours (2). Level 2 studies indicate that fetal heart monitoring should be carried out for at least 6 hours in a pregnant woman with a gestational age of over 20 weeks. Monitoring should be continued in cases of uterine contractions, vaginal bleeding, abnormal fetal heart rate pattern, uterine tenderness, severe maternal injury and rupture of amniotic membranes (2). Level 3 studies indicate that the fetus should be evaluated in the early period and optimum resuscitation of the mother according to advanced trauma life support should be obtained (2). Oxygenation should certainly be provided due to the harmful effects of hypoxemia on the fetus, even when there is no need for maternal intubation (6). Also in this study, all cases were consulted at the Gynecology and Obstetrics Clinic and the fetus was evaluated with urgent obstetric ultrasonography. Consistent with the literature, fetal cardiac monitoring was performed for evaluation of pregnant women in the 2nd and 3rd trimesters and adequate oxygenation of the mother was provided. All pregnant women were monitored for possible obstetric complications such as premature delivery, ablatio placentae. 84.1% of the cases were monitored in the ED for at least 2-6 hours and discharged thereafter. The mean duration of hospital stay was found to be 24 hours.

X-ray, tomography and nuclear imaging methods are a significant cause of anxiety for the patient herself, her family and physician (25). Serum β -hCG levels should be obtained for all females in the reproductive age who were exposed to trauma, and protected X-rays should be obtained as possible (26). The effects of ionizing radiation on an embryo and fetus can include: pregnancy loss, malformations, neurobehavioral abnormalities, fetal growth retardation, and cancer. However, there is no defined threshold and the amount of radiation does not predict the severity of the disease (27).

The American College of Obstetrics and Gynecology (ACOG) reported that 5 rad radiation does not lead to fetal loss, still birth, birth defects or childhood leukemia (2). Nevertheless, Groen et al. (27) stated that a low dose of radiation causes increased risk in childhood leukemia. On the other hand, the nature and extent of determining effects of radiation on pregnancy depend on the radiation dose and trimester of the pregnancy. Animal studies show that, during the first 2 weeks after conception, a dose as small as 10-20 rad can be lethal for an embryo. The threshold for fetal death increases throughout gestation as the fetus develops (27). Despite this, anxiety regarding the harmful effects of radiation is not a drawback for X-ray imaging necessary for making a diagnosis (28). In this study, various imaging methods have been used by preserving the abdomen when there was any indication. Except for 2 women who were exposed to trauma and survived, radiation dose was

below 0.5 rads. Two subjects who were subjected to 5 rads of radiation underwent therapeutic abortion and 20 subjects who were given radiologic tests and whose pregnancies continued were seen to experience no problems in their pregnancies and their babies had no pathologies.

In order to save the baby, caesarean section should be considered in pregnant women whose gestational age is above 24 weeks and who are about to die. Delivery of the baby in 4-20 min following maternal death is of great importance in terms of neurologic outcomes (29). In this study, urgent caesarean section was not considered as fetal heart sounds could not be heard in the initial evaluation of the subjects who died.

In conclusion, appropriate circulation and oxygenization should be obtained in all pregnant women exposed to trauma, required tests should be performed by taking advantages and disadvantages into account and patients should be monitored closely with a multidisciplinary approach. It should be kept in mind that securing the well being of the baby depends on optimum maternal respiratory and circulatory support and complying with recommendations for advanced trauma life support. The patient should be examined in the Obstetrics and Gynecology Clinic for evaluation of the well being of the baby. The pregnant women and relatives should be informed that maternal alcohol and cigarette use, and the presence of diseases like seizures would increase susceptibility to trauma and lead to poor post-traumatic fetal and maternal outcomes.

Conflict of interest

No conflict of interest was declared by the authors.

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