ORIGINAL ARTICLE

The effects of traffic accidents on pregnancy: Is hospitalization necessary in every case?

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ABSTRACT

BACKGROUND: This study aimed to show whether it is necessary to hospitalize pregnant women who have been involved in traffic accidents.

METHODS: Patients at a hospital in Istanbul, Turkey, who underwent traffic accidents between 2012 and 2018 were studied, and pregnant patients' files were evaluated. Demographic and obstetric features of patients, type of accident, type of trauma, Glasgow Coma Score, whether or not hospitalization were examined, the response of patients to hospitalization, and the obstetric and maternal results of accidents were assessed.

RESULTS: In the present study, 95 patients were included. Overall, hospitalization was recommended for 50 patients, but of these, 58% refused to be admitted. No patients who refused hospitalization had complications. Preterm labor was seen in 3.2% of patients, while 3.2% had a fetal loss and 5.3% had a placental abruption. Only one mother was lost (1.1%) due to sustaining multiple traumas in a traffic accident. Hospitalization was increasingly indicated with increasing gestational age, but other parameters had no effect on hospitalization.

CONCLUSION: The likelihood that hospitalization was recommended for pregnant women involved in traffic accidents increased with gestational age. Patients with minor trauma who refused hospitalization had no complications.

Keywords: Hospitalization; pregnancy; traffic accidents.

INTRODUCTION

Traffic accidents affect people of all age groups. It was reported that 1,313,359 traffic accidents occurred in Turkey in 2015. In these accidents, 3831 patients died in accident time and 3699 patients died on follow-up.[1] Overall, it seems that 8% of pregnancies are complicated by trauma,[2,3] which is the leading non-obstetric cause of maternal death.[4] Although the incidence of traffic accidents during pregnancy in Turkey is not known, the event rate of traffic accidents during pregnancy was 6.47 per 1000 cases in Canada.[5] The risk of stillbirth, preterm labor, uterine rupture, cesarean section, placental abruption, spontaneous abortion, and preterm premature rupture of membranes increases with trauma during pregnancy.[6–10] It has been shown that the fetal death rate due to maternal trauma was 2.3 per 100,000 live births.[11] Placental abruption was the major factor leading to fetal death.[12]

It is recommended that every injured female of childbearing years should be checked for a possible pregnancy. Following admission of the patient for further care in a healthcare facility, a pregnancy test should be performed. The confirmation of pregnancy may have a major impact on future decisions regarding diagnostic imaging, use of medications, and other treatment modalities.[13]

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Pregnant women involved in traffic accidents should be managed according to maternal and fetal status. The management of a pregnant trauma patient warrants consideration of several issues specific to pregnancy, such as alterations in maternal physiology and anatomy, exposure to radiation and other possible teratogens, the need to assess fetal well-being, and conditions that are unique to a pregnancy and are related to trauma (Rh isoimmunization, placental abruption, and preterm labor). The majority of trauma cases during pregnancy are minor, and these have fewer risks than those that are major.[6,9,12] Generally, hospitalization is recommended by the obstetrician for pregnant women involved in traffic accidents independently of the severity of trauma. This makes patients and relatives concerned about the health of both mother and fetus. Thus, we analyzed the records of pregnant women involved in traffic accidents to investigate their maternal and neonatal results according to several factors, including the severity of trauma and the necessity of hospitalization.

MATERIALS AND METHODS

This retrospective study was conducted in a tertiary center in the east of Istanbul, Turkey. The local ethical committee of the hospital approved this study (date: 04.01.2019, no: 09.2019.043). The sample was chosen from hard and soft copies of hospital records. Records of admissions to the hospital's Emergency Department between January 2012 and December 2018 were analyzed. In this study, 95 pregnant women involved in traffic accidents were included. In addition to patient demographics, the season in which the accident occurred, gestational weeks at admission, the time between accident and admission, and the method of transport to the hospital (car, taxi, walking, or ambulance) were noted. Patients' Glasgow Coma Scores were also recorded. The type of trauma (no visual trauma, superficial abrasions, abdominal trauma, fracture of the extremities, cranial trauma, or multiple traumas) and the obstetric result of the accident (no complication, start of labor, rupture of membranes, abortion, or placental abruption) were noted. Patients with multiple trauma and fractures were accepted as major trauma, remaining ones were classified as minor trauma. In addition, the recommendation for hospitalization, patient's acceptance of hospitalization, the use of urgent obstetric interventions, and the final health status of mother and fetus were recorded.

Statistical Analyses

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 17.0. The Kolmogorov-Smirnov test and histogram graphics were used to analyze the normality of variable distributions. Descriptive statistics for numeric variables were defined as mean±standard deviation (SD), minimum and maximum values, and categorical variables were defined as number (n) and percent (%). Relationships between nominal variables were analyzed using the Pearson Chi-square Tests. A p-value of <0.05 was considered statistically significant. Post hoc analysis was performed for trimester comparison and adjusted p-value of <0.016 was considered statistically significant.

RESULTS

In this study, 95 women who admitted to hospital due to traffic accidents between January 2012 and December 2018 were evaluated. Patients' mean age was 27.6 (18–44, 5.9 SD) years. Mean gravida was 1.83, parity was 0.63, and abortion was 0.23. The proportion of patients in each trimester was similar, with 29% in the first trimester, 38% in the second, and 33% in the third. Patients' mean gestational age was 21.5 weeks (4.1–38.6, SD 9.7), and their mean Glasgow Coma Score was 14.69 (3–15, SD 1.74; Table 1). In this study, 18% of patients had a cesarean section in their obstetric history. In total, 73% of patients were involved in in-car accidents, while 27% were involved in a pedestrian versus motor vehicle accidents. Around half (57%) of patients were transferred to the hospital within one hour of their accident, and 45% were transferred by ambulance. Just over half (59%) of accidents occurred during spring and summer.

Seventy-one percent of patients had no visual traumas, and 58% required no consultations other than obstetrics. Patients with multiple trauma six (6.3%) and fracture 1 (1.1%) were accepted as major trauma (7.4%) and the remaining 88 patients (92.6%) had minor trauma. Hospitalization was recommended for 50 patients, but 58% of these refused to be admitted. Overall, 89 of the patients (94%) had no acute implications of the accident. Preterm labor was seen in three of patients (3.2%), three of patients (3.2%) experienced fetal

Table 1. Demographics, obstetric features and Glasgow score

	Mean	Standard deviation	Median	Minimum	Maximum
Age	27.61	5.89	27.00	18.00	44.00
Gravida	1.83	1.17	1.00	1.00	6.00
Parity	0.63	1.01	0.00	0.00	5.00
Abort	0.23	0.54	0.00	0.00	2.00
Gestational week	21.53	9.76	22.30	4.10	38.60
Glasgow score	14.69	1.74	15.00	3.00	15.00

loss, and five of patients (5.3%) experienced placental abruption. There were no abortions. Urgent cesarean sections were performed on four patients, and no perimortem cesarean section was performed (Table 2). According to the results, 94% of pregnancies continued without complications. In one case, both the mother and fetus were lost. The mother was a 20-year-old patient at 34 weeks of gestation who experienced multiple traumas after being in a pedestrian versus motor vehicle accident. In total, three patients who delivered shortly after the accident were healthy, and in two cases, fetuses were lost due to placental abruption (Table 2).

The indication of hospitalization was evaluated by examining different variables. Hospitalization was indicated in 80% of patients in the third trimester, 58% of patients in the second trimester, and only 14% in the first trimester. There was a statistically significant difference among trimesters regarding the indication of hospitalization ($p<0.05$). Post-hoc analysis between trimesters was performed regarding hospitalization. Hospitalization indication in the first trimester was low compared to second and third trimester separately (p for both <0.001). There was no significant difference regarding hospitalization between the second and the third trimester ($p=0.049$). The type of the accident, time of transfer, season of accident, and type of trauma showed no significant variation concerning whether or not hospitalization was indicated (Table 3). Overall, hospitalization was recommended for 50 patients, but 58% of these refused to be admitted. Of these, two (7%) patients returned to hospital within the next 12 hours. None had any complications.

DISCUSSION

Since major trauma during pregnancy is associated with adverse maternal and neonatal outcomes,[2,3] pregnant women

Table 2. Traffic accident features, hospitalization, and obstetric outcomes

	Count	Column N %		Count	Column N %
Accident type			Abrasion	17	(17.9)
In-car	69	(72.6)	Multiple trauma	6	(6.3)
Pedestrian	26	(27.4)	Hospitalization		
Admission time			Indicated	50	(52.6)
Within 1 h	54	(56.8)	Not indicated	45	(47.4)
Between one and six h	35	(36.9)	Obstetric implication		
More than six h	6	(6.3)	Not present	89	(93.7)
Admission type			Placental abruption	5	(5.3)
Ambulance	43	(45.3)	Start of labor	1	(1.1)
Own car	31	(32.6)	Obstetric intervention		
Taxi	11	(11.6)	Not present	91	(95.8)
Walking	10	(10.5)	Urgent cesarean	4	(4.2)
Consultation			Response of patient to hospitalization		
Only obstetrics	55	(57.9)	No recommendation	45	(47.4)
Neurosurgery	5	(5.3)	Accepted	21	(22.1)
Orthopedics	12	(12.6)	Rejected	29	(30.5)
General surgery	1	(1.1)	Intensive care unit needed for newborn		
Reconstructive surgery	1	(1.1)	Needed	3	(100.0)
Multiple	19	(20.0)	Not needed	0	(0.0)
Ear, nose & throat	2	(2.1)	Patients re-admitted after rejection of hospitalization		
Season of occurrence			Not re-admitted	27	(93.1)
Winter	20	(21.1)	Re-admitted	2	(6.9)
Spring	26	(27.4)	Final result		
Summer	30	(31.6)	No complications	89	(93.6)
Fall	19	(20.0)	Healthy mother and alive newborn	3	(3.1)
Trauma type			Fetal loss	2	(2.1)
No visual trauma	71	(74.7)	Maternal and fetal loss	1	(1.1)
Fracture	1	(1.1)			

Table 3. Effects of trimester and accident features on hospitalization

		Hospitalization				p[1]
		Not-Indicated		Indicated		
		n	%	n	%	
Trimester	1	24	85.7	4	14.3	<0.001
	2	15	41.7	21	58.3	
	3	6	19.4	25	80.6	
Accident type	In-car	32	46.4	37	53.6	0.753
	Pedestrian	13	50.0	13	50.0	
Admission time	Within 1 h	24	44.4	30	55.6	0.805
	Between 1–6 h	18	51.4	17	48.6	
	More than 6 h	3	50.0	3	50.0	
Accident season	Winter	10	50.0	10	50.0	0.111
	Spring	17	65.4	9	34.6	
	Summer	10	33.3	20	66.7	
	Fall	8	42.1	11	57.9	
Trauma type	No visual	33	46.5	38	53.5	0.611
	Fracture	1	100.0	0	0.0	
	Abrasion	9	52.9	8	47.1	
	Multiple	2	33.3	4	66.7	

[1]Pearson Chi-Square.

involved in traffic accidents with major trauma should have a complete assessment and hospitalization for further observation and intervention. For evaluation of fetal well-being, all pregnant trauma patients with a viable pregnancy (≥23 weeks) should undergo electronic fetal monitoring for at least four hours. Pregnant trauma patients (≥23 weeks) with adverse factors, including uterine tenderness, significant abdominal pain, vaginal bleeding, sustained contractions (>1/10 min), rupture of the membranes, atypical or abnormal fetal heart rate pattern, or serum fibrinogen <200 mg/dL, should be admitted for observation for 24 hours. Anti-D immunoglobulin should be administered to all rhesus D-negative pregnant trauma patients. All pregnant trauma patients with a viable pregnancy who are admitted for fetal monitoring for greater than four hours should have an obstetrical ultrasound before discharge from the hospital.[14]

When the effects of severity of the trauma on pregnancy are questioned, studies on pregnant women with minor trauma generally suggest favorable outcomes.[3,8,15] Thus, hospitalization for those cases is controversial. In the present study, pregnant women who were involved in traffic accidents with a minor trauma had favorable maternal and neonatal outcomes. These results are consistent with other studies dealing with all type of minor trauma cases during pregnancy. Pak et al.[8] prospectively evaluated 85 pregnant minor trauma patients and found no correlation between the traumatic event and subsequent preterm labor. Cahill et al.[3] studied 256 women who had sustained minor trauma during pregnancy at 23 weeks and six days of gestation and beyond. Among the different types of traumas included in the study, motor vehicle accidents comprised 29.4% of cases. In this study, only one patient had placental abruption. Favorable pregnancy outcome was also shown in a study where 512 pregnant women at 23 weeks or more who were admitted due to minor trauma (34.3 % of pregnant women had motor vehicle accident) were included. Preterm birth and placental abruption were seen in 5.9% and 1.2% of cases, respectively.[15] Cheng et al.[16] studied 8,762 minor, 6,076 major trauma cases during pregnancy. In contrast to favorable outcome results, Cheng's study revealed a higher preterm labor rate (odds ratio=1.35) in minor injuries.

In a large sample sized retrospective cohort study, 10,316 delivery patients who sustained different types of trauma during pregnancy were studied regarding maternal and fetal outcomes. Patients were grouped according to time of delivery. Maternal, fetal and neonatal outcomes of patients who delivered at the time of trauma hospitalization were significantly worse than patients who delivered in subsequent hospitalizations. Patients who delivered in subsequent hospitalization had worse outcomes compared with the control group but with a much less degree than patients who delivered at the time of trauma.[9]

Most of the studies related to trauma during pregnancy deal with every type of trauma. Few studies have analyzed traffic accidents alone. Vivian-Taylor et al.[17] investigated 2147 car crashes between 2000 and 2007 and demonstrated that placental abruption was seen in 1.6% of patients with a perinatal death risk of 1.6%. In our study, unfavorable outcomes were only seen in major trauma cases. In a large retrospective cohort study, Schiff et al.[10] studied 625 pregnant women involved in motor vehicle crashes in which the majority of pregnant women in crashes were in their third trimester (65.9 percent). Of these women, 518 (82.9 percent) were hospitalized and subsequently discharged without delivering, and 107 (17.1 percent) delivered during their crash hospitalization. Significantly increased risk of preterm labor, placental abruption, and cesarean delivery was shown among pregnant women involved in motor vehicle crashes compared with women not involved in crashes. Stratifying their trauma analysis as severe and non-severe, they found that severely injured pregnant women had an increased risk of cesarean section and placental abruption compared with pregnant women not involved in motor vehicle crashes. In contrast to our findings, it was stated that pregnant women involved in crashes who had no documented injuries were at a marked increased risk of preterm labor and placental abruption and that their infants were at an increased risk of preterm delivery, low birth weight, and infant respiratory distress syndrome compared with pregnant women not involved in motor vehicle crashes.

Weiner et al.[18] studied 946 pregnant patients (25.8% involved in motor vehicle accidents) who were involved in minor trauma to investigate the necessity of hospitalization in this population. Sixty-five percent of women were hospitalized for 24-hour surveillance, and 35% of women refused to be hospitalized. No difference in preterm birth rate, vaginal bleeding, gestational age at delivery and cesarean delivery was shown between groups. It was concluded that pregnant patients with minor trauma who underwent normal initial assessment did not require hospitalization as our study reveals the same recommendation.

Studies conducted in Turkey related to trauma and pregnancy also reveal favorable outcomes. Üstünyurt et al.[19] studied 173 pregnant women who had minor trauma. Of these, 18 (10.4%) were involved in traffic accidents. No fetal loss and preterm labor was shown in early period after trauma. Karadaş et al.[20] studied 139 pregnant trauma patients without classifying the trauma severity. In general, 95.7% of whole cases had no maternal and fetal complications. In the same study among 25 traffic accident cases, five (17%) fetal and two (7%) maternal losses were shown in contrast to general favorable result of the whole types of traumas.

In light of the increased risk of adverse maternal and perinatal outcomes resulting from major trauma, pregnant women who sustained major trauma requires hospitalization for maternal and fetal monitoring. Current literature reveals that pregnancy outcomes are affected by the trauma severity, gestational weeks during trauma and delivery occurrence during trauma hospitalization. Although major trauma and its effects on pregnancy are well defined, controversies are present regarding minor trauma cases.

Conclusion

Pregnant women who had minor trauma in traffic accidents with normal initial fetal and maternal findings have favorable pregnancy outcomes. Hospitalization requirement of pregnant women with minor trauma who sustained traffic accidents should be individually managed according to clinical presentation. Hospitalization for further observation of those patients is probably not necessary. Large prospective studies are needed for the definition of management of strategies for pregnant women with minor trauma in traffic accidents.

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ORİJİNAL ÇALIŞMA - *ÖZET*

Trafik kazalarının gebelik üzerine etkisi: Her olguda hastaneye yatış gerekli midir?

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AMAÇ: Bu çalışmada trafik kazası geçirmiş gebelerde hastaneye yatışın gerekli olup olmadığını göstermek amaçlanmıştır.
GEREÇ VE YÖNTEM: İstanbul Türkiye'deki bir hastanede 2012 ve 2018 yılları arasında trafik kazası geçirmiş hastalar çalışılarak, gebe hastaların kayıtları incelendi. Hastaların demografik ve obstetrik özellikleri, kaza türü, travma çeşidi, Glasgow koma skoru, hastaneye yatış endikasyonu, hastanın hastaneye yatış önerisine yanıtı ve kazanın obstetrik ve maternal sonuçları değerlendirildi.
BULGULAR: Toplamda çalışmaya 95 hasta dahil oldu. Elli hastaya hastaneye yatış önerildi, bu hastaların %58'i yatışı kabul etmedi. Yatışı kabul etmeyen hastaların hiçbirisinde komplikasyon gelişmedi. Hastaların yüzde 3.2'sinde preterm doğum, %3.2 fetal kayıp ve %5.3 plasenta dekolmanı görüldü. Bir anne (%1.1) trafik kazası sonucu oluşan çoklu travma nedeniyle kaybedildi. Gebelik haftasının artışıyla hastaneye yatış gerekliliği artarken, diğer parametrelerin hastaneye yatış üzerinde herhangi bir etkisi bulunmadı.
TARTIŞMA: Gebelik haftasının artmasıyla, trafik kazası geçirmiş gebelerin hastaneye yatış gereksinimleri artar. Hastaneyi yatışı kabul etmeyen minör travmalı gebelerde herhangi bir komplikasyon gelişmedi.
Anahtar sözcükler: Gebelik; hastaneye yatış; trafik kazaları.

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