ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Analysis of Tibial Fractures and Treatment After Trauma in Pregnant Women

Gebelerde Travmaya Bağlı Tibia Kırıklarının Analizi

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ABSTRACT

Aim: *Our hospital has the most comprehensive obstetrics clinic in our province, and the treatment of pregnant women with trauma is performed intensively in our hospital. In this study, we aimed to evaluate pregnant women with tibial fractures, the treatment of these pregnant women, and their maternal and fetal health outcomes.*

Material and Method: *This study was conducted as a retrospective trial between January 2017 and October 2019. Pregnant women with tibia fractures who were operated on in our hospital were included. Their demographic features, data during surgery, and maternal-fetal outcomes were analyzed.*

Results: *Eleven patients who met the study criteria were identified. Two patients had a tibia fracture after a traffic accident, and the other nine patients had a tibia fracture after a fall. None of the eleven pregnant women who underwent surgical treatment for tibial fractures had pregnancy complications due to trauma or orthopedic surgery.*

Conclusion: *Posttraumatic non-obstetric surgery conditions in pregnant patients can be managed with a multidisciplinary approach and an experienced team by reducing the complication rate. Our study shows that tibial fracture operations in pregnant patients can be successfully treated with a professional team before maternal/fetal mortality and morbidity develops.*

Key words: *pregnancy; tibia fracture; surgery in pregnant women*

ÖZET

Amaç: *Bizim hastanemiz ilimizdeki en kapsamlı kadın hastalıkları ve doğum kliniğine sahiptir ve travmalı gebelerin tedavisi hastanemizde yoğun bir şekilde yapılmaktadır. Bu yüzden bu çalışmada özellikle tibia kırığı olan gebeleri, bu gebelerin tedavisini ve anne bebek sağlığı açısından sonuçlarını değerlendirmeyi amaçladık.*

Materyal ve Metot: *Bu çalışma Ocak 2017 ile Ekim 2019 arasında retrospektif olarak planlandı. Hastanemizde travma sonrası tibia kırığı olan ve ameliyat edilen gebe hastalar dahil edildi. Hastaların demografik özellikleri, ameliyat sırasındaki verileri ve maternal-fetal sonuçları analiz edildi.*

Bulgular: *Çalışma kriterlerine uyan onbir gebe tespit edildi. Hastalardan ikisinde araç içi trafik kazası sonrası tibia kırığı olurken diğer dokuz hastada düşme sonrası tibia kırığı olduğu saptandı. Tibia kırığı nedeniyle cerrahi tedavi uygulanan onbir gebenin hiçbirinde travma veya ortopedik ameliyat nedenli gebelik komplikasyonu tespit edilmedi.*

Sonuç: *Gebe hastalarda travma sonrası non-obstetrik nedenli ameliyat durumları multidisipliner bir yaklaşım ve deneyimli bir ekip ile komplikasyon oranı çok azaltılarak yönetilebilir. Çalışmamızda gösteriyor ki gebe hastalarda tibia kırığı nedenli ameliyatlar maternal/fetalmortalite ve morbidite gelişmeden deneyimli bir ekiple başarılı şekilde tedavi edilebilir.*

Anahtar kelimeler: *gebelik; tibia kırığı; gebelerde operasyon*

Introduction

Trauma affects 7 %of all pregnancies and eqıires admission in 4 of 1000[1]. It has been shown to complicate up to 8 %of all pregnancies[2]. It's mostly seen as falls, in-vehicle, or out-of-vehicle traffic accidents in pregnant women. Depending on the severity of the trauma, the maternal or fetal status may be negatively affected. Posttraumatic fractures are more difficult to treat in pregnant women due to anatomical and physiological changes. There are often case presentations in the literature on trauma in pregnant women, and there are no studies or analyses involving many patients. In addition, there is no case series showing the surgical treatment of pregnant women with isolated tibial fractures and how the mother and baby are affected after this surgery. Our hospital has the most comprehensive obstetrics clinic in our province, and the treatment of

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pregnant women with trauma is performed intensively in our hospital. Therefore, in this study, we aimed to evaluate pregnant women with tibial fractures, the treatment of these pregnant women, and their maternal and fetal health outcomes.

Material and Methods

This study was conducted as a retrospective trial in the Sanlıurfa Research and Training Hospital between January 2017 and October 2019. Pregnant women with tibia fractures who were operated on in our hospital were analyzed. The University ethics committee approved this study protocol (No: 19/07/08). It was made according to Helsinki Declaration. Informed consent was obtained from all participants.

Inclusion criteria were; pregnant women aged 18–40 years who were admitted to our orthopedics and traumatology clinic after trauma and operated on for tibial fractures due to trauma. Patients whose medical information and radiographs could not be reached, whose fracture location on tibia radiographs were not clear, tibial radiographs could not be taken correctly, patients who had begun treatment in another hospital after trauma, who had surgery or who applied to our hospital and refused the treatment we recommended were excluded from the study. The patients were evaluated firstly in the emergency department, then by an orthopedist and obstetrician. The participants diagnosed were admitted to the orthopedic clinic for operation. The obstetricians performed preoperative and postoperative obstetric recommendations.

The tibial fracture classification was performed by X-ray according to AO (Arbeitsgemeinschaftf¨urOste osynthesefragen) classification system. Although there are different classifications of tibial fractures, similar studies in the literature have used the AO classification. For these reasons, we preferred to use the AO classification. The extremity fractures after trauma were grouped as right and left. The operation was determined as plate screw or intramedullary nailing according to the selected implant. Spinal anesthesia was preferred for surgeries. The anesthetic application time was calculated on the anesthesia form in pregnant women. The operation time was kept as short as possible to reduce the side effects and complications related to anesthesia. Lead aprons were used in the operating room to protect the pregnant woman from radiation and tried to get as few X-rays as possible. The number of X-rays taken perioperatively was checked from the recording unit on the scope device. Antibiotic cephalosporin derivatives of pregnancy category B and paracetamol were used as analgesics.

Patient information system and radiology archive were used to examine patient clinical information and radiographic; maternal age, parity, type of trauma, tibial fracture classification, fracture side, type of surgery, type of anesthesia, duration of surgery, number of X-rays, gestational week of fracture, mode of delivery, obstetric complications if any, meconium at birth were recorded.

After the surgery, control x-rays were taken in the protected x-ray room, after protective measures were taken for the baby and the mother. Gestational age was calculated using the first day of the last menstrual period (LMP) and confirmed by the first trimester or early second-trimester ultrasonography.

Results

Of the 573 patients with tibial fractures who were referred to our hospital for post-traumatic surgery on the dates indicated, 19 were pregnant. Five patients were treated at another health center. Radiographs of the remaining two patients could not be reached. One of the pregnant women gave birth in an external center and could not be accessed. Eleven patients who met the study criteria were identified. The mean age of the pregnant women was 26 (20–37), the mean parity was 4 (1–7), and the mean gestational week was 24 (4–30) weeks. Table 1 shows the demographic and clinical outcomes of the patients included in the study.

Two patients had a tibia fracture after a traffic accident, and the other nine patients had a tibia fracture after a fall. Tibia fracture classification according to AO classification, the fracture types of patients were respectively 42. A1/4F. 2A, 42. B2/4F. 2B, 42. A2, 43. A1, 43. A1, 43. B3, 41. C2/4F. 2A, 42. A2,43. B3.1.43. A1.2.42. B2, 4F2B (Table 1). Four patients had right tibia fractures and seven left tibia fractures. Six of the eleven tibial fractures were accompanied by fibula fractures. Intramedullary nailing was performed in two of eleven pregnant women with tibial fractures, and osteosynthesis was performed with plate and screw in the other patients. In Figure 1, an example of treatments with intramedullary nailing and plate-screw are given in postoperative x-rays. The mean operation time was 70 minutes (62–81 minutes), and the mean number of X-rays was 9 (6–14).

Table 1. *Demographic and clinical characteristics of pregnant patient with a tibia fracture*

Case no	Age	Parity	GAD (weeks)	Trauma	Classification	Side	OP	Time of operation	X-ray (n)	Anesthesia	Mode of delivery	Pregnancy complications	MAS
1	26	5	28	Fall	42.A1, 4F.2A	Right	Plate	62	6	Spinal	VD	None	None
2	28	4	29	Fall	42.B2, 4F.2B	Left	Nail	70	10	Spinal	C/S	None	None
3	37	7	28	Fall	42.A2	Left	Plate	75	6	Spinal	VD	None	None
4	20	1	29	Accident	43.A1.2	Left	Plate	50	8	Spinal	C/S	None	None
5	24	3	26	Fall	43.A1.2	Right	Plate	78	7	Spinal	VD	None	None
6	20	3	30	Fall	43.B3.1	Right	Plate	80	11	Spinal	VD	None	None
7	32	6	4	Fall	41.C2, 4F.2A	Left	Plate	81	9	General	C/S	None	None
8	29	4	27	Accident	42.A2	Left	Plate	72	14	Spinal	VD	None	None
9	22	6	26	Fall	43.B3.1	Right	Plate	68	8	Spinal	C/S	None	None
10	31	2	24	Fall	43.A1.2	Left	Plate	65	12	Spinal	VD	None	None
11	22	4	20	Fall	42.B2, 4F.2B	Left	Nail	75	9	Spinal	C/S	None	None

GAD: Gestational age at delivery, OP: Operation type, MAS: Meconium-stained Amniotic fluid, VD: Vaginaldelivery, C/S: Sectio

Figure 1. *Intramedullary nailing and plate-screwin postoperative x-rays.*

Six pregnancies were usually delivered, and five pregnancies were delivered by cesarean section for non-traumatic reasons. The indication for cesarean section was obstetric in all five patients. None of the babies had meconium in the amniotic fluid at birth. None of the eleven pregnant women who underwent surgical treatment for tibial fractures had pregnancy complications due to trauma or orthopedic surgery.

Discussion

We found that the etiology of traumatic tibial fractures in pregnant women in our hospital was primarily due to falls. Although the fracture types were various, most were treated with osteosynthesis with plate and screw. In addition, the treatment processes of these fractures did not negatively affect maternal and fetal outcomes.

The aim of treating post-traumatic injuries during pregnancy is to reduce the morbidity and mortality of the mother and the baby. When this situation is encountered, it should be remembered that the most important thing is to treat the mother. The evaluation of trauma in pregnant women should be done with a multidisciplinary approach with many physicians in adult branches[3]. Most postoperative traumatic orthopedic

injuries are treated conservatively (splint, plaster, bandage, and medical treatments) without any operation. Conservative treatment is the primary treatment option for orthopedic traumas in pregnant women. Still, emergency surgery should be performed on open fractures, circulatory problems, and fractures that require open reduction. While elective operations can be postponed in pregnant women, there is no contraindication for performing emergency orthopedic operations[11].

The operation may be necessary for long bone fractures such as tibia, femur, and humerus. In these patients, maternal and fetal health should be evaluated simultaneously; surgical methods appropriate for a gestational week should be preferred and followed by an experienced physician team. Fracture of the tibia is the most common long bone fracture, and tibia fracture is generally associated with fibula fracture[4]. When we analyzed the classification in our study, we observed that fibula fracture was accompanied in six patients.

Just over half of trauma during pregnancy occurs in the third trimester. In our study, except for one patient, the others were in the second and third trimesters. The rate of adverse effects on fetus health after radiation exposure is related to gestational week[5]. 8–15 gestational weeks of the central nervous system are affected. Studies have not reported any teratogenicity in radiation exposure of less than ten rads[1]. Developmental retardation, microcephaly, and mental retardation can be seen in high-dose radiation exposure in the fetus. ACOG (The American College of Obstetricians and Gynecologists) did not report fetal death and birth deformity at 5 rad and below exposures[6]. In our study, the abdomen and pelvis of all operated on pregnant women were covered with lead vests. A small number of control radiographs were performed to reduce radiation exposure. The average number of scopies taken is nine, and the extremity x-ray (average 200 mini rad) rad value does not exceed 5 Rads in total. Due to this, the total radiations of the radiographs taken during surgery were below the risk values.

Anesthetic drugs affect cell signaling, mitosis, DNA synthesis, cellular differentiation, and organogenesis[7]. There is no optimal anesthetic technique for all general anesthetic drugs across the placenta. Therefore regional anesthesia should be preferred to minimize fetal exposure to anesthetic agents. Spinal anesthesia could not be performed on one of the pregnant women in our study because she had a lumbar vertebra fracture after trauma. The other ten patients underwent spinal anesthesia to minimize radiation exposure to the pregnant and fetus. In addition, the mother's vital values may be monitored during the operation period, and fetal monitoring may be necessary[8]. The patient can be positioned on a backboard with a 15 tilt to relieve vena cava compression. Preoperatively and postoperative obstetrics evaluated pregnant women, and enoxaparin sodium 0,4 ml was administered to all patients to prevent deep vein thrombosis and embolism. In our study, doppler or NST (Non-Stress Test) follow-up was not required during the operation since our operation time was not long.

In the study performed by El-Kady et al.[9], it was stated that traumas during pregnancy would have poor perinatal outcomes and would increase maternal mortality and morbidity. Ali Jameel et al.[10] reported that fetal mortality might increase to 65 %after trauma. In contrast to the literature in our study, it was found that the conditions that we identified as post-traumatic complications were not present in pregnant women. No disorders were leading to maternal or fetal death or preterm birth. This may be due to minor traumas in pregnant women, or there was a team of experienced obstetricians.

Moreover, we included only patients with tibia fractures who were regularly operated on and followed up. Other long bone fractures may be associated with obstetric complications. In this case, our inclusion criteria may have affected this outcome.

Among the strengths of the present study was that the tibial fractures caused by trauma in pregnant women were the first case series in the literature. Nevertheless, our study has some limitations. First, its design was retrospective. Therefore determination of perinatal clinical features is limited. Second, as we are the hospital with the highest number of births in the country, there may be limitations in obtaining some records and patients who cannot be included in the study.

Posttraumatic non-obstetric surgery conditions in pregnant patients can be managed with a multidisciplinary approach and an experienced team by reducing the complication rate. Our study shows that tibia fracture operations in pregnant women can be successfully treated with a professional team before maternal/fetal mortality and morbidity develops. More extensive studies are needed to investigate fractures in different bones to clarify other long bone fractures in pregnancies.

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