

## Intramedullary Nailing at 36 Weeks of Gestation: An Effective Surgical Option for Tibial Fracture

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**ABSTRACT** Nowadays, tibial shaft fractures are a frequently encountered among orthopedic traumas. Although there are many treatment options for tibial shaft fractures, currently the gold standard is intramedullary nailing. Tibia fractures rarely occur in the 3<sup>rd</sup> trimester of pregnancy. The treatment of tibial shaft fractures during pregnancy is controversial, and there are quite few papers in the literature. We applied the intramedullary nailing method in tibial shaft fracture in a woman at the 36<sup>th</sup> week of pregnancy. No complications occurred in the mother or fetus during or after surgery. The patient gave birth with cesarean section due to fetal distress in another hospital 2 weeks after discharge in the 38<sup>th</sup> gestational week. Herein, we aimed to present successful treatment of a tibial shaft fracture with intramedullary nailing which occurred during late period of pregnancy, with the review of literature.

**Keywords:** Tibia shaft fracture; pregnancy; intramedullary nails

Although tibial shaft fractures are common among long bone fractures, there is no consensus on the priority of the treatment. There are many treatment options in the management of tibial fractures including conservative treatment, internal fixation with plaque screws, intramedullary nailing and external fixator.<sup>1</sup> According to the literature, intramedullary nails and plate-screws are the most frequently used surgical treatment options for tibial shaft fractures, while external fixators are the mainstay in the management of open fractures.<sup>2</sup>

### CASE REPORT

The 33-year-old woman in the third trimester of her 3<sup>rd</sup> pregnancy admitted to emergency department with the complaints of severe pain in the leg and difficulty in stepping on. In her previous 2 gestations, the patient delivered via normal vaginal route and she had no history of smoking or alcohol consumption. Her laboratory results and ultrasound follow-up were in normal range during her pregnancy and the fetal development was also considered as normal. Ultrasonography examination was consistent with 36<sup>th</sup> week of gestation and did not reveal any obstetric pathology. Fetal cardiotocography showed normal cardiac activity and beat-to-beat variability.

In the patient with pathological movement in the lower right extremity, a long splint was applied to the leg, considering as the diagnosis of tibia fracture. The neurovascular examination of the right lower extremity was normal. Tibia lateral radiography was taken with a lead shield which revealed displaced shaft fracture (Figure 1). The patient was informed about the operations to be done. The request form was taken. Surgical intervention was planned for the patient after consulted to anesthesiologist. The patient was taken to the surgical table in the supine position. After spinal anesthesia, the side of the tibial fracture was sterilized. Knee was taken at 90 degree flexion and infrapatellar incision was made in front of the knee. After patella was lateralized, proximal tibia was reached and suitable entry point for nail was found. With the help of the guyt wire, intramedullary nail with distal locking was placed (Figure 2) (The tibial nail manufactured by Tasarımmed, Istanbul, Turkey). The patient was also monitored with a fetal monitor during the operation. No abnormal finding was detected in the fetus. Postoperatively, the patient underwent fetal heart rate follow-up and obstetric ultrasonography. There was no obstetric pathology. She was discharged after 3 days of hospitalization in the orthopedics clinic. Two weeks later, our patient gave birth a healthy baby via cesarean section due to fetal distress indication in another hospital having Apgar score of 7 and 9 points at the 1<sup>st</sup> and 5<sup>th</sup> minutes, respectively. The patient was mobilized at the post-op first month with a complete range of motion in the knee joint with the help of a crutch, and she was free of neurovascular problem. Post-operativ radiographs at the end of first month are demonstrated in (Figure 3, Figure 4). The patient was recommended to leave the use of crutch. In the literature review, we found only a few publications about the treatment and follow-up of the tibial shaft fractures occurred at the 36<sup>th</sup> week of pregnancy.<sup>3-7</sup> We aimed to present the management and surgical treatment of a tibial fracture of a pregnant woman at the 36<sup>th</sup> week of gestation, together with the literature review.



FIGURE 1: Tibia Pre-operative lateral radiograph of the tibia reveals shaft fracture.

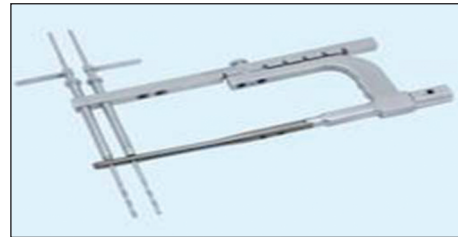


FIGURE 2: The tibial intramedullary nail with distal lock manufactured by TasarımmedR, Istanbul, Turkey.



FIGURE 3: Tibia Antero-posterior radiograph at the 1<sup>st</sup> month after surgery.



FIGURE 4: Tibia Lateral radiograph at the 1<sup>st</sup> month after surgery.

## DISCUSSION

Fractures in pregnancy are uncommon. Although vertebra fractures are the most common fractures during pregnancy in literature, an ankle is the most common fracture region in a study by Herath et al. and is almost evenly distributed between the second and third trimesters.<sup>8,9</sup> Most of the falls that occur in pregnancy are in the second and third trimester. Half of these falls usually result in lower extremity fractures. Possible pre-disposing causes of fall risks include changes in gait, balance, centre of gravity and inability to see foot placement.<sup>10</sup> Trauma has been shown to be the leading cause of non-obstetric deaths in pregnant women, with maternal overall mortality rate from 6% to 7% and fetal mortality in major trauma cases ranges from 55% to 65%.<sup>11,12</sup> In a recent study conducted in our center on 179 pregnant women exposed to trauma, maternal mortality rate was found as 2.8%.<sup>13</sup> Long bone fractures after trauma are mostly seen in the tibial bone due to its localization, complications of which are frequent and its treatment is controversial.<sup>14</sup> Today, intramedullary nailing is commonly used in the treatment of tibial shaft fractures, due to low complication rates, the success of the fracture stabilization and to allow early mobilization.<sup>15</sup> The treatment of tibial shaft fractures in the third

trimester of the pregnancy is still controversial. Since there are few publications in the literature, a consensus on the management of this situation has not been established yet. In case of orthopedic emergencies, the patient should be treated immediately, regardless of the pregnancy status of the patient.<sup>12</sup> If conservative treatment is planned, or if tibia fracture surgery is postponed after delivery, the tibia stability should be provided with above-knee plaster. In this case, however, the mobility of the patient will be reduced. This will increase the risk of deep vein thrombosis (DVT) existing in pregnancy and will require a longer DVT prophylaxis. Moreover, the above-knee casting for tibia fracture in pregnant results in difficulties in normal vaginal delivery.<sup>4,6,15,16</sup> We decided to use a distal-locked intramedullary nail for the tibial shaft fracture of our pregnant patient. In this way, we aimed to ensure mobilization of the patient as early as possible, provide easier delivery and make the care of her baby more comfortable after birth. Low-dose heparin prophylaxis was administered to the patient before and after delivery.

Radiation exposure is another risk factor for the fetus. The development of the central nervous system is more rapid in the first trimester, so fetus is more sensitive to radiation during this period. After the 25<sup>th</sup> week of pregnancy, the fetus becomes more resistant to radiation, but the cumulative effect of radiation is more important. The fetus may expose up to 100 milligray dose of irradiation. There are publications in the literature reporting that X-rays can be used during surgical intervention as long as the radiation is administered safely and this dose is not exceeded.<sup>17</sup> On the other hand, giving anesthesia to the pregnant patients for surgical treatment of the tibia fracture may have side effects on the fetus and mother. This is a frightening situation for both the doctor and the patient, when planning surgical treatment for the tibia fracture. Since anesthetic agents have effects on both mother and baby, pregnancy anesthesia becomes more complex. Although no teratogenic side effects of anesthetic agents have been shown, surgical interventions planned for pregnancies should be avoided in the first trimesters where the organo-

genesis is completed and, if possible, postponed to the second trimester. During the period from the second trimester to the delivery, the fetus will be less affected by surgical interventions performed to the mother.<sup>18</sup> Our patient underwent spinal anesthesia. No problems were encountered in the post-operative period.

In the intramedullary tibial nailing, exposure to fluoroscopy during distal locking of the tibia takes almost half of the entire operation time. It has been reported that mean fluoroscopy exposure is 17.9 minutes in the literature.<sup>19</sup> We also used a distal tibial intramedullary system to reduce the time of surgery and radiation exposure. In our case distal locking took about 3 minutes and we used a single dose fluoroscopic image here. After locking the distal screw with guide wire inserted through the intramedullary space, we decided that the guide wire was in the distal screw when it could not be advanced. The same procedure was repeated in the 2<sup>nd</sup> distal screw. In order to reduce the exposure of the mother and fetus to fluoroscopy, the maternal abdomen was covered with a lead-protective apron. The management of these fractures requires a multi-disciplinary approach, with orthopaedic, obstetric, endocrinology and anaesthetic reviews to optimise maternal and foetal outcomes.<sup>9</sup> The treatment of fractures during pregnancy must take into account the associated morbidity for the mother and risks for the foetus. Generally, surgical intervention during the second trimester is preferred in order to avoid spontaneous abortions and pre-term delivery.<sup>20</sup> However, if indicated, surgery should never be denied, regardless of trimester.<sup>21</sup> The type of fracture (open or closed), localization, age of the patient and the best fixation position that

the fracture can heal easily are the main considerations. In addition, avoiding potential harm to the mother and fetus, ensure the comfort of mother and the newborn are other important issues.

We believe that using an distal-locking intramedullary nailing is a safe and proper option in the surgical treatment of tibial shaft fractures in pregnant patients to provide early postoperative maternal mobilization, comfort and good baby care, if the obstetric examination and obstetric ultrasound are normal.

#### **Informed Consent**

*Written informed consent was obtained from patient as to share case report.*

#### **Source of Finance**

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

#### **Conflict of Interest**

*No conflicts of interest between the authors and /or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

#### **Authorship Contributions**

**Idea/Concept:** Sezai Özkan, Cihan Adanaş; **Design:** Hasan Onur Arık; **Auditing/Consultancy:** Erbil Karaman; **Data Collection and/or Processing:** Erbil Karaman; **Analysis and/or Interpretation:** Sezai Özkan; **Source Search:** Cihan Adanaş; **Article Writing:** Sezai Özkan; **Critical Review:** Hasan Onur Arık; **Resources and Funding:** Erbil Karaman; **Ingredients:** Cihan Adanaş.

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