

# Influence of maternal fractures in the last trimester of pregnancy

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## Abstract

**Introduction:** The management of the pregnant woman is difficult because the risk of complications is increased. Trauma is considered to be the main cause for non-pregnancy related maternal death. Fractures are one of the most common injuries that result after most forms of trauma. Our study analyses the relationship between the most common types of trauma and their outcome, the possible complications and the incidence of premature delivery.

**Material and method:** We studied 23 pregnant women with an average age of 24.3 years admitted to our department between 2003-2007 with one or more fractures caused by different types of trauma. Surgery was performed on 21 of the patients (91.30%); pre-operative radiographies were necessary in order to ensure a good preoperative planning. We performed the follow-up for all our patients in order to monitor the possible complications of our treatment and the short-term side effect on the fetus.

**Results:** After surgery, the patients were transported to the Obstetrics department, where several tests were performed (local examination, cardiotocography, car-

diac frequency of the fetus, ecography). Two of our patients presented a pathological echographical modification; one of them required emergency C-section (woman pregnant in 33 weeks). Medical treatment consisted in antispastic medication and betamethasone/dexamethasone. When comparing the occurrence of complications with the week of pregnancy, we noticed a higher rate of complications in the last 8 weeks before term. We noted that 13 of our patients (17.4%) had a premature delivery, a higher rate than in healthy pregnant women (12%).

**Conclusions:** In our group, a high rate of complications and premature delivery occurred, with a possible connection with the existence of fractures and surgery stress. We found no relationship between the type of trauma and the occurrence of complications. Studying the effects of trauma and fractures on pregnancy and delivery is poorly represented in literature. Further studies are necessary in order to establish a definite relationship between fractures and premature delivery.

**Keywords:** maternal fractures, premature labor

## Introduction

Treating pregnant women that have experienced trauma is a matter of cooperation and communication between several medical specialties. Trauma is considered to be the main cause for non-pregnancy related maternal death; fetal lethality is considered to be 34%, according to statistics. Fractures are one of the most common injuries that result

after most forms of trauma, and their management requires extreme care and precaution. Surgery is sometimes a stress factor for the fetus, with possible irreversible side effects and a possible risk for premature delivery. Our study analyses the relationship between the most common types of trauma and their outcome, the possible complications and the incidence of premature delivery.

## Material and method

We studied 23 pregnant women with an average age of 24.3 years (table 1) that were admitted to our department between 2003-2007 with one or more fractures caused by different types of trauma (table 2).

Radiography was performed only after the obstetrician established that it involves little risk for the fetus.

Table 1. Age of pregnant women admitted to our department

Age	Number of patients
19-24 years	15 (65.21%)
25-30 years	6 (26.08%)
>30 years	2 (8.69%)

Table 2. Types of trauma in pregnant women admitted to our department

Type of trauma	Number of patients
Traffic accident	10 (43.47%)
Fall from standing	4 (17.39%)
Fall from height	3 (13.04%)
Domestic violence	6 (26.08%)

Table 3. Type of fractures and treatment

Type of fractures	Number of patients	Treatment
Distal radius fractures	7	3/external fixation, 2/conservative, 2/pinning
Forearm fractures	4	plates on both bones
Humeral diaphysis fractures	4	plates
Femoral diaphysis fractures	2	1/nail, 1/plate
Cubitus fractures	2	plates
Femoral supracondylar fractures	2	plates (Dynamic Condylar Screw)
Olecranon fractures	1	tension band
Clavicle fractures	1	plate

Table 4. Type of anesthesia

Type of anesthesia	Number of patients
Locoregional anesthesia	17 (73.91%)
Spinal anesthesia	4 (17.39%)

Still, two patients refused the radiological examination and with the help of clinical diagnosis, were immobilized in casts. This represented an exclusion criterion from our study.

When radiography was performed we used radiological protection over the abdomen and pelvis (radiation-opaque apron) in order to protect the fetus.

We analyzed the type of fractures that resulted as an effect of various trauma and we performed different surgical and orthopedic procedures adequate to the pathology (table 3).

Surgery was performed on 21 of the patients (91.30%). The surgical treatment was in such manner elected as to reduce to minimum or exclude intraoperative radioscopy. For instance, if normally for a supracondylar fracture of the femur we use a retrograde nail for fixation, in such cases we used a surgical method (plate fixation) that does not require intraoperative radiological verification.

Regarding anesthesia, the anesthetic was chosen after consulting with the obstetrician. If possible, we used regional anesthetic; spinal anesthesia was preferred in femur fractures. The two cases that did not need surgery did not receive an anesthetic.

After surgery, the patients were transported to the Obstetrics Department. Local examination measured the dilatation of the cervix in order to assess the onset of labour and the risk of pre-term delivery. Patients that presented rhythmical abdominal pain every 5-10 minutes that lasted for at least 1 minute or any signs of genital bleeding were closely monitored.

Cardiotocography was performed in order to assess the contractility of the uterus and the cardiac frequency of the fetus. In order to screen for abruptio placentae, an echographical survey was initiated on all the women (a retroplacental lacunar image was considered pathological).

## Results

We performed the follow-up for all our patients in order to monitor the possible complications of our treatment and the short-term side effect on the fetus.

The echographical screening revealed that one of the patients presented a thin lacunar image retroplacental, with no blood or amniotic liquid in



Figure 1. Preoperative X-ray

Figure 2. Postoperative X-ray (AP and lateral)

the vagina. The patient was monitored closely, and the bleeding stopped with no consequences for the fetus; follow-up showed that the woman gave birth at term.

Another patient had a hematoma that increased in volume in the following 8 hours. An emergency C-section was performed on the mother (pregnant in 33 weeks). The treatment for the patients that presented with pregnancy-related modifications consisted in antispastic medication and, for prophylaxis purposes (avoiding hyaline membrane disease in women that presented contractions before week 35 of pregnancy), betamethasone or dexamethasone.

Other complications were encountered: three patients delivered two weeks before the probable date of birth, two patients experienced abnormal contractions that ceased after

antispastic medication and one patient delivered two days after surgery (pregnant in 30 weeks); we present this case as an example.

The patient, aged 24 and in her 30th week of pregnancy, was injured in a traffic accident (frontal collision between two vehicles). On admittance, we performed an anterior radiography of

the femur (figure 1) and we established the diagnosis: right femur diaphyseal fracture. After consulting with an obstetrician, we performed a nail osteosynthesis of the femur (figure 2). Although the nail had locking holes and normally we would have blocked the nail, in this case we chose not to because such a maneuver would have required radiological control and the irradiation would have been significant.

Immediately after surgery, the patient was transferred to the Obstetrics department.

After being admitted in the obstetrics service, the patient was closely followed. The genital examination revealed a shortened cervix, anterior oriented. The cardio-tocography and the echography were normal. The patient received 4 doses of Dexamethasone, 12 hours apart each. After approximately 48 hours, the medical team was forced to perform an emergency cesarean section for acute fetal distress (fetal heart rate under 90). Postoperative evolution was good, both for mother and child, with no complications of any kind.

We assessed the relationship between the type of trauma (as mentioned in a previous table) and the complications rate (table 5) and found no statistically significant differences.

As part of the follow-up, we monitored the patients until delivery and we noted that 4 of our patients (17.4%) had a premature delivery, a higher rate than in healthy pregnant women (according to U.S. statistics, only 12% of the newborns are premature).

## Discussions

Pregnant women represent a delicate type of patient, because extra precautions are necessary when treat-

Table 5. Relationship between type of trauma and the number of complications

Type of trauma	Complications
Traffic accident	2
Fall from standing	2
Fall from height	2
Domestic violence	2

ting them. Unfortunately, types of trauma such as falls or car accidents that can lead to one or more fractures are quite frequent. Kuczkowski<sup>(1)</sup> also mentions transportation accidents, violent assaults and burn injuries as causes for trauma in pregnancy. They are considered to be the main cause of non-pregnancy related maternal death.

Several studies have assessed an important number of risk factors that can lead to premature birth, evaluating the outcome for both the mother and the infant. Schiff<sup>(2)</sup> performed a retrospective study over a period of 17 years in order to assess the impact of a fall on pregnant women. 47.4% of the effects of the fall were represented by fractures of the lower extremities and one of the parameters taken into account for measuring was represented by preterm labor and delivery. With the aid of the Poisson regression analysis, the adjusted relative risk was measured and found to be of 4.4 (increased risk of preterm labor). Another parameter taken into account was placental abruption, with a relative risk of 8.0 (increased risk of placental abruption).

Regarding the surgery of a pregnant woman, it is often the result of the combined efforts of the obstetrician, the orthopedic surgeon and the radiologist. Anesthesia must also be chosen in such a manner as not to harm the fetus (class C). Pain management can also be obtained if little risk is associated with the administered drug - Desai<sup>(3)</sup> recommends opioid use.

It is important to take into account the anatomical and physiological modifications that appear during pregnancy in order to offer an adequate treatment. Studies have indicated that a left lateral

decubitus position has a higher rate of success in terms of post operative results<sup>(1)</sup>. Flick<sup>(4)</sup> underlines the fact that the management of the trauma should primarily focus on the mother, and encourages some imaging examinations such as magnetic resonance imaging; he also recommends radiographs, abdominal ultrasound of the mother and fetal ultrasound. Prokop<sup>(5)</sup> also recommends a cardiotocography, and if necessary, an emergency cesarean section with a pediatric team in order to manage the new-born. Kuczkowski<sup>(1)</sup> supports this idea, underlining the importance of the state of health of the mother and assessing the optimal perioperative management of pregnant women that suffer any type of trauma.

It is also important to take into account the psychology of the patient when confronted with trauma. A study performed by Cartin-Ceba<sup>(6)</sup> of pregnant women that have been admitted to Intensive Therapy over a period of 10 years shows that maternal shock is a favoring factor in poor fetal and neonatal outcome (odds ratio of 6.85). Desai<sup>(3)</sup> reviews the main concerns that can cause anxiety to the mother, such as radiation exposure, effects on the fetus as well as medication with its possible side effects. Unfortunately, radiography is essential when treating a fracture in order to obtain a correct operative planning; Desai's study suggests that the risk of irradiating the fetus is small if the cumulative dose of radiation does not surpass 5 rad.

Regarding the management of fractures, pelvic fractures are associated with a higher mortality risk especially for the fetus; however, studies show good outcomes in such fractures if

the preoperative, intraoperative and postoperative management of the patients are optimal. In such cases, the main concern of the team must be not to trigger a premature delivery. El Kady<sup>(7)</sup> performed a retrospective study that included an important number of pregnant women in order to assess the connection between fractures and perinatal outcome. His results show that a statistically significant higher proportion of pregnant women presented more severe complications if they gave birth during hospitalization. Furthermore, he emphasizes the increased risk of premature delivery and low weight at birth for women that suffered a trauma in their last months of pregnancy. Wolf<sup>(8)</sup> underlines the fact that although fractures of any type are not always a threat to the mother's life, their existence and their treatment are frequently associated with short or long-term side effects on the fetus.

## Conclusions

Our research has led us to the conclusion that pregnant women who suffer a trauma and require surgery are more likely to give birth before term. Furthermore, complications such as hematomas, early contractions and decrease of the cardiac frequency of the fetus are more frequent in the last weeks of pregnancy. We found no relationship between the type of trauma and the occurrence of complications.

Studying the effects of trauma and fractures on pregnancy and delivery is poorly represented in literature. Further studies are necessary in order to establish a definite relationship between fractures and premature delivery. ■

## Bibliografie

1. Kuczkowski K.M. Trauma during pregnancy: a situation pregnant with danger. *Acta Anaesthesiol Belg.* 2005; 56(1):13-8.
2. Schiff M. Pregnancy outcomes following hospitalisation for a fall in Washington State from 1987 to 2004. *BJOG.* 2008 Dec; 115(13):1648-54.
3. Desai P., Suk M. Orthopedic trauma in pregnancy. *Am J Orthop.* 2007 Nov;36(11):E160-6.
4. Flik K., Kloen P., Toro J.B., Urmey W., Nijhuis J.G., Helfet D.L. Orthopaedic trauma in the pregnant patient. *J Am Acad Orthop Surg.* 2006 Mar; 14(3):175-82.
5. Prokop A., Swol-Ben J., Helling H.J., Neuhaus W., Rehm K.E. Trauma in the last trimester of pregnancy. *Unfallchirurg.* 1996 Jun; 99(6):450-3.
6. Cartin-Ceba R., Gajic O., Iyer V.N., Vlahakis N.E. Fetal outcomes of critically ill pregnant women admitted to the intensive care unit for nonobstetric causes. *Crit Care Med.* 2008 Oct; 36(10):2746-51.
7. El Kady D., Gilbert W.M., Xing G., Smith L.H. Association of maternal fractures with adverse perinatal outcomes. *Am J Obstet Gynecol.* 2006 Sep; 195(3):711-6.
8. Wolf J.P., Pigne A., Maria B., Barrat J. Pregnancy and injuries in traffic. Apropos of a case. *J Gynecol Obstet Biol Reprod (Paris).* 1983; 12(8):879-82.