



## Case Report

## A case of intrauterine lethal fetal injury after attempted suicide of the mother

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## ARTICLE INFO

## Article history:

Received 10 January 2017

Received in revised form 7 September 2017

Accepted 11 October 2017

Available online 18 October 2017

## Keywords:

Pregnancy

Blunt abdominal trauma

Fetal trauma

Suicide

## ABSTRACT

Traumatic injuries in pregnancy such as abdominal trauma, pelvic fractures and penetrating trauma are major causes of maternal and neonatal morbidity and mortality. The most common causes of trauma during pregnancy are motor vehicle accidents, falls, assaults, gunshots, and burns. Pregnancy itself has been identified as a risk factor for trauma, together with a younger age, drug use, alcohol use, and domestic violence. We report the case of a 46-year-old woman, 34 weeks pregnant, who attempted suicide by jumping from a flyover, immediately after a probably deliberate traffic collision with the guardrail. She had fractures of five lumbar vertebrae and three ribs with pulmonary contusions, but was without other injuries. Following the mother's stabilization, the fetal heart tones were detected as abnormal and the patient had an emergency caesarean section delivering a still-born male infant. Neither alcohol nor drugs were found in the mother who had been diagnosed with an unspecified episodic mood disorder. She recovered completely from her injuries. At autopsy of the newborn, a massive subarachnoid hemorrhage with deformity of the skull was found, caused by maternal blunt abdominal trauma following car accident and fall. This case is an outstanding example of fetal head trauma which occurred with no life-threatening maternal injury due to attempted suicide. It is important for clinicians and forensic pathologists to have adequate knowledge and practical experience of these cases, because pregnancy is a special risk factor for self-inflicted injuries among females, with significant adverse effects on the fetus even with minor injuries to the mother.

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## 1. Introduction

Trauma complicates >7% of all pregnancies and is the leading non-obstetrical cause of maternal death (46% of all maternal deaths) [1]. The most common causes of trauma in pregnancy are motor vehicle accidents (49%), falls (25%), assaults (18%), gunshots (4%), and burns (1%) [1–3]. Pregnancy *per se* could be identified as a risk factor for trauma because often trauma is provoked with the aim of fetal injury by hitting the gravid abdomen. Other factors including younger age, drug use, alcohol use, and domestic violence have all been linked to obstetric trauma [1,4–6]. The American College of Obstetricians and Gynecologists (ACOG) identifies three different types of trauma in pregnancy: blunt abdominal trauma, pelvic fractures, and penetrating trauma [1]. The effect of a blunt abdominal trauma depends on several factors:

the fetus gestational age, the extent of disruption to the normal uterus, fetal physiology and type and severity of trauma.

During the first trimester, trauma does not usually threaten pregnancy except in the case of severe hypotension with associated hypoperfusion of the uterus and its contents. It is well known that enlargement of the uterus after 18–20 weeks of gestation compresses both the inferior vena cava and aorta in the supine position, increasing the likelihood of hypotension and decreased uterine perfusion [1]. During the second and third trimester, even relatively minor trauma can have significant adverse effects, including maternal injury or death, shock, internal hemorrhage, intrauterine fetal demise, direct fetal injury, abruptio placentae (even delayed), and uterine rupture which can occur at any gestational age [1,2,7]. Hence, blunt abdominal trauma is associated with several poor pregnancy outcomes, increasing the incidence of spontaneous abortion, preterm premature rupture of membranes, preterm birth, cesarean delivery, placental abruption, and stillbirth [1,8,9]. Major complications after severe blunt trauma can be either intraperitoneal or retroperitoneal hemorrhage (due to splenic or hepatic injury, rupture of the pelvic

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venous plexus), causing intrauterine fetal demise especially in the setting of abruptio placentae (at least 50% of fetal losses) [1]. Maternal non-survival is the most frequent cause of fetal death [10].

An extremely uncommon serious fetal sequela that has been associated with blunt abdominal trauma is direct fetal injury with skull fracture, which may be associated with acute intracranial hemorrhage [11]. This is a rare event that complicates less than 1% of all pregnancies affected by trauma [4]. This generally occurs in the context of significant trauma late in the third trimester, when the fetal head is situated low in the pelvis often in the setting of a pelvic fracture, although case reports have described fractures following relatively minor trauma [2,11–13].

We present a case of a lethal fetal injury after attempted suicide of the mother where she presented with a blunt injury which was not life-threatening. To our knowledge, this is a unique case of an intrauterine head trauma with a slippage of skull's bones and acute intracranial hemorrhage, diagnosed on a trauma CT scan which was performed through the gravid uterus during the mother's hospitalization.

## 2. Case background

During the nighttime, a 46-year-old woman, 34 weeks pregnant, was found lying on the ground approximately 10 m below a flyover, wearing nightclothes. Her car had collided with the guardrail of the overhead flyover in the same place.

Witnesses noticed the woman driving fast along the flyover before colliding with guardrail. After the accident, she attempted suicide by jumping from the guardrail of the flyover.

She was transported to the Emergency Department unconscious, but with autonomous breathing, showing small abrasions on the thorax and the feet. She was hemodynamically stable with the following vital signs: blood pressure of 119/75 mm Hg, pulse of 105 beats per minute, and oxygen saturation of 99% on 100% oxygen. The obstetric–gynecology service was consulted. A FAST ultrasound was performed showing a single live fetus in cephalic presentation; fetal heart tones were normal. The placenta was located at the anterior wall of the uterus, with no abruption or amniotic loss. Because both the patient and the fetus were stable, the decision was made to proceed with further maternal evaluation with a total body CT scan with contrast. CT scan showed a slight left pneumothorax and pleural effusion with bilateral lung contusions, fractures of three left ribs, and of L1, L3, L4, L5 vertebrae, as well as of the left metatarsus.

After the head CT was complete and the mother was stabilized, external fetal monitoring demonstrated abnormal fetal heart tones with evidence of fetal distress. The patient was transferred immediately to the operating room where she had an emergency cesarean section (4 h after admission) with the delivery of a still-born male infant at 34 week+4 days of gestation and weighing 2625 g. The toxicological examination on maternal blood did not revealed alcohol or drugs.

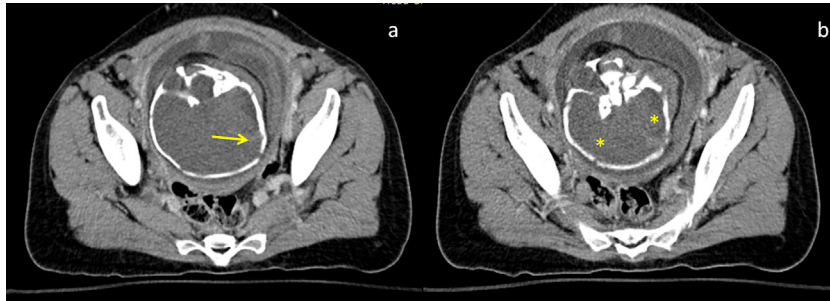
On closer inspection of the CT scan through the gravid uterus (Fig. 1), there was evidence of deformation of fetal skull bones with an acute intracranial hemorrhage (Fig. 2a,b).

The mother was treated for her injuries and then transferred to Psychiatric Department. On admission, she became distressed with feelings of sadness, anxiety, guilt, and hopelessness with suicidal thoughts. Her mental condition improved with therapy and she showed positive behaviors and good intentions towards her family. The patient was discharged after 12 days with the diagnosis of “unspecified episodic mood disorder”.

Her husband, who had another child with her, reported that she had lost her job as an engineer two months previously. As a result, she had developed insomnia and felt agitated, without showing



Fig. 1. Sagittal reconstruction images from the contrast enhanced CT total body: cephalic presentation of the fetus.



**Fig. 2.** Axial contrast enhanced CT through the gravid uterus. (a) Deformation of the fetal skull (arrow). (b) Acute subarachnoid hemorrhages of the temporal, and parietal lobes (\*).

negative feelings or suicidal tendencies. Her previous medical history was unremarkable.

Due to the unclear dynamics of the traumatic event, a medico-legal autopsy was performed on the infant.

### 3. Autopsy and histopathological findings

The external examination revealed a fully developed infant, with a weight of 2230 g and a crown-heel length of 47,5 cm. The head showed a deformity and a left eyelid bruises (Fig. 3). Internal examination disclosed a widespread subgaleal hemorrhage; the skull had burst with a slippage of the left parietal bone below the right one (Fig. 4). The brain showed massive and fresh subarachnoid hemorrhages of the left temporal, parietal and occipital lobes and of the right parietal and occipital lobes (Fig. 5). The remaining internal organs appeared unremarkable, and competitive causes of death were absent.

Histological analyses revealed diffuse bleeding in the intra-alveolar space of the lung, with no alveolar expansion. As a result of the attempted reanimation, the lung tissue had intraalveolar lamellar material. Consistent with the macroscopic findings, brain

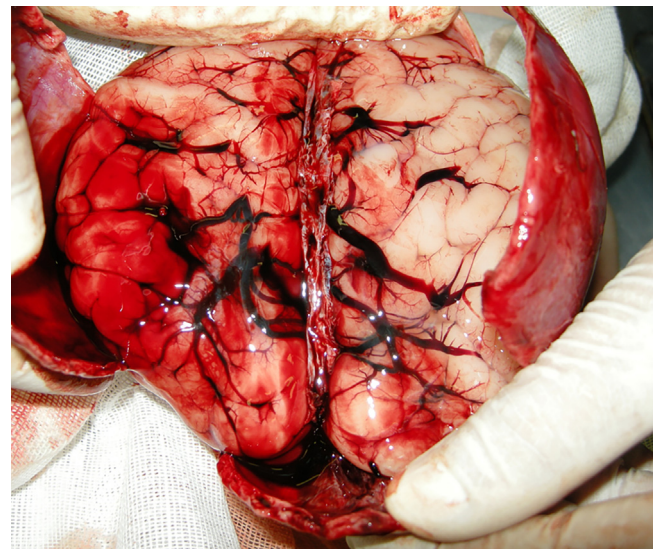


**Fig. 4.** Internal examination: slippage of the left parietal bone below the right one.

tissue showed hemorrhagic infiltration with polymorphonuclear leukocytes within and mainly around the hemorrhage. Other organs (heart, liver, spleen, kidneys, pancreas, thymus) were normal. The umbilical cord sectioned at 10 cm from the placental



**Fig. 3.** External examination of the 34 weeks fetus: deformity of the skull and a left eyelid bruises.



**Fig. 5.** Macroscopic photograph of the brain: massive subarachnoid hemorrhages of the left temporal, parietal and occipital lobes and of the right parietal and occipital lobes.

insertion showed a small amount of bleeding. No abnormalities were found in the histological examination of the placenta.

Based on the external and internal examination, the cause of death was found to be compression related skull and brain injury. These lesions were due to a blunt force injury to the head inside the maternal abdomen. It is difficult to establish if the abdominal injury occurred at the time of the car accident or the fall from height or both.

#### 4. Discussion

Rates of suicidal ideation during pregnancy range from 13.1% to 46% [14]. Important determinants of suicide risk include psychiatric disorders, such as major depressive disorder, panic disorder and generalized anxiety disorder, but also violence by partners, being unmarried, unemployment and unintended pregnancy which is the main reason for suicide attempts [15–17]. Of those who attempt suicide during pregnancy, 31% women do so during the 3rd trimester, while 25% try to end their lives during the first trimester and 43% during the second [18]. Changes in mood and symptoms including pain and sleep disturbances, are important to recognize, because they can often be confused with physical changes due to pregnancy [15].

Several methods are used to attempt suicide: ingestion of noxious substances solid or liquid, stabbing, inhalation of noxious substances, hanging, shooting and jumping from height [16].

Pregnancies complicated by suicide attempts can require hospitalization because two individuals, mother and fetus, are at risk and the mother's survival is the priority [10]. The improvement of fetal status depends on stabilization of the mother.

Major trauma with maternal instability should be initially managed using advanced cardiac life support/advanced trauma life support procedure and can require a multidisciplinary approach involving obstetricians, neonatologists, emergency room providers, and trauma care teams [1,10]. Continuous fetal and uterine monitoring with an external Doppler and tocodynamometer plus ultrasonography has to be performed. Gestational age can significantly influence medical approach because selecting expectant management versus expedited delivery has to be managed on the basis of continuous fetal heart rate monitoring [4]. The improvement of fetal status generally follows the stabilization of the mother.

Trauma occurring during the second and third trimester has different clinical consequences than during the first trimester, considering that the presence of a gravid uterus does alter the pattern of injury [13].

The literature about trauma in pregnancy is quite extensive. The effects on the fetus after non-life-threatening blunt injuries to the mother in attempted suicide are not frequently diagnosed on a trauma CT scan performed during the mother's hospitalization.

In this case, the exact pathophysiology of fetal brain injury is not clearly understood. The question remains whether the blunt injury was the result of the motor vehicle crash or the fall from height. The car was extensively damaged, and the driver airbag deployed; moreover, we do not know if the mother was wearing a seatbelt properly. The trauma due to a rapidly deploying airbag may be not harmful for the mother, but it can distribute sufficient force to injure the fetus. The airbag hits backward into the mother's abdomen, potentially causing coup–contrecoup injury regardless of fetal presentation [13]. The Police investigation excluded the victim being thrown out of the car following impact. On the other hand, the victim probably rolled down the cliff under the flyover during the fall. That caused the typical compression fractures of lumbar vertebrae and of metatarsus together with the thoracic injury, affecting the abdomen and the fetus.

Fetal skull fractures were not found in the present case. Nevertheless, the rolling of the body and maternal pelvis during the fall may be responsible for intracranial lesions and skull compression.

The hypothesis of fetal head “molding” was ruled out, in the absence of risk factors including primigravida, large for gestational age babies, cephalopelvic disproportion, oligohydramnios, multiple births, prolonged courses of labor, and vaginal delivery [19].

The mother arrived to the Emergency Department one hour after trauma, and the fetal heart tones were normal. When fetal distress was identified, she was transferred to the operating room but, just prior to the cesarean section, no fetal heart tones were detected. Therefore, the fetal survival time was approximately 5–6 h after the trauma. This data is consistent with histopathological findings of the neutrophilic emigration associated with brain hemorrhages, representing one of the earliest reactions after wounding [20].

In conclusion, this report stresses the effect of trauma on the pregnant woman and how it can be devastating for the unborn fetus. This is especially true in cases of attempted suicide when the mother's condition and the potential effect on the fetus must be managed with considerable caution, because relatively minor trauma can have significant adverse effects.

#### Funding

This work did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

#### Conflict of interest

None.

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