



# Death due to Ectopic Pregnancy: How Accurate can be Estimations for Gestational Age?

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## Editorial

A 25-year-old female, who was experiencing ovulation disorders, complained about abdominal pain and nausea. After a few hours and a vomiting episode, she collapsed. She was pronounced dead at the hospital and a forensic autopsy was ordered.

The autopsy revealed massive hemoperitoneum and rupture of the left fallopian tube, with the presence of a 1 cm in diameter villus-form tissue and a 4 cm in diameter leiomyoma at the coaxial uterus horn. Histopathological examination showed marked degenerative lesions of the chorionic villi and no other fetal elements were detected.

No other macroscopic lesions were observed at the rest of the organs and cause of death was determined as massive hemoperitoneum due to rupture of ectopic pregnancy.

Accusations for medical negligence were made, based on gestational age estimation and the absence of nucleated red blood cells in the fetal vessels of the chorionic villi.

Ectopic pregnancy is defined as the implantation of the blastocyst elsewhere than the endometrium and is considered as an early pregnancy complication. The majority of ectopic pregnancies (nearly 95%) are implanted in the fallopian tube, most commonly as ampullary implantation (70%). Implantation in the isthmus accounts for approximately 12% of tubal pregnancies, while interstitial implantation is considered extremely rare (2% to 3%) [1].

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Mortality rate due to ectopic pregnancy seems to have been decreased during the past decades, probably due to early diagnosis and effective medical interventions [2]. On the contrary, incidence of ectopic pregnancies has been increased [1].

Death during pregnancy can be a really devastating and stressful event for the family of the deceased woman. Accusations for the doctors that may have been involved during diagnosis and/or treatment are not rare, due to the nature of the medicine, as a profession.

Tubal rupture due to ectopic pregnancy accounts for 6% to 9% of all pregnancy-related deaths, while mortality rate ranges around 2% [1-3]. During legal procedures, gestational age and fetal age estimations might be of great importance, in order to achieve the best scientifically acceptable conclusion.

Clinical observations have shown that tubal pregnancies may develop more heterogeneously and probably more slowly than the normal implanted in the endometrium pregnancies [4-6]. During the past years various methods have been proposed for gestational age estimation in ectopic pregnancies. The study of Klein et al. [6] showed that the average Ki-67 proliferation rate was significantly lower in trophoblastic tissue of tubal pregnancies. On the other hand, Grafton et al. [7] proposed that gestational age estimations may be made using the diameter of the resected fallopian tube. Sowmya et al. [8], in their study, made estimations of gestational age by the microscopic characteristics of tertiary chorionic villi.

Another well-known histological finding that can be of great assistance for the estimation of gestational age is the presence of nucleated red blood cells in the fetal vessels, that are evident within the villous capillary spaces from the 8<sup>th</sup> week after the last menstrual period and can be seen until the 20<sup>th</sup> week [9].

Nowadays, due to rampant development of biomedical engineering and the widespread use of sonography, there is a lack of research about estimation of gestational age, based on histological criteria. Besides, it is more common, if not the rule, that the estimations about gestational age are

made based on the last menstrual period of the woman and that more precise estimations are made later during pregnancy, upon sonographic criteria.

In our case, the last menstrual period of the deceased was not precisely known, and was thought to be at about three months prior death. Moreover, degeneration of the villi and absence of nucleated red blood cells, probably suggest a first-trimester spontaneous abortion with simultaneous destruction of the yolk sac. Therefore, gestational age estimation, solely based on the absence of nucleated red blood cells, is considered extremely risky.

Despite the general knowledge about embryo's gestation and growth, and the main principles of embryology and pathology about microscopic findings in the early stage of a fetus, it remains unknown whether these principles are applied for both intrauterine and extrauterine pregnancies.

More research is needed, in order to confirm or reject the hypothesis of different and heterogenous development of ectopic tubal pregnancies. Deaths due to ruptures of tubal pregnancies may have decreased, but unfortunately they will continue to happen. When such cases are presented at Courts, all doctors should be accurate and make assumptions based on scientific evidence.

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