



## Pathology Biology Section – 2010

### G13 A Death Due to Subinvolution of the Uteroplacental Arteries: A Case Report and Literature Review

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After attending this presentation, attendees will be educated on subinvolution of the uteroplacental arteries, the risk of delayed postpartum hemorrhage with subinvolution, associated morbidity with subinvolution, and pathophysiology of subinvolution.

This presentation will impact the forensic science community by providing education as to the morbidity and mortality of the postpartum patient with subinvolution of the uteroplacental arteries.

Postpartum hemorrhage remains one of the major causes of postpartum morbidity and mortality and is defined as blood loss > 500 mL in vaginal deliveries and > 1000 mL for cesarean births. Hemorrhage within the first twenty four hours after the birth is more common, and referred to as primary or early postpartum hemorrhage. Primary and secondary postpartum hemorrhage share many of the same causes and can include uterine atony, retained placenta, placental accrete or percreta, endometrial infection, inherited coagulation disorders, consumptive coagulopathy, and lacerations of the perineum. Secondary postpartum hemorrhage, however, has received less attention, most likely because it complicates only about one percent of all pregnancies and is more frequently associated with maternal morbidity rather than mortality. However, secondary postpartum bleeding may be fatal, as is the case in this individual, and because the increase uterine bleeding occurs between one to two weeks after delivery and the patient is often home and unaware that the hemorrhage is significant.

The etiology of secondary postpartum bleeding often remains unknown if the patient can be treated conservatively; however, if bleeding is severe, a hysterectomy may be performed or the individual may not survive and require an autopsy to determine the cause of the bleeding. In subinvolution of the placental site, the uterus is grossly enlarged and boggy. Multiple microscopic sections of the placental implantation site should be taken to determine the cause of the hemorrhage and to rule out other causes of secondary postpartum bleeding such as gestational trophoblastic disease, retained placenta, placenta accreta, and endometritis. Subinvolution of the placental site is an important cause of secondary postpartum bleeding and is defined by either a partial or complete lack of the normal involution of the superficial modified spiral arteries at the placental implantation site. Microscopically, the spiral arteries in the superficial myometrium are large and dilated and are partially occluded with thrombi. In addition, cytotrophoblasts are identified within and surrounding the vessels and can be highlighted using low molecular cyokeratin immunohistochemistry staining.

The physiologic and anatomic changes that occur in the uterine vessels during pregnancy and in the postpartum period are complex. In the beginning of pregnancy, the cytotrophoblasts derived from the placenta invade and surround the maternal spiral arteries, transforming them into large vessels that accommodate the increased blood flow needed by the placenta and fetus. The findings are most striking at the site where the placenta has inserted into the uterus. In the normal postpartum period, involution of the arteries occurs. Involution involves the modification of the arteries back to the non-gestational state and eventual removal of the arteries from the uterus. The changes in the arteries include fibrointimal thickening, endarteritis, thrombosis, replacement of the cytotrophoblasts within the vessels by maternal endothelial cells and regeneration of the internal elastic lamina. There is also a disappearance of the cytotrophoblasts from the myometrium interstitium. This process, in addition to the sloughing of the decidua in the superficial endometrium and the uterine smooth muscle contraction, is necessary to avoid abnormal postpartum bleeding.

The clinical symptoms are delayed postpartum bleeding usually within two weeks of delivery. There is an abrupt onset of increased uterine bleeding that may require a hysterectomy in some cases.

The exact pathophysiology of subinvolution is not known. Some suspect an immune component leading to abnormal interaction between the maternal and fetal tissues.

Subinvolution of the uterine arteries at the placental implantation site is the result of the modified spiral arteries refusing to convert to a non pregnant state. This can lead to significant postpartum bleeding, and if not suspected, may result in death as in our case. The pathophysiology behind subinvolution is unknown but speculated that an immune etiology with miscommunication between the maternal and fetal tissues. Although it is a common suspect in delayed postpartum bleeding and can cause significant morbidity, the mortality rate due to subinvolution is unknown.

**Postpartum Hemorrhage, Subinvolution, Uteroplacental Arteries**