Death induced by pulmonary thromboembolism after caesarean section:  
A case report

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Abstract: Deep vein thrombosis and pulmonary embolisms are two of the most common venous thromboembolic events which cause maternal death in Western European countries and the United States.

In this case study, a 21-year-old woman delivered a healthy 2,600 g male infant via emergency caesarean section due to an indication of fetal distress following the start of her labor with vertex presentation at the 40th gestational week. After being discharged 10 days after her initial hospitalization, she had to be readmitted seven days later and died suddenly. An autopsy was performed to determine the cause of death in the hospital.

The autopsy revealed the lumen of both the femoral and popliteal veins were filled with thrombosis while the lumen of the pulmonary arteries were filled with ante-mortem thrombosis. Additionally, histopathological findings consistent with pulmonary thromboembolism were detected.

The aim of this report is to emphasize venous thromboembolic events as they relate to cause of death in the postpartum period following caesarean sections.

Key Words: postpartum, deep vein thrombosis, venous thromboembolism, pulmonary embolus, autopsy

Deep vein thrombosis (DVT) and pulmonary embolisms (PE) are two of the most common venous thromboembolic events which cause maternal death in Western European countries and the United States [1,2].

Venous thromboembolism (VTE) is responsible for maternal deaths in 1.1 of every 100,000 births and accounts for 10% of all maternal deaths [2]. The incidence of PE is known to occur in 25 out of every 100,000 hospitalized patients [1].

Both acquired and genetic factors play important roles in the development of the thrombus. Activated protein C resistance, factor V Leiden gene mutation, and prothrombine gene mutation along with protein C, protein S, and antithrombin deficiencies are well known genetic factors (hereditary thrombophilia) that cause thromboembolism development. Examples of acquired risk factors include immobility, senescence, obesity, trauma, surgical procedures, malignancies, pregnancy, puerperium, the use of the oral contraceptive drugs, and long-term air travel [1, 3, 4].

The maternal mortality rate in Turkey is between 16.91-143.42 per 100,000 live births. The most common causes are postpartum bleeding, PE, eclampsia/preeclampsia, and infections [5-7]. Pulmonary embolisms are responsible for approximately 40% of the deaths that develop after gynecological operations. It is estimated that less than half of the cases with lethal PE are diagnosed in the United States [8].

Case report
A 21-year-old pregnant woman (at 40 weeks) was admitted to the hospital complaining of labor pains. From her history, it was learned that she had no disease other than bronchial asthma. When she arrived at the hospital, labor had already begun.
The position of the baby was in the normal vertex presentation. The baby had fetal distress symptoms; therefore, the woman underwent an emergency caesarean delivery and delivered a healthy 2,600 g boy.

Seven days after the caesarean section, her stitches were removed. She was hospitalized and followed up for a total of 10 days and was given antibiotic drugs during that time. After the 10 days, she was discharged from the hospital. However, seven days later, she became ill and was readmitted to the hospital where she died suddenly. Therefore, an autopsy was ordered to determine the reason for her death.

It was observed during the autopsy that she was 170 cm in height and weighed 90-100 kg. In her suprapubic region, there was a 15 cm operation scar due to the Pfannenstiel incision. There was stria gravidarum around her abdominal region, and milk could be discharged from her breasts after squeezing.

During the inspection of her internal organs, the total weight of the brain and the cerebellum was 1,310 g. There was no pathological finding after macroscopic examination of the brain and cerebellum. The right and left lungs weighed 662 and 519 g, respectively.

There was diffused petechial bleeding on the surface of the both lungs. Thrombus formation in the lumen of both pulmonary arteries was observed. The weight of the heart and the diameter of the valves were within the normal range. The thickness of the right and left ventricular wall were 0.3 cm and 2 cm, respectively. The uterus was 247 g in weight. There was a 9 cm operation scar on the inferior intestinal surface of the corpus uteri. The distance between the fundus and the cervix uteri was 11 cm, and the thickness of the wall of the uterus was 3 cm. The distance between the two ovaries was 23 cm. No pathological findings of significance were found in either the macroscopic or microscopic examinations of the other abdominal organs.

The lumens of the femoral and popliteal veins were almost occluded with ante-mortem thrombi that were adherent to the vessel walls. (Figure 1, 2)

A toxicological examination revealed that there were no sedatives or opiate drugs in the blood or urine of the patient. The parts of the internal organs and the contents of the stomach were free of any related toxicological substances. There was no alcohol in her blood samples.

A histopathological examination showed that there were thrombi in the lumens of the femoral and popliteal veins and thromboemboli in the lumen of the medium- to large-sized vessels of the lungs. Also, erythrocytes, fibrin, and degenerated blood elements were found clinging to the vessel walls.

Figure 1. In the lumen of the femoral vein there was a thrombus that was adherent to the vessel wall and was almost occluding the lumen.

Figure 2. The thrombi located in the lumens of the femoral and popliteal veins.
walls. Necrotic cell remnants, degenerated blood elements, and dilated vascular structures were detected in the uterine sections. There was congestion in the brain, cerebellum, brain stem, pons, heart, liver, kidney, adrenal glands, and stomach sections. In addition, autolysis findings were identified in the mucosa of the stomach.

When the medical information and autopsy findings were evaluated together, it was decided that she died because of respiratory and circulatory arrest that developed due to underlying pulmonary emboli induced by the thrombosis of the femoral and popliteal veins.

**Discussion**

Virchow determined the factors which predisposed thrombus formation as being endothelial injury, circulatory stasis, and hypercoagulability [1]. Venous thrombosis often develops in the deep veins of the legs and arms [9]. The source of thromboembolisms is usually the vessels that drain into the femoral veins in almost all patients with PE. In rare cases related to pregnancy or abortion, pelvic veins and renal veins, the inferior vena cava, the right half of the heart, and axillary veins can also be sources [8, 9].

It has been reported that the risk of VTE development starts during the first trimester of pregnancy. The puerperal period is the highest risk period, and the rate of VTE is 38% among women are 35 years old or older [4]. The risk of VTE development is three to four times higher in women who use oral contraceptive drugs compared with those who do not [4].

The frequency of the thrombosis and the risk of fetal PE development are 10 times higher after caesarian delivery compared with normal vaginal deliveries in the postpartum period. In 50% of cases, preoperative DVT occurred during the operation, in 25%, it occurred 72 hours after surgery, and in 5%, DVT occurred one week after the operation [10]. In our case, VTE was detected during the autopsy, and there was no information regarding the beginning of the clinical findings of VTE during the follow-up period.

The risk of arterial thromboembolism is three to four times higher and the risk of VTE is four to five times higher in pregnant women than in non-pregnant women. The risk increases 20 times after delivery. Approximately 20% of these events are arterial thromboembolisms and 80% are VTE [11].

In our case, during the autopsy we observed both in macroscopic and microscopic examinations that in the lumens of the femoral and the popliteal veins there were ante-mortem thrombi that were adherent to the vessel walls and were almost occluding the lumens. (Figures 1 and 2) Throughout the histopathological examination of the lung sections in our case, we detected erythrocyte, fibrin, and degenerated blood elements that were attached to the walls of some medium- and large-sized vessels which were compatible with pulmonary thromboembolisms.

Factor V leiden, prothrombin gene mutation, increased levels of the anticardiolipin antibody, protein C, protein S, and antithrombin deficiencies are the most important causes of thrombophilia. Routine screening for thrombophilia is not accepted because it is not cost effective [4]. In our case, there was no information about whether she had a genetic susceptibility to hypercoagulability or not.

Venous thromboembolisms were found in 25% of all autopsy cases in a research performed in Malmo, Sweden, where the incidence of autopsies was reported as 79%. In this study, VTE was detected in 31% of patients hospitalized for acute hospital care, and in 37% of patients admitted for chronic care. Moreover, VTE was found in 5% of suspicious deaths outside of hospital [12].

Today, both DVT and PE, which is accepted as a complication, are considered to be preventable. In addition, although there is enough knowledge and experience regarding the diagnosis and treatment of DVT and PE, [10, 13, 14] there are some difficulties with the evaluation of patients for VTE and its appropriate treatment. As a result, undetermined numbers of deaths occur each year because of thromboembolic events. Both early diagnosis and treatment of VTE are crucial in order to prevent maternal deaths during the puerperal period.

A survey by the American Medical Association showed that 5% of the doctors who responded to the survey questions had been faced with a malpractice claim in the previous year [15]. In fact, 7.4% of all doctors have been sued for malpractice in the US, and it has been reported that 22% of them paid high amounts of compensation, with obstetrics and gynecology physicians being responsible for the majority [15]. For physicians who work until they are 65 years old, it is estimated that the risk of being sued for malpractice is 75% for those working in low risk fields and 99% for those practicing in fields considered to be high risk [15].

Emergency medical services are one major factor that causes malpractice lawsuits along with late diagnosis and treatment of complications [16].
References