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Original Article

A critical analysis of prophylaxis to avoid venous thromboembolism after cesarean delivery

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Abstract

Aim: The aim of the present study was to analyze the risk factors for VTE in patients who underwent cesarean section. Pregnancy is a thrombogenic condition, and pregnant women have a five-to-six fold higher risk of VTE than non-pregnant women. The incidence of VTE is two-to-four times higher in cesarean deliveries than in vaginal deliveries.

Material and Methods: 450 pregnant women who delivered by cesarean section were analyzed. The Turkey Ministry of Health Risk Pregnancy Management Guidelines was used to determine the VTE risk and its factors. After analyses of the data, the number and proportion of high-risk patients, that of medium-risk patients, and that of patients were determined.

Results: After analyzing the risk factors we found that 59 (13.1%) pregnant women had a high risk, 351 (78%) had a moderate risk, and 40 (8.9%) had a low risk for VTE. In risk factor analyses, 9 women (2%) in the high-risk group had a history of VTE, 9 (2%) had a high risk of thrombophilia, 9(2%) had a low risk of thrombophilia and a family history of VTE, and 32(7.1%) needed low molecular–weight heparin during the antenatal period. When moderate-risk patients were classified for VTE, we found that 151 (33.6%) had two or more minor risk factors, 117 (26%) required cesarean section during labor, 42 (9.3%) had a hospital stay >3 days or were readmitted after delivery, 32 (7.1%) had a systemic disease, and 9 (2%) had a BMI>40 kg/m2.

Conclusion: The results of the study suggest that the majority of pregnant women should be given VTE prophylaxis after cesarean delivery.

Keywords: Venous thromboembolism; VTE; pregnancy; cesarean delivery.

INTRODUCTION

Venous thromboembolism (VTE) is the leading cause of maternal morbidity and mortality in developed countries (1,2), with pregnant women having a five- to six-fold higher risk of developing VTE than non-pregnant women of the same age (3). VTE contributes to complications in approximately 1 in 1,000 births and accounts for thrombosis during the postpartum period in that same number of women. In addition, cesarean deliveries post a two- to four-times greater risk of VTE than vaginal deliveries (4-6).

Pregnancy is a thrombogenic condition, however, sometimes hypercoagulation may be necessary to protect the mother from excessive bleeding during and after birth. In pregnancy, factors VII, VIII, X, the von Willebrand factor, and fibrinogen increase, and free protein S levels decrease, and there is a five-fold increase in plasminogen activator inhibitor type I levels. As a result, thrombogenic properties increase because of the balance between procoagulants and anticoagulants changes (7). Considering that all pregnant women have the same physiological mechanisms, there are risk factors that facilitate VTE in these women. Although the VTE rate is high during all stages of pregnancy compared to that in a non-pregnant population of the same age, the postpartum period is the riskiest.

To prevent postpartum VTE, specific risk factors have been determined by the Turkish Ministry of Health, and after scoring these risk factors, the patients at low, medium, and high risk for VTE have been identified (8). It is evident that administering post-cesarean thromboembolism prophylaxis decreases maternal mortality from thromboembolic diseases during postpartum (9). The aim of the present study was to analyze the VTE risk factors in patients who underwent a cesarean section.

MATERIAL and METHODS

This was a prospective cohort study that was approved by

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the Ethics Committee at Erciyes University, Kayseri, Turkey (Decision No: 2019/312). The study was conducted at Kayseri City Hospital in accordance with the Declaration of Helsinki.

The study prospectively analyzed 450 pregnant women who delivered by cesarean section at Kayseri City Hospital between March 2019 and July 2019. The patient's last menstrual period was used to determine her gestational week. The gestational age of those who did not know the date of their last menstrual period was calculated according to ultrasonographic measurements performed in the first trimester. Because of the risk factors of the patients were to be identified, the study did not have any exclusion criteria.

Demographic characteristics, such as maternal age, body mass index (BMI), gravida, parity and abortion numbers, previous delivery type, and additional diseases related to pregnancy were recorded. In addition, the risk factors for pregnant women were determined by analyzing the postpartum VTE risk parameters presented in Figure 1 (8). After analyzing the data, the number and proportion of high-risk, medium-risk, and low-risk patients were determined, and the frequency of the risk parameters was investigated.

Data were analyzed using Minitab®16 (Minitab Inc., State College, PA, USA). The analysis of patients according to VTE risk factors and VTE risk factor parameters were calculated as n%.

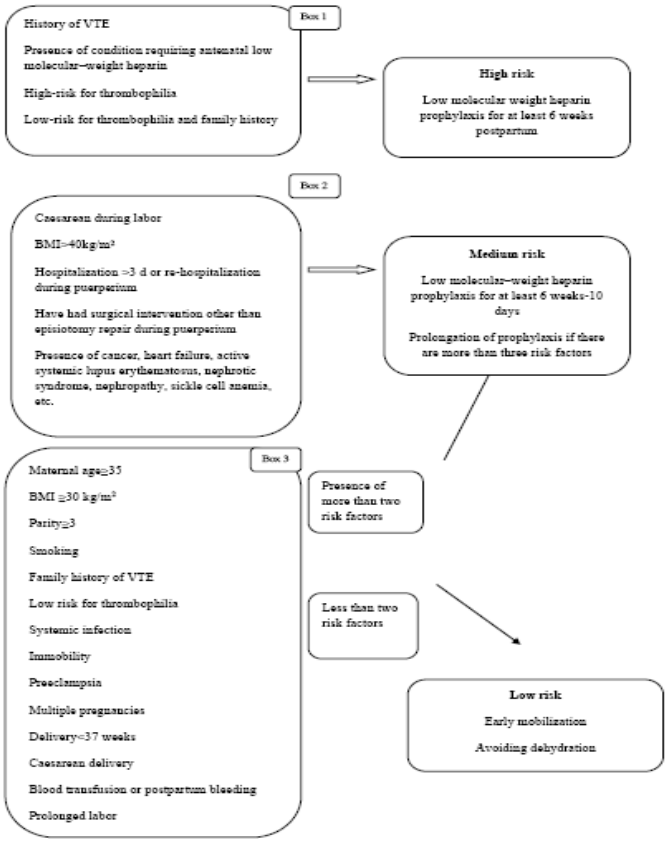

Figure 1. Assessment of venous thromboembolism (VTE) risk factors.

RESULTS

The mean maternal age was 29 ± 4.2 years, mean BMI was 27 ± 3.2kg/m2, nulliparity rate was 22%, and the mean gestational age at delivery was 38 ± 2.1 weeks. The indications of cesarean section included: previous cesarean section 95 (21%), cephalo-pelvic disproportion 64 (14%), fetal distress 76 (17%), prolonged labor 64 (14%), preeclampsia 8 (1.8%), multiple pregnancy 9 (2%), placenta previa 2 (%0.5), previous uterine surgery 9 (2%), mal-presentation 36 (8%), macrosomia 23 (5.1%), placental abruption 5 (1.1%), and others 59 (13%).

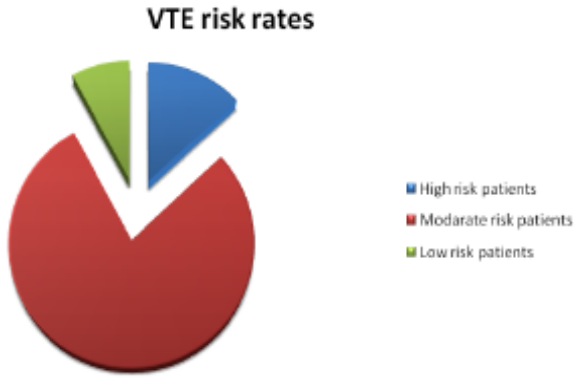

Figure 2. The ratio of patients according to the risk factors for venous thromboembolism (VTE).

After analyzing the risk factors, we found that 59 (13.1%) pregnant women were at high risk, 351 (78%) were at moderate risk, and 40 (8.9%) were at low risk for VTE. The rates are shown in Figure 2. When the parameters within the groups determining the risk factors were individually evaluated, we found that 9 pregnant women (2%) in the high-risk group had a history of VTE, 9 (2%) were at high risk for thrombophilia, 9 (2%) were at low risk for thrombophilia and a family history of VTE, and 32 (7.1%) needed low molecular weight heparin (LMWH) during the antenatal period.The rates were illustrated in Figure 3.

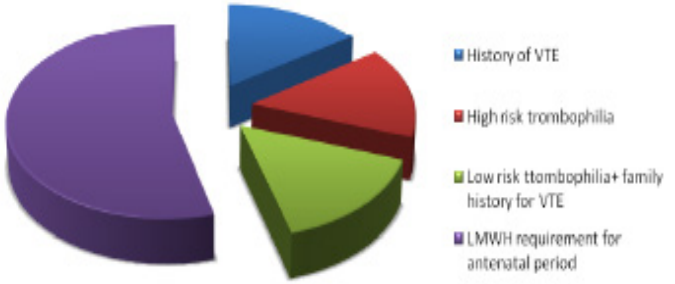

Figure 3. The ratio of patients at high risk for venous thromboembolism (VTE).

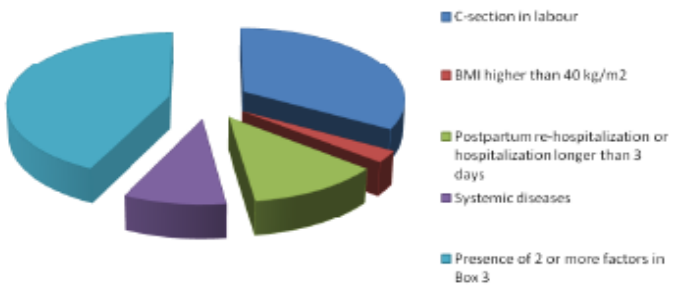

Figure 4. The ratio of patients with moderate risk for venous thromboembolism (VTE).

After classifying the patients having a moderate risk for VTE, we observed that 151 (33.6%) had two or more of the risk factors from box 3 in Figure 1. One hundred seventeen (26%) of the patients required a cesarean section, 42 (9.3%) were readmitted to the hospital during postpartum or had a hospital stay >3 d, 32 (7.1%) had systemic disease, and (2%) had a BMI> 40 kg/m2. The rates are provided in Figure 4.When these rates were assessed, we observed that having two or more of the minor risk factors identified in box 3 in Figure 1 was the most common risk at a rate of 33.6%. The frequency of identified risk factors is shown in Figure 5. We did not find any venous thromboembolism case in the study group during puerperal period.

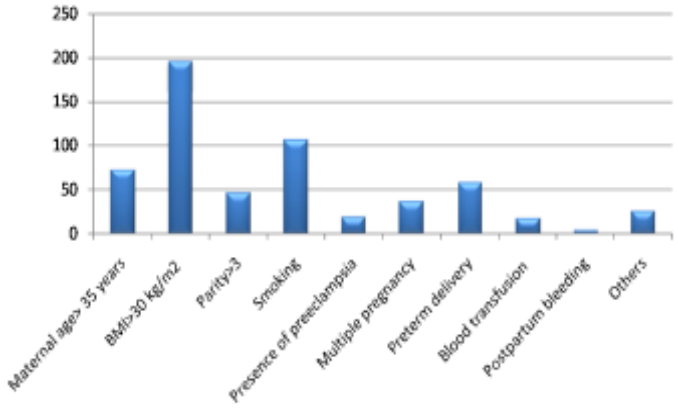

Figure 5. Analysis of the minor risk factors for venous thromboembolism (VTE).

DISCUSSION

The risk of VTE in a pregnant woman is four to five times higher than that in a non-pregnant woman. Although thromboembolic events are observed during the antenatal period, the risk increases considerably during the 4weeksafter birth. Excessive bleeding is the most common cause of maternal death in developing countries, while thromboembolic diseases are among the most common causes of maternal death in developed countries (10).

The optimal clinical strategy for post-cesarean pharmacologic prophylaxis remains unclear. Although the appropriate use of mechanical methods of prophylaxis administered after cesarean delivery has reduced death from VTE (11), these methods might not be fully utilized throughout the country (12), and evidence from obstetrics and other specialties suggest suboptimal device compliance (13-16). In addition, a 2011 Cochrane review found that the combined use of mechanical and pharmacologic prophylaxis in non-obstetric patients significantly reduced the incidence of VTE compared with the use of mechanical prophylaxis alone(17). VTE risk factors are on the rise (18), such as obesity, advanced maternal age, and major medical comorbidities (19).

Administering pharmacologic thromboprophylaxis after a caesarian birth could lower the risk of VTE in women who are in the high-risk category (17,20); however, the criteria for identifying patients that should receive prophylaxis with unfractionated (UFH) or LMWH differ substantially across major references, such as the American College of Obstetricians and Gynecologists (ACOG), Royal College of Obstetricians and Gynaecologists (RCOG), and American College of Chest Physicians (Chest). ACOG's recommendation is to administer pharmacologic prophylaxis for an only small group of postpartum women who are at high risk of thrombophilia, had a previous VTE event, and/or had a low risk of thrombophilia but had a family history these events (21). The recommendations from Chest are similar (2); however, there is no prophylaxis recommendation for women in the low-risk category who have delivered by cesarean section. Chest recommends treatment only for women with infection, pre-eclampsia, and obesity (2). RCOG is the most conservative and recommends LMWH for women >35 years old with a BMI>30 kg/m2, or for whom a cesarean section was necessary during labor (5). Together with those from ACOG and Chest, the criteria for receiving prophylaxis treatment has substantially expanded.

According to the results of our study, 59 (13.1%) patients with a high risk for VTE after cesarean section, 351 (78%) with a medium risk, and 40 (8.9%) with low risk were identified. The most important risk factor identified is a history of VTE. In these individuals, the risk of VTE recurrence increases by three to four times. The second most important factor is hereditary or acquired thrombophilia. Thrombophilia was present in 20–50% of patients with VTE during the postpartum period (10). In our study, when we assessed the high-risk factors, we found that 7.1% of the patients who needed LMWH during the antepartum period was the most common cause. The most important step in preventing VTE is the recognition of these high-risk patients during both the antenatal and postpartum periods and providing thromboembolism prophylaxis with LMWH for at least 6 weeks during the postpartum period.

Our study results showed that 91.1% of patients who had a cesarean section were at risk for VTE, 78% of which were at moderate risk. The most common risk factor within this

group was the need for cesarean section during labor. The most common factors that required a cesarean section were fetal distress, non-reassuring fetal heart rates, cephalopelvic disproportion, and failed induction. Although pregnancy is a low-risk factor for VTE, an emergency cesarean section puts the women into the moderate risk category (8). Because cesarean section during labor is common, these moderate-risk patients should be carefully monitored for VTE during the postpartum period. There was no venous thromboembolism case in this study population during their puerperal period.

Although the presence of only one minor factor does not pose a risk for VTE, adding a delivery by cesarean section changes that risk to moderate. In addition to cesarean section, the presence of at least two minor factors will increase the risk of VTE, and LMWH prophylaxis should be planned for ≥10 d after delivery (8). As shown in Figure 4, 33.6% (151/450) of VTE risk is caused by a combination of minor factors. In addition to the increasing rates of cesarean section, the risks of VTE during both antepartum and postpartum periods are increasing, especially with increasing maternal age, increasing obesity, and smoking; therefore, VTE prophylaxis is becoming increasingly important.

Although the recommendations from ACOG for receiving prophylaxis consider only a small number of women, the RCOG recommendations substantially broaden the criteria for receiving LMWH to 80–90%. The Chest guidelines fall within an intermediate range of criteria conditions. Population-based U.S. data suggest that health providers primarily follow the ACOG recommendations; therefore, postpartum pharmacologic prophylaxis is rare in the U.S (12,18). According to the Turkey Ministry of Health Risk Pregnancy Management Guidelines in which the criteria are comparable to the results of our study, 91.1% of pregnant women who have had cesarean section required LMWH prophylaxis, which is compatible with the RCOG criteria.

The strength of the present study is that it contributes to the literature on a very important issue for maternal health. However, there are some limitations of this study. Number of patients of the study is small. This population could not be followed up for a long time in terms of venous thromboembolism.

CONCLUSION

Our findings suggest that the majority of pregnant women who have had a cesarean delivery are candidates for VTE prophylaxis. Because of the increase in VTE within this population, additional research is needed to determine whether broadening VTE prophylaxis would reduce severe maternal morbidity and death.

Competing interests: The authors declare that they have no competing interest.
Financial Disclosure: There are no financial supports.
Ethical approval: This was a prospective cohort study that was approved by the Ethics Committee at Erciyes University, Kayseri, Turkey (Decision No: 2019/312).

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