

Thromboembolism Prophylaxis after Cesarean Section

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Background: Cesarean section (CS) increases the risk of venous thromboembolism (VTE). Therefore, thromboprophylaxis is recommended for women undergoing CS.

Objective: To evaluate the thromboembolic risk for patients delivered by CS and to evaluate the current thromboprophylaxis following CS.

Design: A Retrospective, Cross-Sectional Study.

Setting: Salmaniya Medical Complex, Bahrain.

Method: Five hundred fifty-eight CS were performed from 1 May 2011 to 31 October 2011. The following risk factors for VTE were documented: age, weight, parity, the number of fetuses and whether elective or emergency CS, extended surgery, postpartum hemorrhage, the presence of preeclampsia and sickle cell disease. Thromboprophylaxis used, dose and duration were also recorded. All data were analyzed using SPSS statistical package versions 23. Descriptive statistics were used to report the data.

Result: Five hundred fifty-eight CS were performed from 1 May 2011 to 31 October 2011. Three hundred seventeen (56.8%) participants were Bahraini. The mean maternal age was 32 years, and the mean parity was 2.2. Emergency CS was performed in 345 (61.8%) participants and 213 (38.2%) women had elective CS. Five hundred ten (91.4%) women have had at least one risk factor for thrombosis. One hundred eighty-four (33%) were 35 years and older, 164 (29.3%) were multiparous, and 46 (8.2%) had multiple gestations. One hundred thirty-nine (24.9%) were obese. Other risk factors were extended surgery, 8 (1.4%), CS hysterectomy, 2 (0.4%), postpartum hemorrhage, 19 (3.4%), sickle cell disease, 9 (1.6%) and preeclampsia, 21 (3.8%). An anticoagulant was prescribed for 139 (24.9%) participants. Low molecular weight heparin (LMWH) was the most commonly prescribed anticoagulant 125 (22.4%), followed by unfractionated Heparin UFH 7 (1.3%). Thromboprophylaxis was administered for three days in 89 (15.9%) and 63 (41.4%) received it for five days.

Conclusion: Approximately two-thirds of the patients received inadequate thromboprophylaxis. There is an urgent need for proper administration of thromboprophylaxis following CS to reduce maternal morbidity and mortality.

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The incidence of VTE in pregnancy is ten times higher than the age-matched, non-pregnant population¹⁻³. VTE could occur at any stage of pregnancy, but the risk is higher at the puerperium⁴. VTE continues to be a leading cause of maternal mortality⁵⁻⁷. Pulmonary embolism (PE) is the leading cause of maternal death in the United Kingdom, accounting for approximately 1.8 per 100,000 deliveries and 11% of maternal deaths in the United States⁸⁻⁹. PE is the second leading cause of maternal death in Saudi Arabia, accounting for 25% of all maternal deaths¹⁰. In Bahrain, PE is accounting for 35% of all maternal deaths in sickle cell disease (SCD) patients, as well as 21% of non-SCD^{11,12}.

CS is a recognized risk factor for VTE¹³. Hence, thromboprophylaxis is recommended for women undergoing CS following risk assessment¹³⁻¹⁵. The patients were divided into three groups according to their risks: lower risk, intermediate risk and high risk. Lower risks require only early ambulation

and hydration; these include women undergoing elective CS with no risk factors. Intermediate risk constitutes women delivered by elective CS with at least one risk factor of the following: age ³ 35 years, body mass index (BMI) of ³ 30 kg/cm². para 3 or more, multiple pregnancy or assisted reproductive technology (IVF), presence of varicose vein, current infection, pre-eclampsia or immobilization prior to CS for at least 4 days. In addition, emergency CS, major current illness complicating pregnancy such as sickle cell disease (SCD), heart or lung disease, inflammatory bowel disease, nephrotic syndrome and cancer are classified as a moderate or intermediate risk group. It is recommended that these patients are prescribed low molecular weight heparin (LMWH) for at least ten days postnatally. High-risk patients include patients with personal or family history of VTE or acquired thrombophilia or those who are on antenatal Heparin. They are recommended for anticoagulant for six weeks postnatally^{5,15,16}.

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There is a wide variation in the adoption of these recommendations. In our institution, anticoagulants are prescribed following CS according to clinical risk assessment. Because nearly all patients are discharged on the third postoperative day, thromboprophylaxis is usually prescribed for three days only.

The aim of this study is to evaluate the thromboembolic risk for patients delivered by CS and the current thromboprophylaxis following CS.

METHOD

A retrospective, cross-sectional analysis of all CS performed between 1 May 2011 and 31 October 2011 was performed. The following risk factors for VTE were documented: age, weight, parity, the number of fetuses and whether elective or emergency CS, extended surgery, postpartum hemorrhage, blood transfusion, preeclampsia and sickle cell disease and current or history of VTE.

Thromboprophylaxis dose and duration were also recorded. Side effects of thromboprophylaxis were beyond the scope of this study.

All data were analyzed using SPSS versions 23. Descriptive statistics were used to report the data as frequencies, mean, standard deviation (SD) and percentage.

All patients undergoing CS were provided with thromboembolic disorders (TED) stockings preoperatively as well as intermittent pneumatic compression intraoperatively. Early mobilization and hydration are considered standard of care for almost all mothers delivered by CS.

RESULT

During the study period, approximately 755 CS were performed. Incomplete data forms were excluded; therefore, 558 CS patients were included in this study.

Three hundred seventeen (56.8%) patients were Bahrainis. The mean maternal age was 32 years \pm 5.8 years ranging from 16 to 49 years, while the mean parity was 2.2 \pm 1.3 ranging from one to para 9. The mean gestational age was 37.1 weeks \pm 2.7 weeks ranging from 24 to 42 weeks and the mean number of fetuses was 1.09 \pm 0.35 ranging from singleton to quadruplets.

Emergency CS was performed for 345 (61.8%) women and 213 (38.2%) women had elective CS. It was found that 510 (91.4%) women had at least one risk factor for thrombosis. This included all emergency CS and 165 (29.6%) of the elective CS. Risk profile characteristics are shown in tables 1 A and 1 B.

Table 1 (A): Personal Characteristics

Characteristics	Mean	\pm SD	Min	Max
Maternal Age (years)	32	5.8	16	49
Gestational Age (weeks)	37.1	2.7	24	42
Parity	2.2	1.3	1	9
Number of Gestation	1.09	0.35	1	4

Table 1 (B): Risk Profile Characteristics

	Number (558)	Percentage
Risks for VTE		
Age \geq 35 years	184	33%
Obesity (> 90 kg)	139	24.9%
Class III Obesity (>130 kg)	14	2.5%
Parity \geq 3	163	29.3%
Multiple Gestation	46	8.2%
Emergency CS	345	61.8%
CS Hysterectomy	2	0.4%
Extended Surgery	6	1.1%
Sickle Cell Disease	9	1.6%
Pre-eclampsia (PET)	21	3.4%
Postpartum Hemorrhage	29	3.8%
Risk Factors for VTE		
1 Risk	199	35.7%
2 Risks	166	29.7%
3 Risk & >	143	25.6%
Cesarean Section with Associated Risks for VTE		
Elective CS with no added risk	48	8.6%
Elective CS with at least one risk	165	29.6%
Emergency CS with no risk factor	128	22.9%
Emergency with at least one risk factor	217	38.9%
CS with risk factors for VTE	510	91.4%

One hundred ninety-nine (35.7%) women had at least one additional risk factor compared to 166 (29.7%) who had two or more risk factors. One hundred eighty-four (33%) women were 35 years and older, 163 (29.2%) were multiparous (para 3 and above); while 46 (8.2%) had multiple gestations. Obesity was defined as the maternal weight of more than 90 kg. One hundred fifty-three (27.4%) patients were obese. Fourteen (2.5%) patients had class three obesity (maternal weight of more than 130 kg). Other risk factors were extended surgery found in eight (1.4%), two (0.4%) patients had CS hysterectomy, while 19 (3.4%) women had postpartum hemorrhage (PPH) defined as blood loss of more than 1 liter. Sickle cell disease was found in 9 (1.6%) and preeclampsia was reported in 21 (3.8%).

An anticoagulant was prescribed for 139 (24.9%) women. Only one hundred fifty-two (27.3%) women had CS who were eligible for thromboprophylaxis did receive it. LMWH was the most commonly prescribed anticoagulant, 502 (89.9%), followed by unfractionated Heparin UFH, 28 (5%). These agents were administered for three days in 81 (14.5%) women and 58 (10.4%) received anticoagulant for a total of 5 days. Four hundred twenty-one (75.4%) received the recommended adjusted dose according to weight. Thirteen (2.3%) patients had contraindications for thromboprophylaxis including thrombocytopenia, active or a potential risk of bleeding due to placenta praevia, placenta abruption or uncontrolled hypertension, see table 2.

Table 2: The Use of Anticoagulant

	Number (139)	Percentage
Anticoagulant		
LMWH*	125	89.9%
UFH**	7	5%
Others	7	5%
Total	139	100%
Duration		
≤ 3 days	81	58.3%
> 3-5 days	58	41.7%
Total	139	100%
Adjusted Dose According to Woman's Weight		
Yes	105	75.5%
No	21	15.1%
Not defined	13	9.4%
Total	139	100%
Contraindication to Anticoagulant		
Yes	13	9.4%
No	126	90.6%
Total	139	100%

* LMWH: Low molecular weight heparin

** UFH: Unfractionated heparin

DISCUSSION

Thromboembolic disorders are a leading cause of maternal morbidity and mortality^{5-8,17}. CS is a recognized risk factor for VTE¹³. The Royal College of Obstetricians and Gynecologists (RCOG) has recommended thromboprophylaxis (LMWH) for 10 days after delivery for all women who have had an emergency CS, as well as all women who had an elective CS with one or more additional risk factors, such as age ≥ 35 years, multiparity (para 3 and more), multiple gestation and BMI ≥ 30 kg/m²^{13,14}. The use of postoperative thromboprophylaxis could be associated with potential bleeding^{13,18}. Therefore, these endorsements were not widely practiced.

This study has revealed the following risk factors: maternal age of ≥ 35 years and multiparity. BMI is not routinely recorded in the antenatal data; therefore, maternal weight has been used as an alternative. The maternal weight of > 90 kg was found in 24.9% and class-three obesity (>130 kg) was found in 2.5^{15,19,20}%. The increased prevalence of obesity in our population is a reflection of a growing problem in the region; other studies revealed that the prevalence of obesity in antenatal patients in the Gulf countries was 76%²¹.

Sickle cell disease was found in 1.6% and pre-eclampsia in 3.8%. Other risk factors found were postpartum hemorrhage, 3.4%, extended surgery, 1.4% and cesarean hysterectomy, 0.4%.

Emergency CS was performed in 61.8% and 38.2% had elective CS. However, only 29.6% of women who had elective CS had risk factors for VTE. Therefore, patients who had a risk

factor for VTE was 91.4%. Nevertheless, anticoagulant was prescribed for only 27.3%. Two-thirds of women undergoing CS and eligible for thromboprophylaxis did not receive it, which is a cause of concern. In a CS audit report performed in the UK, prophylaxis was not used in 11% of emergency CS and 13% after elective CS²². Furthermore, a third of the women delivered at a tertiary hospital in Singapore did not receive the full thromboprophylaxis²³.

The UK confidential enquiries into maternal death and morbidity report, published in December 2015, reported that more than 80% of women who died due to thrombosis had at least one risk factor for VTE; two-thirds of women had two or more. However, these risks were not recognized²⁴.

It is proposed that the risk of VTE is highest during the first week postpartum. Thus, the minimum recommended period of thromboprophylaxis is seven days, extended to 10 days in the updated 2015 RCOG guidelines¹⁵. The majority of women, 325 (58.2%), in our study received thromboprophylaxis for three days only and was consistent with the period of hospitalization. In contrast, 233 (41.8%) women were prescribed anticoagulant for five days; both reflect inadequate thromboprophylaxis.

CONCLUSION

The study highlights a deficiency in the utilization of thromboprophylaxis either due to omission or inadequate coverage. There is an urgent need for proper administration of thromboprophylaxis following CS to reduce maternal morbidity and mortality.

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