

## **Thromboembolism Prophylaxis after Cesarean Section**

Naeema A. Mahmood, MD, MBBS\* Khalid M. Sharif, MRCP, MD\*\*

**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.

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

**Table 1 (B): Risk Profile Characteristics**

	Number (558)	Percentage
<b>Risks for VTE</b>		
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%
<b>Risk Factors for VTE</b>		
1 Risk	199	35.7%
2 Risks	166	29.7%
3 Risk & $>$	143	25.6%
<b>Cesarean Section with Associated Risks for VTE</b>		
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.

**Table 2: The Use of Anticoagulant**

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

\* LMWH: Low molecular weight heparin

\*\* UFH: Unfractionated heparin

## DISCUSSION

Thromboembolic disorders are a leading cause of maternal morbidity and mortality<sup>5-8,17</sup>. CS is a recognized risk factor for VTE<sup>13</sup>. 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

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 CS<sup>22</sup>. Furthermore, a third of the women delivered at a tertiary hospital in Singapore did not receive the full thromboprophylaxis<sup>23</sup>.

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 recognized<sup>24</sup>.

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 guidelines<sup>15</sup>. 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.**

**Author Contribution:** All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript

3. Chunilal S D, Bates S M. Venous Thromboembolism in Pregnancy: Diagnosis, Management and Prevention. *Thromb Haemost* 2009;101(3):428–38.
4. Sharam S, Monga D. Venous Thromboembolism during Pregnancy and the Postpartum Period: Incidence and Risk Factors in a Large Victorian Health Service. *Aust N Z J Obstet Gynaecol* 2008;48(1): 44–9.
5. Lewis G. Confidential Enquiry into Maternal and Child Health. Saving Mothers' Lives: Reviewing Maternal Deaths to Make Motherhood Safer, 2003–2005. The Seventh Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. London: CEMACH; 2007. <http://www.publichealth.hscni.net/sites/default/files/Saving%20Mothers%27%20Lives%202003-05%20.pdf>.
6. Lewis G, Drife JO. Why Mothers Die 1997–1999: The Fifth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. Sussex Place, London: RCOG Press 2001.
7. Crowhurst JA, Plaat F. Why Mothers Die - Report On Confidential Enquiries Into Maternal Deaths in The United Kingdom 1994–96. *Anaesthesia* 1999;54(3):207-9.
8. Centre for Maternal and Child Enquiries. (CMACE). Saving Mothers' Lives: Reviewing Maternal Deaths to Make Motherhood Safer: 2006–08. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG* 2011;118(Suppl 1):1–203. <http://www.centreformidwiferyeducation.ie/wp-content/uploads/2011/03/CMACE-2011-Saving-Mothers-Lives-Reviewing-maternal-deaths-to-make-motherhood-safer-2006-2008.pdf>.
9. Seeho S K M, Nippita T A, Roberts C L et al. Venous Thromboembolism Prophylaxis During and Following Caesarean Section: A Survey of Clinical Practice. *Aust N Z J Obstet Gynaecol* 2016;56(1):54–9.
10. Al- Gahtani F H. Pregnancy-Associated Venous Thromboembolism. Part 1 Deep Vein Thrombus Diagnosis and treatment. *Saudi Med J* 2009; 30(1):13–23.
15. Royal College of Obstetricians and Gynaecologist. Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium. Green-top Guideline No. 37a. London: RCOG 2015. <https://www.rcog.org.uk/globalassets/documents/guidelines/gtg-37a.pdf>
16. Duhl A J, Paidas M J, Ural S H, et al. Antithrombotic Therapy and Pregnancy: Consensus Report and Recommendations for Prevention and Treatment of Venous Thromboembolism and Adverse Pregnancy Outcomes. *Am J Obstet Gynecol* 2007; 197(5):457.e1-21.
17. Goto M, Yoshizato T, Tatsumura M et al. Safety and efficacy of thromboprophylaxis using enoxaparin sodium after cesarean section: A multicenter study in Japan. *Taiwanese Journal of Obstetrics & Gynecology* 2015; 54 (3): 248-52.
18. Knight M, Kenyon S, Brocklehurst P et al. on behalf of EMBRACE - UK: Saving Lives, Improving Mothers' Care. Lessons Learned to Inform Future Maternity Care From the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009- 2012. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2014. <https://www.npeu.ox.ac.uk/downloads/files/mbrace-uk/reports/Saving%20Lives%20Improving%20Mothers%20Care%20report%202014%20Full.pdf>.
19. Modder JF, Fitzsimons KJ. CMACE/RCOG joint guideline: Management of women with obesity in pregnancy. Centre for Maternal and Child Enquiries and the Royal College of Obstetricians and Gynaecologists; 2010. <https://www.rcog.org.uk/globalassets/documents/guidelines/cmaccercogjointguidelinemanagementwomenobesitypregnancya.pdf>.
20. Center for Disease Control. Definition of Adult Overweight and Obesity. <https://www.cdc.gov/obesity/adult/defining.html> Accessed 9 January 2016.
21. Al Sayegh F, Al Jassir W, Wani S et al. Venous Thromboembolic Risk and Adequacy of Prophylaxis of High Risk Pregnancy in the Arabian Gulf. *Curr Vasc Pharmacol* 2016; 14(4):368-73.