



CAESAREAN SECTION

THROMBOPROPHYLAXIS AFTER CAESAREAN BIRTH

Keywords: thrombotic event, caesarean, thromboprophylaxis, prophylaxis after caesarean, DVT, anti-embolic stockings, TEDS, graduated compression stockings, VTE, venous thromboembolism, LMWH, heparin, bridging dose, clexane, enoxaparin, anticoagulant, emergency caesarean, epidural removal

Quick Reference Guide

CONSIDER RISK FACTORS FOR VTE:

- Age >35
- Obesity (BMI >30 pre-pregnancy)
- Prolonged labour (>24 hours)
- Varicose veins
- Caesarean
- Infection (systemic/ severe)
- Oral contraceptives
- Prolonged hospital admission
- Pre-eclampsia
- Smoker
- Recent surgical procedures in puerperium (especially abdominal & pelvic)
- Prolonged or severe immobility (e.g. Paraplegia/ lower limb paralysis, prolonged bed rest, plaster cast/ brace, prolonged travel)
- Multiparity (>3); multiple pregnancy; puerperium
- Postpartum haemorrhage (>1000mL)
- Inherited or acquired thrombophilia (asymptomatic)
- Medical illness (e.g. Maternal heart, nephritic, inflammatory bowel, sickle cell, respiratory disease, malignancy)

NON-PHARMACOLOGICAL THROMBOPROPHYLAXIS:

ALL women after caesarean:

- **Early mobilisation**
- **Adequate hydration**
- Graduated compression stockings (GCS), *unless contraindicated*, until fully mobile
- **Educate** on VTE prevention, signs & symptoms, & action to take if symptoms develop.
- **Consider** intermittent pneumatic compression device intra/postoperatively if cannot wear GCS &/or receive pharmacological thromboprophylaxis.

PHARMACOLOGICAL THROMBOPROPHYLAXIS:

Lower risk:

- **Elective caesarean with no other risk factors:**
 - **No** thromboprophylaxis with LMWH (low molecular weight heparin; enoxaparin).³

Intermediate risk (assess bleeding risk & contraindications prior - see full guideline):

- **Elective caesarean with one or more risk factors (in addition to puerperium) OR**
- **Emergency/ non-elective caesarean section (CS) in labour:**
 - Consider 5-7 days postnatal prophylactic LMWH³ (enoxaparin 40mg at 2000hrs*).
 - *Bridging doses for births outside daylight hours: If CS between 1600-2400hrs replace day 1 LMWH dose with 5000IU unfractionated heparin (UFH) at 4 & 12hrs after CS; For births 2400-0800hrs give bridging dose 5000IU UFH 4hrs after CS.
 - Consider extending postnatal LMWH if persisting or >3 risk factors.³

High risk (Previous VTE or requiring antenatal LMWH):

- At least 6 weeks postnatal prophylactic LMWH (enoxaparin).³
- See also relevant KEMH Clinical Guidelines within Section B: 2.12: Venous thrombosis and embolism in pregnancy and the puerperium.

Note: This QRG represents minimum care & should be read in conjunction with the full guideline. Additional care should be individualised.

AIM

- To ensure the appropriate prophylaxis for all women undergoing a caesarean birth in order to reduce the risk of venous thromboembolism (VTE).

BACKGROUND

Caesarean birth increases the risk of VTE¹⁻⁴ in addition to the already hypercoagulable state of pregnancy.⁵ VTE during pregnancy and the immediate postnatal period is rare although when it occurs it is associated with high degrees of morbidity and mortality.¹ VTE is a major cause of maternal mortality in Australia and the USA,⁶ and is the most common direct cause of maternal death in the UK.^{1,7} Furthermore, for those who survive VTE there is increased risk of future cardiovascular complications, making VTE risk and prophylaxis assessment a necessity for all hospitalised patients.⁸ Some women have additional risk factors, placing them at higher risk of developing VTE.

KEY POINTS

- Pregnancy has up to a tenfold increased risk of VTE compared to non-pregnant women,¹ with an emergency caesarean having a further twofold increased risk of VTE than elective caesarean, and a fourfold increase than vaginal birth.³ Although a number of risk factors have been identified, the size of the increases in risk attributable to these factors is generally poorly quantified.
- In women with risk factors a combination of pharmacological and non-pharmacological methods are recommended.⁹⁻¹¹ There is limited literature on the effect of mechanical methods for postpartum thromboprophylaxis, however benefit has been shown in other clinical areas.^{1,9}
- When used after caesarean delivery, low molecular weight heparin (Enoxaparin) may increase the frequency of bleeding and wound haematoma, although it is associated with less abnormal bleeding than unfractionated heparin.¹ Pharmacological prophylaxis is potentially contraindicated in women with primary postpartum haemorrhage > 1000mL,¹ although these women are actually at increased risk of VTE.³ The decision to utilise pharmacological thromboprophylaxis in these women should be at the discretion of the obstetrician and anaesthetist.
- Discuss with the woman to ensure her support and adherence to the selected VTE prophylaxis.¹² Educate all women on VTE (deep vein thrombosis & pulmonary embolism) prevention, signs and symptoms and the action to take if symptoms develop.¹³⁻¹⁵

RISK FACTORS FOR VTE IN THE PERIPARTUM PERIOD

- Age (> 35 years)^{3, 13, 15}
- Caesarean birth^{3, 4}, especially emergency caesarean¹
- Inherited or acquired thrombophilias^{1-4, 15}
- Malignancy- Active or occult^{1, 16}
- Medical illness- acute (e.g. severe infection^{1, 3, 4, 16}, maternal heart^{1, 16}, nephritic³, inflammatory bowel^{1, 16}, or respiratory disease)¹
- Multiple pregnancy³ or multiparity >3³
- Obesity^{1-4, 13, 16} (BMI > 30³ pre/early pregnancy¹⁵)
- Postpartum haemorrhage¹⁵ (>1000ml)³
- Pre-eclampsia^{3, 4, 13, 15}
- Previous VTE^{1, 3, 4, 16} or family history^{13, 15}
- Prolonged or severe immobility^{1, 3, 4, 16} (e.g. paraplegia / lower limb paralysis, prolonged bed rest¹³, immobilisation in a plaster cast or brace or prolonged travel³ resulting in limited movement and subsequent venous stasis).
- Prolonged labour (24hrs)³
- Recent surgical procedures,^{1, 16} especially abdominal & pelvic surgery¹
- Sickle cell disease³
- Smoker^{3, 4}
- Varicose veins^{1, 3, 15, 16}



THROMBOPROPHYLAXIS

NON-PHARMACOLOGICAL THROMBOPROPHYLAXIS

- All women require early ambulation and adequate hydration.^{1, 17}
- Unless contra-indicated all women should have:
 - [Graduated Compression Stockings \(GCS\)](#) fitted pre-operatively.¹
- Unless contra-indicated (e.g. peripheral arterial disease or arterial ulcers), intermittent pneumatic compression (IPC) devices should be utilised for the intra and post operative periods (for up to 24 hours)¹ in women who are unable to wear GCS and / or are unable to receive pharmacological prophylaxis.⁹ Pharmacological thromboprophylaxis should be added to IPC for high risk women if their risk for bleeding subsides.⁹ Their use should also be considered in women who will be immobile post operatively for extended periods of time.
- In women who are considered very high risk, IPC devices should be used instead of GCS for the intra & post-operative period. They should be replaced by GCS when the patient resumes mobility.

Contraindications to mechanical prophylaxis¹:

- Incorrect fit (restricts blood flow)
- Inflammatory conditions of the lower leg
- Morbid obesity (where unable to achieve correct fit)
- Severe lower limb deformity
- Severe oedema of the legs
- Severe peripheral arterial disease or peripheral /diabetic neuropathy.

PHARMACOLOGICAL THROMBOPROPHYLAXIS

- ***Women having an Elective Caesarean with no other risk factors for VTE (other than puerperium) do not require post-operative thromboprophylaxis with low molecular weight heparin (LMWH) Clethane.***^{17, 18}
- **For those with risk factors (as detailed above) consider:**
 - Enoxaparin 40mg subcutaneously^{16, 19} prescribed at 2000 hrs post operatively unless contra-indicated.
- The first dose of pharmacological prophylaxis should be given at least 4 hours after delivery^{1, 19}
- Removal of the epidural catheter should occur at least 12 hours after the last dose of LMWH.³ After removal, the next dose should be at least 2 hours¹, but preferably 4 hours later.³
- The duration of pharmacological prophylaxis is between 5 to 7 days or until the patient is fully mobile¹ and discharged from hospital.¹⁹ In high risk patients (e.g. previous VTE or who received pharmacological prophylaxis during pregnancy) this may be extended for six weeks after the birth.^{1, 3, 18, 19} See also relevant KEMH Clinical Guidelines within Obstetrics & Midwifery: [Complications of Pregnancy: Venous Thrombosis and Embolism in Pregnancy and the Puerperium.](#)

Guidelines for pharmacological prophylaxis for women who deliver outside normal daytime hours

- With the current administration time of enoxaparin being fixed at 2000hrs, women who deliver after 1600hr or prior to 0800hr may have a considerable delay prior to their first dose of enoxaparin. In these women the use of subcutaneous heparin should be considered as a bridging method until their first dose of enoxaparin. Women who deliver between 1600 and 2400 will require two bridging doses of heparin whilst women who deliver after 2400 will only require one.
 - Women who deliver between 1600 and 2400 hours will be administered a 5000IU subcutaneous dose of unfractionated heparin at 4 and 12 hours post surgical completion (unless contra-indicated).
 - Women who deliver between 2400 and 0800 hours will be administered a single 5000IU subcutaneous dose of unfractionated heparin at 4 hours post surgical completion (unless contra-indicated).



Potential contraindications to prescribing enoxaparin or heparin:

- Thrombocytopenia¹⁶ - Low platelet count (<100 000/uL)
- High risk of uncontrolled haemorrhage or current bleeding
- Acute bacterial endocarditis¹⁶
- Adverse reaction/ allergy to enoxaparin or heparin,¹⁶

Patient related risk factors for bleeding:¹

- Current active major bleeding³ (defined as requiring at least 2 units of blood or blood products to be transfused in 24 hours)
- Current chronic, clinically significant and measurable bleeding over 48 hours
- Bleeding disorders (e.g. haemophilia)
- Recent central nervous system bleeding
- Intracranial or spinal lesion
- Renal impairment
- Abnormal blood coagulation including underlying coagulopathy or coagulation factor abnormalities
- Thrombocytopenia. Pharmacological prophylaxis is not recommended for patients with a platelet count < 50000/uL. It is generally considered safe with a platelet count of > 100,000/uL. A platelet count between these two values should be discussed with senior obstetric and anaesthetic staff.
- Severe platelet dysfunction
- Active peptic ulcer or active ulcerative gastrointestinal disease
- Obstructive jaundice or cholestasis
- Recent major surgical procedure with a high bleeding risk
- Concomitant use of medication that may affect the clotting process (e.g. anticoagulants, antiplatelets, non-steroidal anti-inflammatory drugs or thrombolytic agents)
- Neuraxial anaesthesia or recent lumbar puncture for any reason
- High risk of falls.



REFERENCES / STANDARDS

1. National Health and Medical Research Council. **Clinical practice guideline for the prevention of venous thromboembolism in patients admitted to Australian hospitals.** Melbourne: NHMRC; 2009. Available from: https://www.nhmrc.gov.au/files_nhmrc/file/nics/programs/vtp/guideline_prevention_venous_thromboembolism.pdf
2. The Australia & New Zealand Working Party on the Management and Prevention of Venous Thromboembolism. **Prevention of venous thromboembolism.** 4th ed. Health Education & Management Innovations; n.d. Available from: http://www.surgeons.org/media/19372/VTE_Guidelines.pdf
3. Royal College of Obstetricians and Gynaecologists. Green-top guideline No. 37a: Reducing the risk of thrombosis and embolism during pregnancy and the puerperium. **RCOG** [Internet]. 2009. Available from: <http://www.rcog.org.uk/files/rcog-corp/GTG37aReducingRiskThrombosis.pdf>
4. Bourjeily G, Paidas M, Khalil H, Rosene-Montella K, Rodger M. Pulmonary embolism in pregnancy. **The Lancet.** 2010;375(9713):500-12.
5. Basude S, Hein C, Curtis S, Clark A, Trinder J. Low-molecular-weight heparin or warfarin for anticoagulation in pregnant women with mechanical heart valves: What are the risks? A retrospective observational study. **BJOG.** 2012;119(8):1008-13.
6. Sharma S, Monga D. Venous thromboembolism during pregnancy and the post-partum period: Incidence and risk factors in a large Victorian health service. **Australian and New Zealand Journal of Obstetrics and Gynaecology.** 2008;48(1):44-9.
7. Royal College of Obstetricians and Gynaecologists. Green-top guideline No. 37b: The acute management of thrombosis and embolism during pregnancy and the puerperium. **RCOG** [Internet]. 2010. Available from: http://www.rcog.org.uk/files/rcog-corp/GTG37b_230611.pdf
8. National Health and Medical Research Council. **Stop the Clot: Integrating VTE prevention guideline recommendations into routine hospital care.** 3rd ed. Melbourne: NHMRC; 2011. Available from: www.nhmrc.gov.au
9. Ho K, Tan JA. Stratified meta-analysis of intermittent pneumatic compression of the lower limbs to prevent venous thromboembolism in hospitalized patients. **Circulation.** 2013;128(9):1003-20.
10. Sachdeva A, Dalton M, Amaragiri SV, Lees T. Elastic compression stockings for prevention of deep vein thrombosis (Review). **Cochrane Database of Systematic Reviews.** 2010 (7).
11. Kakkos SK, Caprini JA, Geroulakos G, Nicolaidis AN, Stansby G, Reddy DJ. Combined intermittent pneumatic leg compression and pharmacological prophylaxis for prevention of venous thromboembolism in high-risk patients (Review). **Cochrane Database of Systematic Reviews.** 2008 (4).
12. National Health and Medical Research Council. Prevention of venous thromboembolism (VTE) in patients admitted to Australian hospitals: Guideline summary: **NHMRC.** 2010. Available from: www.nhmrc.gov.au
13. Reynolds S. Deep vein thrombosis: Are postnatal women aware? **British Journal Of Midwifery.** 2004;12(10):636-40.
14. Alzoubi KH, Khassawneh BY, Obeidat B, Asfoor SS, Al-azzam SI. Awareness of patients who undergo cesarean section about venous thromboembolism prophylaxis. **Journal of Vascular Nursing.** 2013;31(1):15-20.
15. National Institute for Health and Clinical Excellence. **NICE clinical guideline 92: Venous thromboembolism: Reducing the risk: Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital.** London: NICE; 2010. Available from: www.nice.org.uk/guidance/CG92
16. MIMS Australia. Clexane and clexane forte. **MIMS Online** [Internet]. 2011. Available from: <https://www.mimsonline.com.au>
17. BestPractice. **Hypercoagulable state: Treatment approach:** BMJ Evidence Centre; 2013. Available from: <http://bestpractice.bmj.com/best-practice/monograph/889.html>
18. Guyatt G, Akl EA, Crowther M, Gutterman DD, Schönemann HJ. Executive Summary: Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. **Chest.** 2012;141(2 Suppl):7S-47S.
19. Nicolaidis AN, Fareed J, Kakkar A, Breddin H, Goldhaber S, Hull R, et al. **Prevention and treatment of venous thromboembolism: International consensus statement (Guidelines according to scientific evidence).** London: CDER Trust; 2006. Available from: <http://www.venousdisease.com/International%20Consensus%20guidelines.pdf>

National Standards – 1 Clinical Care is Guided by Current Best Practice

Legislation - Nil

Related Policies - Nil

Other related documents – KEMH Clinical Guidelines: O&G: [Graduated compression stockings](#); O&M: [VTE in Pregnancy](#); O&M: [Caesarean Section](#)

RESPONSIBILITY

Policy Sponsor	Medical Director Obstetrics
Initial Endorsement	March 2004
Last Reviewed	October 2014
Last Amended	February 2015
Review date	October 2017