NHS
Greater Glasgow and Clyde

CLINICAL GUIDELINE

Anticoagulation management in patients admitted to Orthopaedics with hip fractures

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

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Approval Group:	Anaesthesia Cross Sector Governance Group

Important Note:

The Intranet version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

General management of patients with hip fracture on anticoagulant / anti-platelet medications

Stop warfarin, DOAC, clopidogrel / ticagrelor on admission

Record timing of last dose in the notes

NB- Patients on DOACs do not require pre-operative LMWH

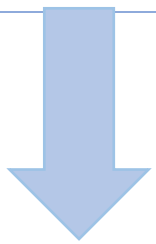
Check FBC, coag/INR, U+E, LFT on admission and on morning of surgery

(at 6am with results ready for morning review)

Calculate creatinine clearance using GGC calculator

Drug	Elimination half-life	Management	Acceptable to proceed with spinal?
Aspirin	Irreversible effect on platelets	• Proceed with surgery	• Yes
Clopidogrel	Irreversible effect on platelets	• Consider stopping if high risk of bleeding thought to outweigh risk of stopping • Proceed with surgery • Monitor blood loss • Consider platelet transfusion if concerns regarding bleeding	• Yes, if GA poses greater risk to patient
Aspirin AND clopidogrel	Irreversible effect on platelets	• Stop clopidogrel, continue aspirin • Proceed with surgery 24h after last dose of clopidogrel	• Yes, if GA poses greater risk to patient
Ticagrelor	8–12 h	• Proceed with surgery • Monitor for blood loss • Consider platelet transfusion if concerned about risk of bleeding	• Yes, if GA poses greater risk to patient
Unfractionated i.v. heparin	1–2 h	• Stop i.v. heparin 2–4 h pre-op	• 4 h post dose
Low molecular weight heparin subcutaneous prophylactic dose	3–7 h	• Last dose 12 h pre-op	• 12 h post dose

Drug	Elimination half-life	Management	Acceptable to proceed with spinal?
Low molecular weight heparin subcutaneous treatment dose	3–7 h	• Last dose 12–24 h pre-op • Monitor blood loss	• 24 h post dose
***Warfarin (see flowchart)**	4–5 days	• 5mg vitamin K i.v. and repeat INR after 4 h • Consider repeating vitamin K dose • Consider prothrombin complex for immediate reversal	• If INR ≤ 1.5
*****NB - BEFORE CONSIDERING REGIONAL ANAESTHESIA IN PATIENTS ON DOAC AGENTS***** **THERE MAY BE SOME CLINICALLY RELEVANT ANTICOAGULATION IN THE PATIENT'S PLASMA IF:** • **Last Xa Inhibitor (reduced dose e.g. apixaban 2.5mg bd) taken <48 hours previously** • **Last Xa Inhibitor (therapeutic dose e.g. apixaban 5mg bd) taken <72 hours previously** • **CrCl <30** **THE ASSOCIATED RISK OF SPINAL HAEMATOMA IN THESE ABOVE SITUATIONS NEEDS TO BE BALANCED AGAINST THE PATIENT'S RISK OF A POOR OUTCOME IF SURGERY IS DELAYED OR PERFORMED UNDER GA.** **GA SHOULD BE CONSIDERED ABOVE RA IF IT HAS BEEN <48 HOURS SINCE REDUCED DOSE, OR <72 HOURS SINCE THERAPEUTIC DOSE DOAC ADMINISTRATION, ALSO TAKING INTO ACCOUNT RENAL FUNCTION.**			
Xa inhibitors **e.g.** **Rivaroxaban** **Apixaban** **Edoxaban**	12 h	• Consider surgery 24 h after last dose under GA if bleeding risk acceptable and CrCl ≥ 30 $ml.min^{-1}$ • Wait 48h since last dose if CrCl < 30 $ml.min^{-1}$ • May be partially reversed with prothrombin complex (D/W Haematology)	• *****Risk-benefit assessment***:** • If risk of GA considered unacceptable, proceed with spinal after: - 24h if CrCl ≥ 30 $ml.min^{-1}$ - 48h if CrCl < 30 $ml.min^{-1}$ • Alternatively, if CrCl < 30$ml.min^{-1}$ & DOAC specific assay available, proceed when ≤ 25 $ng.ml^{-1}$ • If level >25$ng.ml^{-1}$, balance of risks and benefits may still warrant proceeding with spinal anaesthesia
Treatment dose Thrombin inhibitors **e.g.** **Dabigatran 150mg bd**	15–17 h	• Plan surgery for afternoon of next day under GA if CrCl ≥ 30 $ml.min^{-1}$ • Wait 48h since last dose if CrCl < 30 $ml.min^{-1}$ • Perform TT on morning of surgery • Proceed if TT normal • Consider Idarucizumab for immediate reversal (D/W haematology)	• If risk of GA considered unacceptable, proceed with spinal after 24–36 h if CrCl ≥ 30 $ml.min^{-1}$ and TT normal, or dabigatran assay ≤ 25 $ng.ml^{-1}$ on day of surgery • Wait 48h since last dose if CrCl < 30 $ml.min^{-1}$ and proceed if TT normal or dabigatran assay ≤ 25 $ng.ml^{-1}$ on day of surgery • If TT prolonged or assay >25 $ng.ml^{-1}$, discuss Idarucizumab with Haematology



Prescribe LMWH prophylactic dose

Resart anticoagulant / antiplatelet at 24h unless ongoing bleeding

(first dose of DOAC should not be given until 24h post LMWH dose)

- **All patients should be monitored for signs of vertebral canal haematoma in the postoperative period**
- (back pain, numbness, motor weakness, bladder/bowel incontinence)

Call Anaesthetics if any concerns

GRI: page 13298

QEUH: ext 83463/4

RAH:Page 56188

NB - Assessment of renal function should be done by calculating creatinine clearance using the Cockroft and Gault formula, ***not*** eGFR. A GGC creatinine clearance calculator can be accessed on Staffnet Clinical Info page or directly here.

General points

- **The risks of delaying surgery and/or thromboembolism usually greatly outweigh the risks of vertebral canal haematoma and/or of peri-operative bleeding.**
- Surgeon and Anaesthetist discretion should be used in evaluating the following patients who may, after discussion, be treated as having a higher bleeding risk, or risk of greater complication from blood loss (e.g. extensive/complex surgery, periprosthetic fracture, IM Nailing for pathological fracture, concomitant use of anti-platelet agents, Jehovah's Witness, aortic Stenosis, heart failure)
- Tranexamic acid should be administered peri-operatively (consider combined IV and topical use where appropriate)
- In broad terms, the elimination of DOAC drugs is dependent on renal function
- Dabigatran is 80% cleared by the kidneys, compared to 50% for edoxaban, 33% for rivaroxaban, and 25% for apixaban
- Half-lives: dabigatran approximately 15-h (in healthy elderly volunteers), apixaban 12-h, edoxaban 12-h, rivaroxaban approximately 12-h (in elderly patients)
- In general, waiting two half-lives (approximate residual anticoagulant effect of around 25%) between the last dose and surgery/anaesthesia provides an appropriate compromise between risk (avoidance of surgical haemorrhage, anaesthetic vertebral canal haematoma, thromboembolism) and benefit (timely surgery).
- Standard coagulation screens (INR, aPTT) are not a reliable indicator of the effects of DOACs. The thrombin time (TT) is very sensitive to dabigatran. A normal TT rules out any significant effect of dabigatran. Drug-specific assays can accurately measure DOAC concentrations in plasma in the haemostasis laboratory at GRI only.

Protocol for **Warfarin reversal** in patients admitted with hip fracture

START HERE

Patient presents requiring trauma surgery. Patient is taking regular warfarin

STEP 1:

Send FBC, INR, U+E, LFT, G+S.

If INR > 4.5, consider use of Beriplex as per protocol in NHSGGC Therapeutics Handbook

STEP 2:

Is the patient going to require emergency surgery? (e.g. uncontrolled bleeding, compartment syndrome)

YES

- Establish IV access.
- Cross Match.
- Give 5mg IV Vit K (in 100ml 5% dextrose over 30 mins).
- Consider PCC if not already given.

Reassess and repeat INR.

NO

Is surgery required within 24 hours? (e.g. hip fracture)

YES

INR ≥ 1.5

YES

STEP 3:

STOP Warfarin. Give 5mg IV Vit K (in 100ml 5% dextrose over 30 mins).
If INR > 4.5, consider use of PCC as per protocol in NHSGGC Therapeutics Handbook.
Repeat INR 6 hours after vitamin K dose.

NO

Management will depend on individual circumstances. Discuss with orthopaedic surgeon plus haematologist if required.

RISK ASSESSMENT *

PRE-OP

Start enoxaparin 40mg sc at 1700 on day 1 after admission.

- *Check INR daily at 06:00, may require further IV Vit K in doses of 2mg.*
- If surgery is delayed > 24h due to inadequate warfarin reversal, discuss with Haematology re possibility of PCC

THEATRE WHEN INR ≤ 1.8
SPINAL WHEN INR ≤ 1.5

POST-OP

Give 40mg enoxaparin sc at 1700, or 6 hours post-op (whichever is later). **NOT IF BLEEDING.**

24 hrs post-op

Low thrombotic risk

Re-start warfarin at usual dose 24 hours post-op. **NOT IF BLEEDING.**

High thrombotic risk

Low risk of bleeding and no epidural; increase enoxaparin to 1.5mg/kg od.

Continued high-risk of bleeding; continue 40mg enoxaparin. Once bleeding risk considered low, increase to 1.5mg/kg + restart warfarin. If epidural in situ, discuss with on-call anaesthetist.

Continue enoxaparin until INR therapeutic.

IMPORTANT CONSIDERATIONS

- *Dose of enoxaparin should always be rounded down rather than up and should not exceed 120mg.*
- *Consider enoxaparin dose reduction if eGFR <30ml/min/1.73m2 or weight < 50kg - see NHSGGC Therapeutics Handbook or discuss with pharmacist*
- *If patient has an epidural in situ, discuss with on-call anaesthetist for appropriate management of anti-coagulation.*
- *Heparin (including enoxaparin) is contraindicated in patients with a history of Heparin Induced Thrombocytopaenia (HIT).*

* Is Patient at High or Low risk of Thrombosis?

HIGH RISK

- Mechanical heart valve in any position. - **VERY HIGH RISK - DISCUSS WITH HAEMATOLOGY.**
- AF with previous stroke, embolism, valve disease or valve replacement.
- Artificial valve plus previous embolism.
- Any valve replaced within previous 2 months.
- Arterial embolism or venous thrombosis within previous 3 months.
- Prior recurrent venous thrombosis.
- Prior venous thrombosis and known high risk thrombophilia (e.g. anti-thrombin deficiency, Protein C or S deficiency, antiphospholipid syndrome).
- Patient with target INR of 3-4.

LOW RISK

- AF with normal heart valves and no previous embolism or stroke.
- Single episode of venous thromboembolism > 3 months ago.
- Sinus rhythm, with tissue valve inserted > 2 months ago.

References

- Griffiths R et al. Association of Anaesthetists' guideline for the management of hip fractures 2020. *Anaesthesia* 2021; **76(2):** 225-37
- Scottish Hip Fracture Audit. Consensus Statement for Management of Anticoagulants and Antiplatelet drugs in Patients with Hip Fracture 2018. https://www.shfa.scot.nhs.uk/_docs/2018/Consensus-Statement-for-Management-of-Anticoagulants-180913.pdf
- GGC Clinical Guideline: Apixaban, Edoxaban and Rivaroxaban: Management of Haemorrhage, Surgery and other Invasive Procedures (1/10/201