

Regional anaesthesia in patients at risk of bleeding

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Learning objectives

By reading this article, you should be able to:

- Outline the risk of neuraxial and peripheral nerve blocks in a patient who is anticoagulated.
- Specify the classes of anticoagulant drugs, their key mechanisms of action and the available reversal agents.
- Explain which patient groups are at especially high risk of vertebral canal haematoma.
- Discuss principles guiding risk/benefit decisions before performing peripheral nerve blocks in patients who are anticoagulated.

Vertebral canal haematoma

If not diagnosed and treated within 8-12 hours paraplegia is likely.

Incidence varies in literature:

Swedish: 1/200k obstetric epidural, 1/3600 women 1/9000 men knee arthroplasty epi/CSE

NAP3 overall 1/117,000 for all CNBs. *Peri-op epidural 1/16,321*
(excluding paed/obs/spinals/pain epidurals)

Finnish: 1/775,000 spinals, 1/26,000 epidural, 1/17,000 CSE

Obs meta-analysis 1 million epidurals : 1/168,000

Vertebral canal haematoma risk factors

Increased age (>65 years)

Female sex

Anticoagulant use

For prophylactic enoxaparin use VCH risk is higher in: (age, female sex)

History of easy bruising or excessive surgical bleeding

Spinal column abnormalities

Renal insufficiency

Antiplatelet drugs....

Antiplatelet drugs

P2Y₁₂ receptor antagonists – inhibit ADP mediated platelet aggregation.

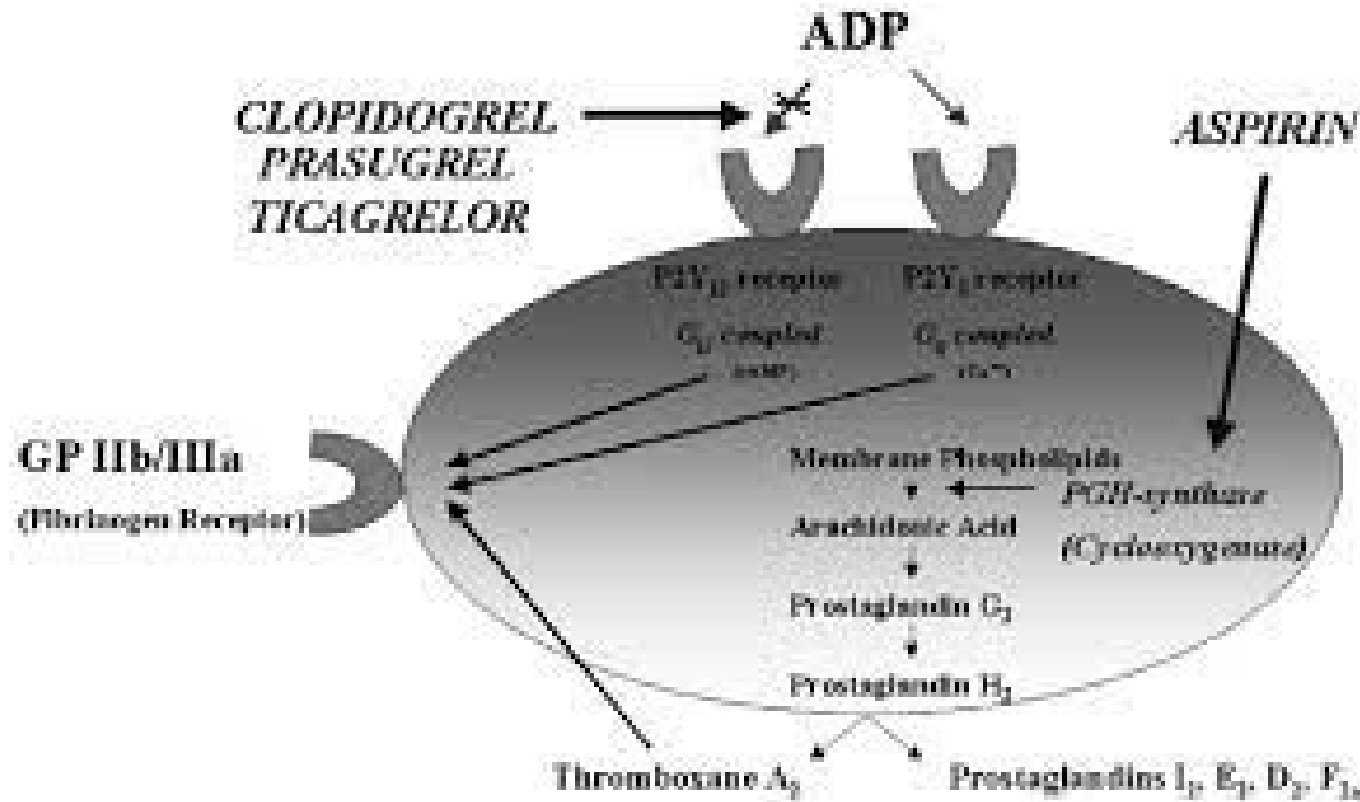
Thienopyridines – clopidogrel, prasugrel, ticlopidine

Non-thienopyridines – ticagrelor, cangrelor

GPIIb/IIIa receptor antagonists

Interfere with platelet/fibrinogen
Platelet VWF binding

Eg Abciximab,
eptifibatide,
tirofiban.



Aspirin and NSAIDs:

Inhibit COX, prevent TXA₂, reduce platelet aggregation.

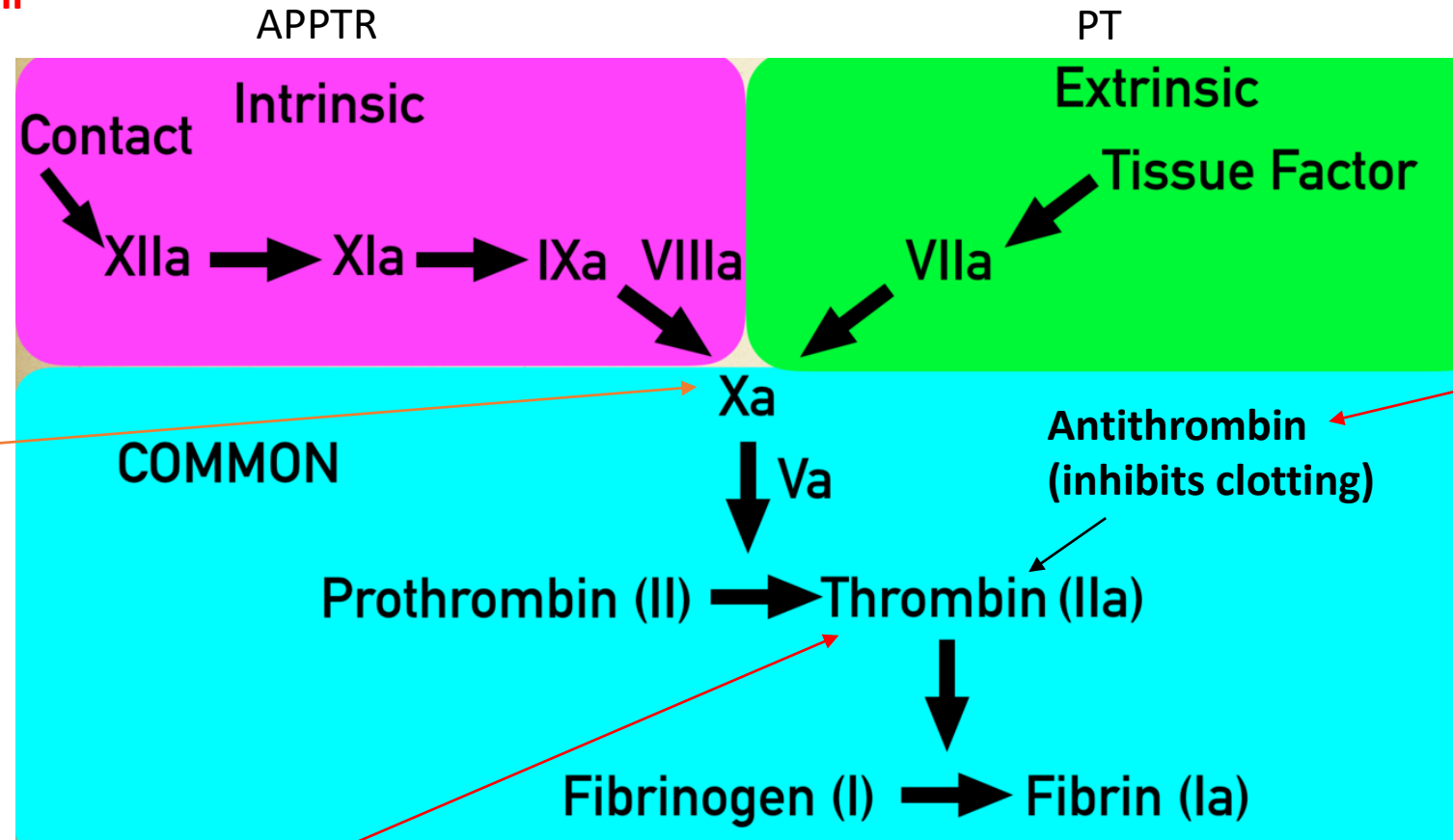
Aspirin acts for the whole platelet life, other NSAIDs transient.

Antiplatelet agents: Association of Anaesthetists guidance, varies slightly from ASRA.

| Agent | Time to CNB after stopping | Catheter in situ guidance | Time after CNB/catheter removal to next dose |
|---|--|---------------------------|--|
| Aspirin/NSAIDs | No precautions | No precautions | No precautions |
| Clopidogrel/Prasugrel | 7 days | Not recommended | 6 hours |
| Ticagrelor | 5 days | Not recommended | 6 hours |
| Tirofiban | 8 hours | Not recommended | 6 hours |
| Abciximab | 48h | Not recommended | 6 hours |
| Dipyridamole (beware combination with aspirin) | No precautions 24h MR formulation: ASRA | No precautions | 6 hours |

Mechanisms of action of other
anticoagulants.....

Warfarin: II, VII, IX, X
>65, female, Asian, <45kg,
cardiac/liver/renal disease all
increase sensitivity.



Xa inhibitors:
LMWH s.c.
Fondaparinux i.v.
oral Xa inhibitors
(rivaroxaban/apixaban)

UFH binds to
antithrombin,
potentiates the
inactivation of
thrombin

Direct thrombin inhibitors (IV) eg.
Argatroban

Oral thrombin inhibitors eg
dabigatran

Heparins/parenteral alternatives:

| Agent/route | Time to CNB after stopping | Catheter in situ guidance | Time after CNB/catheter removal to next dose |
|-------------|---|--|---|
| UFH s.c | Prophylactic dose: 4h or normal APPTTR | Caution | 1 hour |
| UFH i.v * | Treatment dose: 4h or normal APPTTR | Caution: cardiac/vascular follow local guidelines | 4 hours |
| LMWH s.c.* | Prophylactic dose 12h Treatment dose 24h | Prophylactic dose: caution Treatment: not recommended | Prophylactic dose 4h Treatment dose 4h, if traumatic block consider 24h (ASRA 24h) |

Parenteral heparin alternatives: (others include argatroban, bivalirudin)

| | | | |
|------------------|--|-----------------|---|
| Fondaparinux s.c | Prophylactic dose: 36-42h Consider Xa levels Treatment dose: avoid | Not recommended | Prophylactic 6-12 hours Treatment 12 hours |
|------------------|--|-----------------|---|

* If > 4 days of treatment with UFH/LMWH ASRA advises checking platelet count, HIT risk.

Oral anticoagulants

| Agent/route | Time to CNB after stopping | Catheter in situ guidance | Time after CNB/catheter removal to next dose |
|---|--|---------------------------|--|
| Warfarin | INR \leq 1.4 | Not recommended | After catheter removal |
| Rivaroxaban CrCl >30 ml/min | Prophylactic dose 18 hours Treatment dose 48h | Not recommended | 6 hours |
| Apixaban | 24-48 hours | Not recommended | 6 hours |
| Dabigatran | CrCl >80: 48 hours CrCl 50-80: 72 hours CrCl 30-50: 96 hours | Not recommended | 6 hours |
| Thrombolytic drugs eg streptokinase, alteplas | 10 days | Not recommended | 10 days |

Intra-operative heparin and epidural catheters

BJA Ed 2012 vol 12, issue 1 11-16, RA and antithrombotic drugs

Eg Open AAA repair. Cardiac surgery (1:3500 risk VCH)

Does not appear to present significant risk provided:

- Exclude high risk patients – pre-existing coagulopathy
- Give low dose (5000IU) minimum 1h after CNB
- Avoid full intra-op heparinization for 6-12h post CNB
- Traumatic placement intuitively increases risk, but no data to support cancelling surgery.

Reversal agents...

Reversal agents

Don't forget vitamin K / prothrombin complex

Andexanet alfa (Ondexxya)

- Reverses rivaroxaban/apixaban in minutes.
- Provides decoy Xa for drugs to bind to.
- £15,000/ patient treated, limited evidence, not recommended by NICE.

Idarucizumab (Praxbind)

- Monoclonal antibody that binds to dabigatran, reverses in minutes.
- Licensed by NICE, £2600 per dose, may need 2 doses.

Special Groups

Neck of femur fractures

Pregnancy

Pain procedures

Others

Special groups: NOF fractures

30-40% NOF # patients are taking anticoagulants.

The elevated risk of VCH is unquantifiable but small, and may be lower than the risks of GA/delaying surgery.

- Single antiplatelet meds are not a C/I
- Dual antiplatelets are also not absolutely C/I, provided compelling reason to avoid GA
- Warfarin ≤ 1.8 surgery, **≤ 1.5 spinal**. Restart 12-24h post op.
- DOACs – see chart.

Peri-op fascia-iliaca compartment plane block (infra-inguinal) carries a low risk of haemorrhagic complications.

Patients with acute hip fracture: spinal anaesthesia and DOACs

Thrombin inhibitors (dabigatran)
list for afternoon surgery the day
after the last dose

Factor Xa inhibitors
(apixaban, rivaroxaban,
edoxaban)

Measure thrombin time at 0800
on day of surgery

CrCl ≥ 30 ml min⁻¹ :
proceed 24 h following the last
dose

CrCl < 30 ml min⁻¹ :
measure anti-factor Xa levels and
discuss with haematologist before
proceeding, or delay surgery

Thrombin time normal:
proceed

Thrombin time prolonged:
contact haematologist, consider
reversal with idarucizumab

Fig 1 Spinal anaesthesia and direct oral anticoagulants (DOACs). Adapted from Shelton C., White S. Anaesthesia for hip fracture repair, BJA Educ 20, 2020, 142-9.²³

Special groups: Pregnancy

Obstetric Anaesthetists Handbook UHCW

Pre-eclampsia mild/severe - platelet >75 , stable, normal coag screen

Severe PET/HELLP check plt/clotting immediately prior to spinal

Platelets <75

IUD

Placental abruption/haemorrhage → plt & clotting within 6 hours

AFE

Heparin IV within 24 hours

Mild PET plt >100 or Sc heparin for >4 days → platelet within 6 hours

High risk pain procedures

See ASRA guideline

Classifies the procedural risk:

High – spinal cord stimulators

Intermediate – sympathetic block (stellate/coeliac plexus)

Low – PNB, thoracic/lumbar facet joint injections.

Guideline has advice for anticoagulant drugs depending on risk of procedure.

Note, for high risk procedures aspirin and NSAIDs are also stopped.

Other special circumstances

| Haemophilia | See haematology advice |
|--------------------------------|--|
| Trauma and massive transfusion | Dilutional and consumptive coagulopathy, assess coagulation status before regional technique eg TEG/ROTEM. |
| Sepsis | Prothombotic state, so often on LMWH, consumptive coagulopathy. C/I from abscess POV |
| Liver failure | All factors other than VIII are synthesised in liver. Assess coagulation before regional. |
| Uraemia | May cause thrombocytopenia. Dialysis patients may have residual heparin, beware LA catheters in dialysis patients – don't forget the heparin in their next dialysis. |
| DIC | Never neuraxial, PNB only if careful risk/balance considered and compressible site. |

Peripheral nerve blockade

What is the risk of complications with anticoagulant medications?



Anaesthesia Critical Care & Pain Medicine

Volume 38, Issue 5, October 2019, Pages 507-516



Review article

Bleeding complications following peripheral regional anaesthesia in patients treated with anticoagulants or antiplatelet agents: A systematic review

F. Joubert ^a, P. Gillois ^b, H. Bouaziz ^c, E. Marret ^d, G. Iohom ^e, P. Albaladejo ^a

1978-2018 6 studies

9688 PNBs

65 bleeding events. (90% from one study)

No neuropathy reported.

ASRA guidelines on PNB and haemorrhagic complications

Summarises the 32 case reports of serious haemorrhagic complications post plexus/PNB: 18/32 were anticoagulated

- 1. All patients who had neurological deficit had complete recovery by 12 months.*
- 2. Haemorrhagic complications in patients with anticoagulation resulted in longer stays, more complicated recovery.*
- 3. Complications due to blood loss more common than neurological damage.*
- 4. Deep plexus blocks (eg lumbar), deep peripheral (eg proximal sciatic) carry the most risk.*
- 5. Often there is no evidence of vessel trauma.*

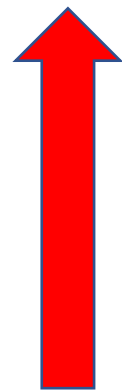
Advice to anaesthetists:

There is no specific guidance on safe intervals between anticoagulant and PNB

ASRA – manage deep plexus/deep PNB as if they were having CNB.

- For all others consider the site; vascularity, compressibility and consequences of haemorrhage.

AoA - similar to ASRA, but stratifies into risk groups:



'Paravertebral' group - eg paravertebral block, deep cervical/lumbar plexus

Deep blocks - supra-clavicular brachial plexus

Superficial perivascular – eg popliteal sciatic

Fascial plane – TAP blocks.

Superficial blocks – forearm/ankle blocks

Summary

1. Vertebral canal haematoma is a rare complication of neuraxial block. Peri-operative epidural/CSE in older patients higher risk.
2. The Association of Anaesthetists has extensive advice on peri-operative management of anticoagulant medications.
3. Peripheral nerve blocks have low rates of serious haemorrhagic complications and no specific guidance exists on safe intervals after anticoagulant medication.
4. A sensible approach to PNB in patients on anticoagulation is to consider the site, vascularity, compressibility and consequences of a bleed. Treating deep/'paravertebral' blocks similarly to CNB.

Questions?