European Society of Regional Anaesthesia & Pain Therapy
ESRA ITALIA

ESRA Italian Chapter
XXVIII CONGRESSO NAZIONALE

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ALR
E COAGULAZIONE

PRESIDENTE DEL CONGRESSO
Luciano Calderone

SISTEMA SANITARIO REGIONALE
ASL ROMA 1

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MZ EVENTS

-7 Ottobre CONGRESSO

European Society of Regional Anaesthesia & Pain Therapy

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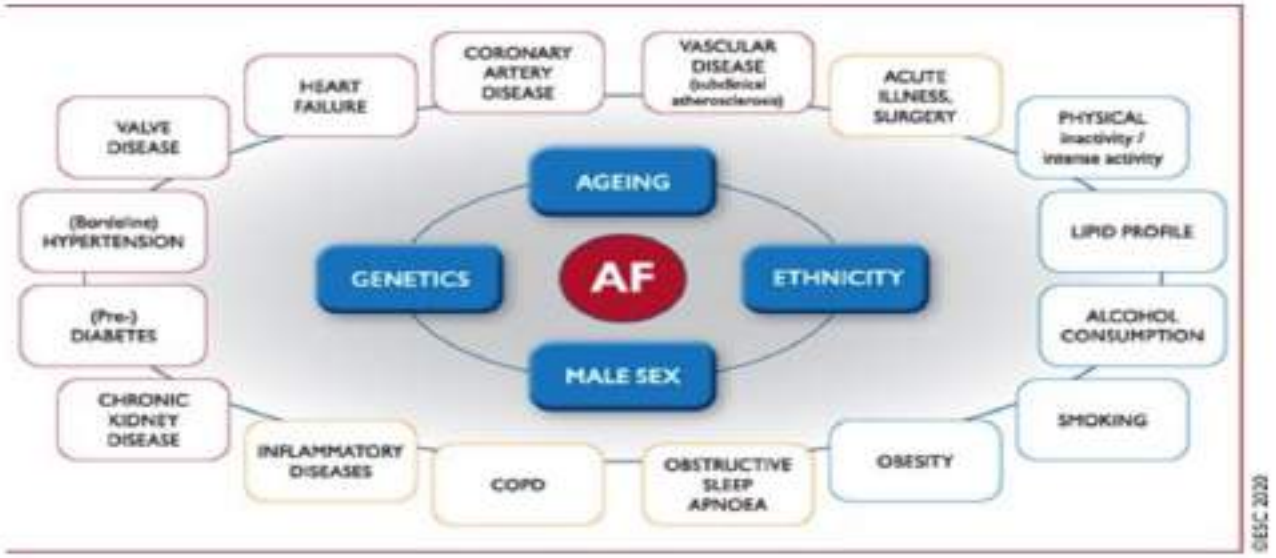
SISTEMA SANITARIO REGIONALE

PATIENTS ON ANTICOAGULATION

The vast **majority of patients on anticoagulation suffer from atrial fibrillation**

Older people with a burden of comorbidities

Figure 3



Volume 42, Issue 5

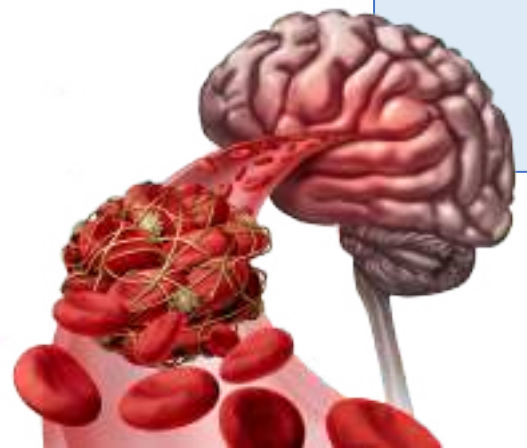
1 February 2021

ATRIAL FIBRILLATION (AF) AND ANTICOAGULATION

ATRIAL FIBRILLATION IS A RISK FACTOR FOR STROKE

WITH AGEING INCIDENCE OF A.F. INCREASES TO 39/1000 IN PEOPLE >80 YEARS

ORAL ANTICOAGULATION REDUCES THE RISK OF STROKE BY 65%



ORAL ANTICOAGULATION AND AF

FROM WARFARIN (1954) AND VITAMIN K ANTAGONISTS *(AVK)* TO NEW DIRECT ORAL ANTICOAGULANTs (2008) *(DOACS)*

AVKs REQUIRE FREQUENT MONITORING (INR) AND DOSE ADJUSTMENT

DOACs NOW REPRESENT THE MAJORITY OF ANTICOAGULATION PRESCRIPTION FOR AF

THE USE OF ANTICOAGULATION FOR AF HAS INCREASED FROM 2008 TO 2018 MOSTLY IN PEOPLE AGED OVER 85 YEARS

COMORBIDITIES INCREASE THE RISK OF BLEEDING COMPLICATIONS

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Journal of the American Heart Association
Volume 11, Issue 22, 15 November 2022
https://doi.org/10.1161/JAHA.122.026723

American Heart Association.

ORIGINAL RESEARCH

Trends in Oral Anticoagulant Use Among 436 864 Patients With Atrial Fibrillation in Community Practice, 2011 to 2020

Ann Marie Navar, MD, PhD ; Ahmed A. Kolkailah, MD, MSc ; Robert Overton, MS; Nishant P. Shah, MD, MPH, MSc; Justin F. Rousseau, MD, MMSc ; Greg C. Flaker, MD; Michael P. Pignone, MD, MPH; Eric D. Peterson, MD, MPH

We identified 436 864 patients with AF at risk for stroke (median age, 78 years; 52.1% men). ***From 2011 to 2020, overall anticoagulation rates increased from 56.3% to 64.7%, as DOAC use increased steadily (from 4.7% to 47.9%), while warfarin use declined (from 52.4% to 17.7%)***

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GIORNALE ITALIANO DI CARDIOLOGIA

«the prevalence of AF in Italy is 1.7%, i.e. 1.036.448 cases.
Of these, 62.6%, i.e. 648.832 subjects, are estimated to have a CHADS2 ≥2 and therefore strongly eligible for anticoagulant treatment.

Prevalence of Af is:

- **5% between 65 and 75 years**
- **9% between 76 and 85 years**
- **10% > 85 years**

The estimated percentage of eligible treated patients in 2015 was 43.7%, significantly greater compared to 2014 (31.3%), with local and regional variabilities.

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PROCEDURE –related

- traumatic procedure/epidural catheter

10-40% of **haematoma** with bloody tap

PATIENT- related:

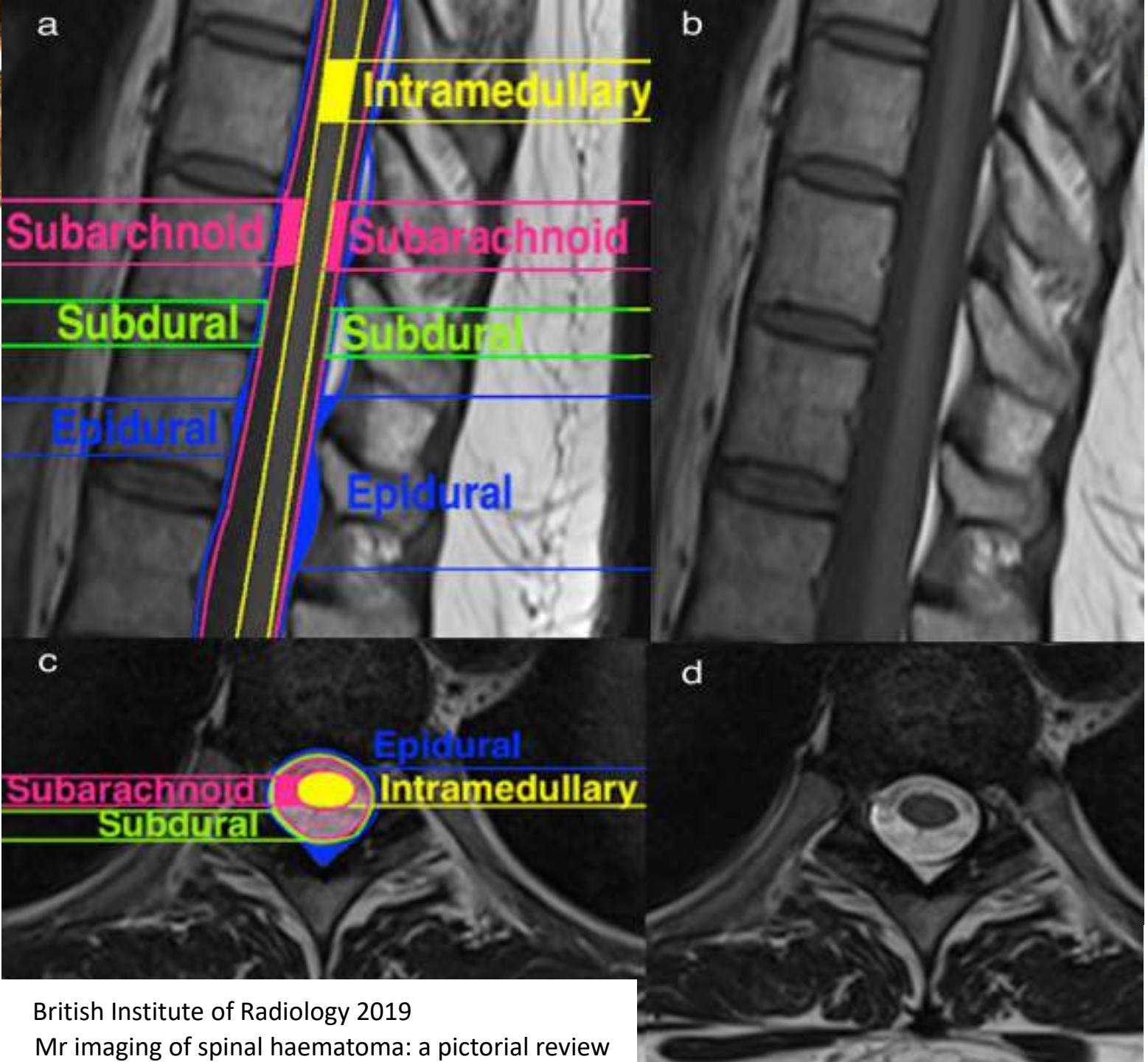
- Age
- Sex – female
- Congenital –acquired coagulopathies
- Spinal abnormalities
- Thrombocytopenia

DRUG –related

- antiplatelet/anticoagulant/dual therapy

Regional Anesth Pain Med 2022 Antithrombotic drugs and the risk of bloody

Regional anesthesia safety recommendations update .Systematic review. Eur Anesthesiologia 2020



British Institute of Radiology 2019
Mr imaging of spinal haematoma: a pictorial review

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hematoma spinal / **epidural**

1: 150.000

1: 220.000

1: 3.600 knee arthroplasthy

British Journal of Anaesthesia 114 (5): 808–11 (2015)
Retrospective analysis of the incidence of epidural haematoma in patients with epidural catheters and abnormal coagulation parameters

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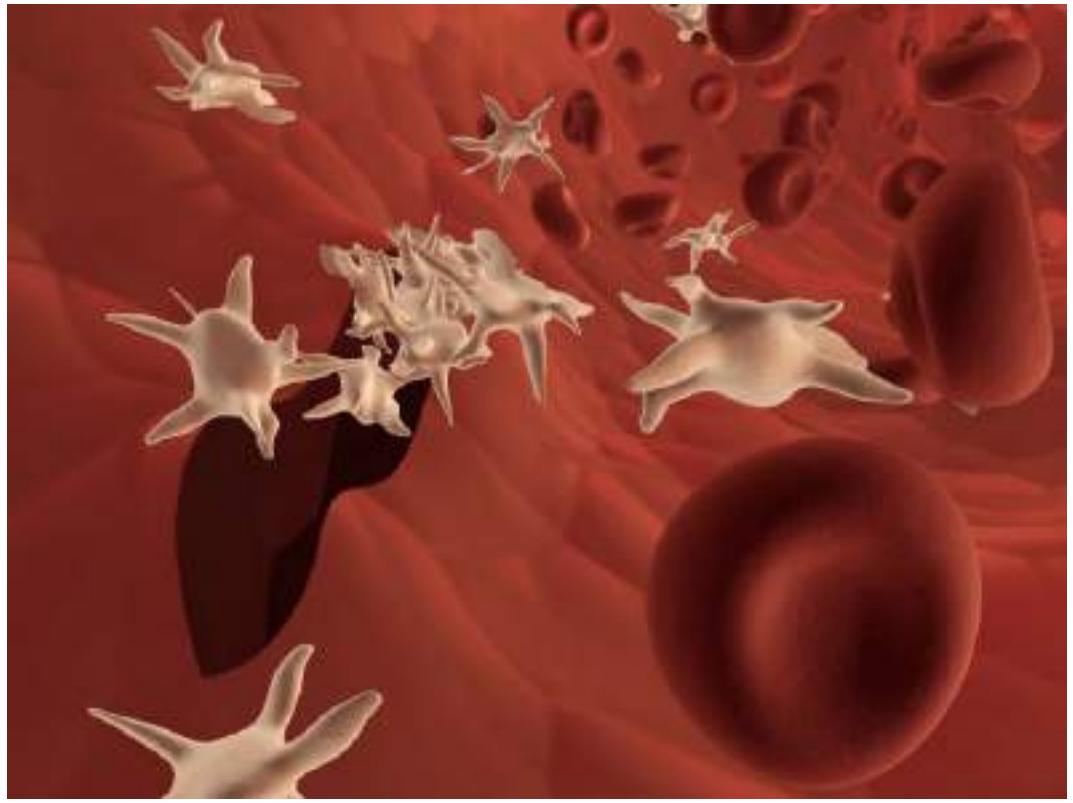
PLATELET



• **Neuraxial block** ➢ In absence of other Additional risk ➢ Is acceptable without futher assessments	**≥ 80x10⁹/L** **≥ 100x10⁹/L**
• **Lumbar puncture**	**≥ 40x10⁹/L**
• **Venous central lines**	**> 20x10⁹/L**
• **Major surgery**	**> 50x10⁹/L**
• **Neurosurgery and Ophthalmic surgery posterior segment**	**> 100x10⁹/L**

Guidelines for the use of platelet trasfusions - 2016 British Journal of Haematology

Obstetric Anesthesiology

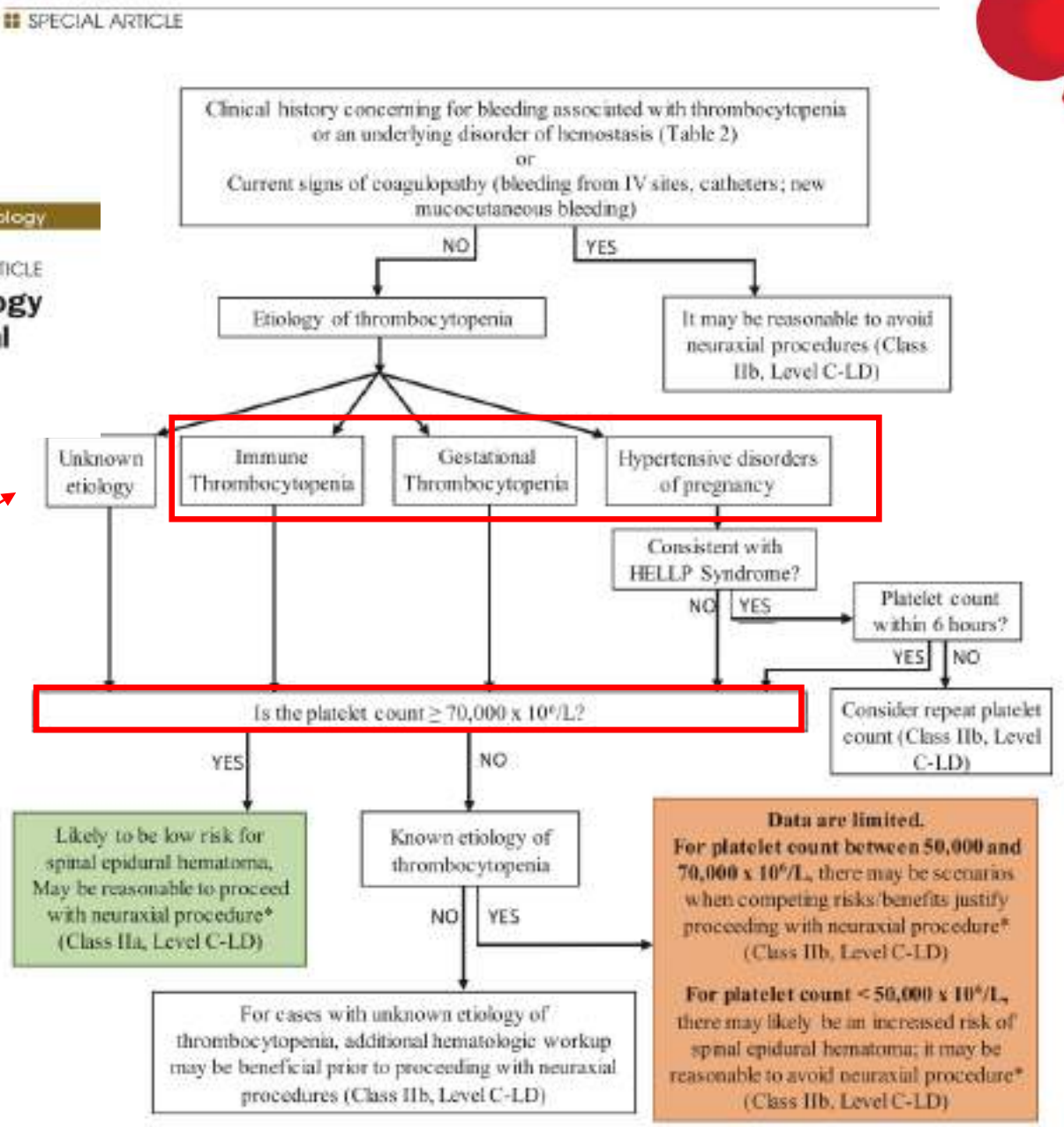
SPECIAL ARTICLE

The Society for Obstetric Anesthesia and Perinatology Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients With Thrombocytopenia

2021

PLT ≥70.000

gestational thrombocytopenia, immune thrombocytopenia and hypertensive disorders of pregnancy in the absence of other risk factors



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ANTIPLATELET AND ANTICOAGULANT THERAPY

time before time after catheter

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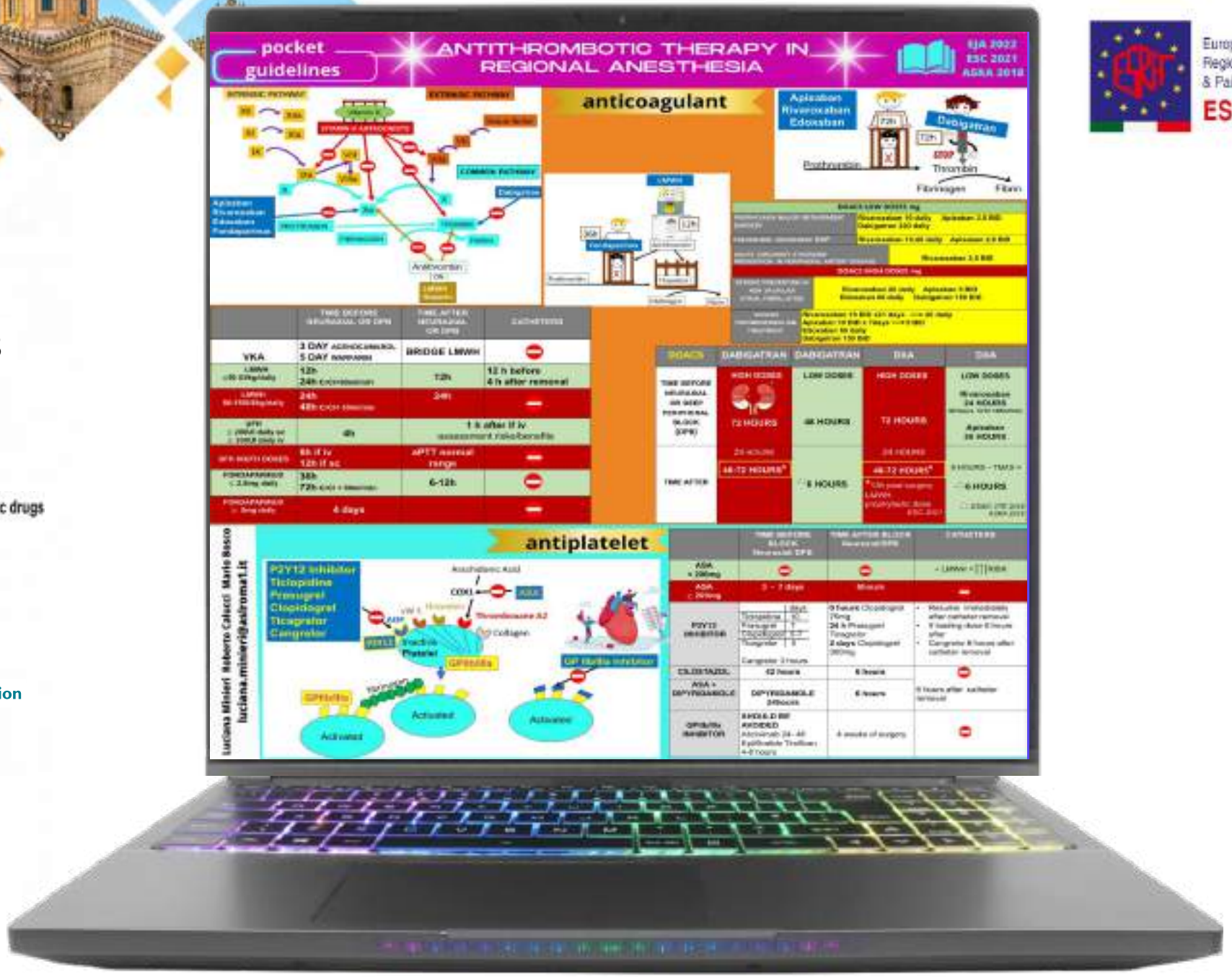
PDF Adobe ASRA 2018

PDF Adobe EJA 2022
Regional anaesthesia in patients on antithrombotic drugs
Joint ESAIC/ESRA guidelines

PDF Adobe ESC
European Society of Cardiology
2021 European Heart Rhythm Association



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pocket guidelines

ANTITHROMBOTIC THERAPY IN REGIONAL ANESTHESIA

EJA 2022
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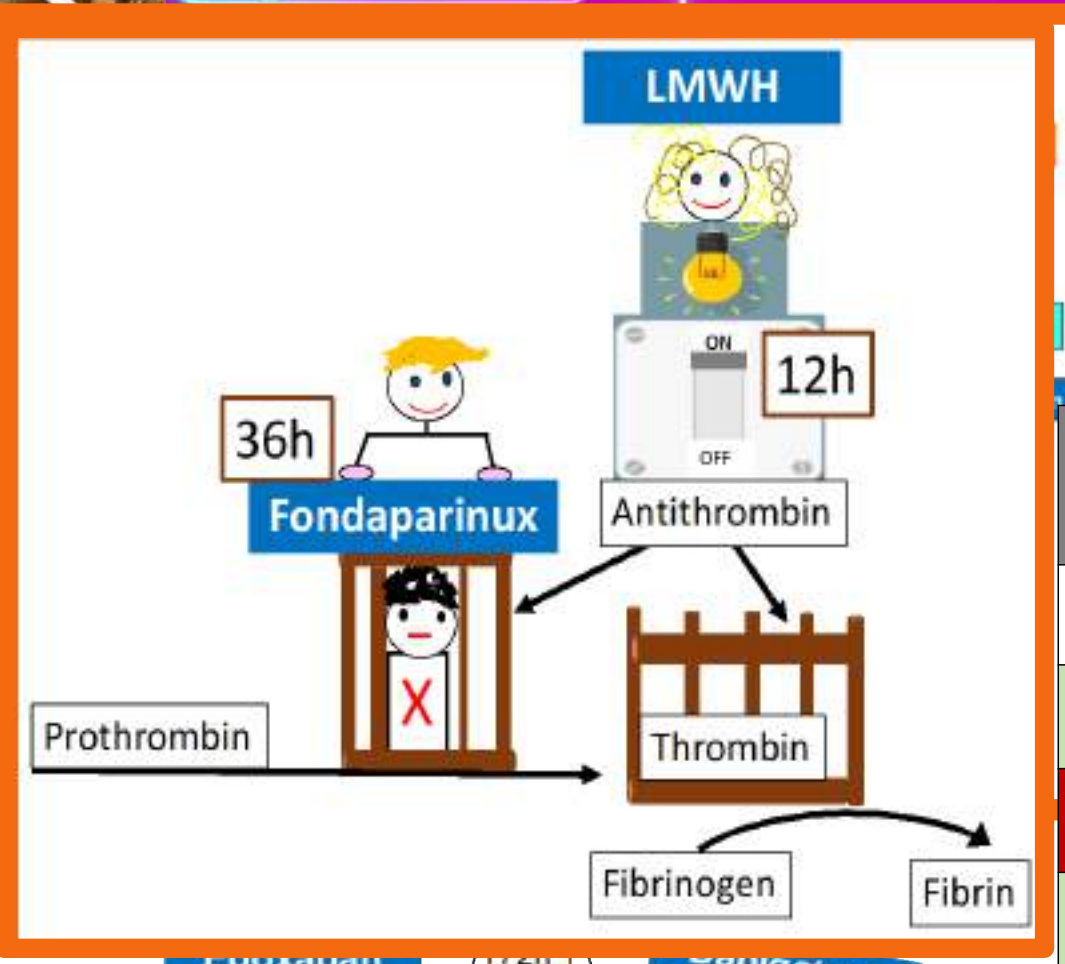

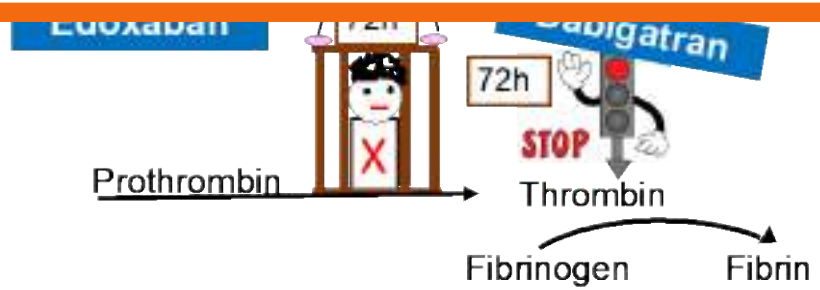

VKA- LMWH- FONDAPARINUX
anticoagulant: doacs

DRUG DOSE	TIME BEFORE NEURAXIAL OR DEEP PERIPHERAL BLOCK	LABORATORY TESTS	TIME AFTER NEURAXIAL OR DEEP PERIPHERAL BLOCK	NEURAXIAL CATHETER
VKA	• **3 DAY** ACENOCUMAROL • **5 DAY** WARFARIN	**INR < 1,5**	**BRIDGE LMWH**	**NO**
LMWH LOW DOSES ≤50 UI/kg/daily Ex: Enoxaparin 4000UI daily	• **12h** • **24h if CrCl<30ml/min**	——	**12 h**	• **12 h before** • **4 h after removal**
LMWH HIGTH DOSES 80-150UI/kg/daily	• **24h** • **48h if CrCl< 30ml/min**	Anti Xa ≤ 0,1UI/ml	**24 h**	
UFH LOW DOSES ≤ 200UI daily sc ≤ 100UI daily iv	**4 h**	——	**1 h after if iv** assessment risks/benefits	
UFH HIGTH DOSES	• 6h if iv • 12 h if sc	aPTT or anti-Xa or ACT	**aPTT normal range**	**NO**
FONDAPARINUX LOW DOSES ≤ 2,5mg daily	• **36h** • **72h if CrCl < 50ml/min**	——	**12 h**	**NO**
FONDAPARINUX HIGTH DOSES ≥ *5mg daily*	**4 days**	Anti Xa ≤0,1UI/ml		**NO**

pocket guidelines

ANTITHROMBOTIC THERAPY IN REGIONAL ANESTHESIA

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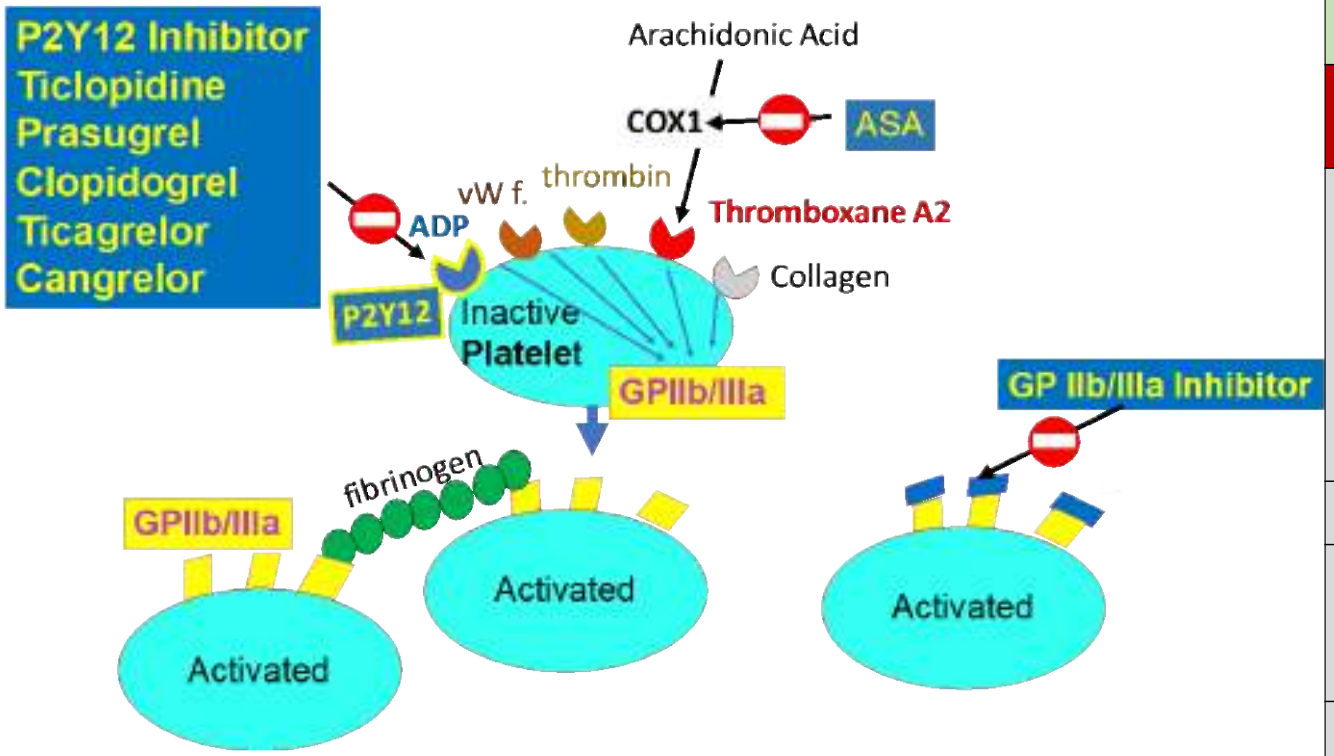
antiplatelet



	TIME BEFORE BLOCK Neuraxial/ DPB	TIME AFTER BLOCK Neuraxial/DPB	CATHETERS
ASA < 200mg	⛔	⛔	+ LMWH = ↑↑↑ RISK
ASA ≥ 200mg	**3 - 7 days**	**6hours**	⛔
P2Y12 INHIBITOR	Ticlopidine 10 days Prasugrel 7 Clopidogrel 5-7 Ticagrelor 5 Cangrelor 3 hours	**0 hours** Clopidogrel 75mg **24 h** Prasugrel Ticagrelor **2 days** Clopidogrel 300mg	• Resume immediately after catheter removal • If loading dose 6 hours after • Cangrelor 8 hours after catheter removal
CILOSTAZOL	**42 hours**	**6 hours**	⛔ 6 hours after catheter removal
ASA + DIPYRIDAMOLE	**DIPYRIDAMOLE 24hours**	**6 hours**	
GPIIb/IIIa INHIBITOR	**SHOULD BE AVOIDED** Abciximab 24- 48 Eptifibatide Tirofiban 4-8 hours	4 weeks of surgery	⛔

Examples for blocks			
Head, neck	Stellate ganglion Deep cervical plexus Cervical paravertebral		Occipital Peribulbar Sub-Tenon's Superficial cervical plexus
Upper limb	Infraclavicular		Interscalene Supraclavicular Axillary Suprascapular Ulnar, radial, medial (forearm or wrist level)
Thorax	Epidural Thoracic paravertebral		Parasternal intercostal plane (deep, superficial) Serratus anterior (deep, superficial) Erector spinae plane Intercostal Interpectoral plane and pecto-serratus plane
Abdomen, pelvic			Ilioinguinal Iliohypogastric Transversus abdominis plane (TAP) Rectus sheath Genital branch of genitofemoral nerve Pudendal nerve
Lower limb, back	Lumbar plexus Psoas compartment Lumbar sympathectomy Lumbar paravertebral Quadratus lumborum Fascia transversalis Sacral plexus Pericapsular nerve group (PENG) Sciatic (proximal approaches) Spinal Epidural Lumbar paravertebral		Femoral Femoral triangle Adductor canal Sciatic (subgluteal, popliteal level) Fascia iliaca Lateral cutaneous nerve of the thigh Femoral branch of genitofemoral nerve Sural, saphenous, tibial, peroneal (deep, superficial)

Deep
nerve block
=
neuraxial
block

Superficial
nerve block

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Distance between the region of interest (nerves) and the body surface is not a criterion to differentiate between deep and superficial blocks. Distance varies depending on anatomy and BMI. The list is neither definitive nor absolute. Institutional or individual block categorisation may vary according to the specific technique applied and to operators' experience and skills. Individual risk-benefit analysis must be made before any block. This is particularly important if the only reason the drug is being withheld is to facilitate regional anaesthesia. Anaesthesiological alternatives (e.g. general anaesthesia) should be considered in patients with high thromboembolic or ischaemic risk where it may be preferable to continue antithrombotic drugs peri-operatively without withdrawal, and in cases wherein the bleeding risk due to the block itself is high and potentially catastrophic.

LEVEL OF ACTIVITY DRUG

- Anti Xa activity (< 0,1UI/ml) for DXA, LMWH, Fondaparinux
- aPTT or ACT for UFH
- INR < 1,5 for VKA

Drug blood level Dabigatran/DXA < 30ng/ml^{-1}

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La gestione anestesiologica della frattura di femore nel paziente anziano

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CONTENUTI

1 SCOPO E CAMPI DI APPLICAZIONE
2 DESTINATARI
3 CONTENUTI
4 BIBLIOGRAFIA

Tab. 4 ANTICOAGULANTI E ANTIAGGREGANTI: CONSIDERAZIONI PER L'OPERABILITÀ E PER L'ANESTESIA NEUROASSIALE [12, 22-27]

Farmaco	Considerazioni per l'operabilità	Considerazioni per l'anestesia neuroassiale	Test di laboratorio
Warfarin	operabile con INR <2. Se INR>1,5, consigliabile somministrazione di 1-3 mg di vitamina K ev PCC indicato nel caso non si riesca ad ottenere INR<1,5 dopo *reverse* con vitamina k	INR ≤ 1,5	INR
Xabani* dose profilattica Rivaroxaban (Xarelto) Apixaban (Eliquis) Edoxaban (Lixiana)	dopo 12-48h dall'ultima dose	dopo 24-72h, → attendere 40-75h, se dosaggi maggiori, creatinina > 1,5 mg/dl, età > 80 anni, peso <60 Kg	attività anti-Xa farmaco specifica
Dabigratan* (Pradaxa) a dose profilattica	dopo 24-48h dall'ultima dose considerare idarucizumab (Praxbind) 5 g ev come reverse rapido	incompatibile con chirurgia < 48h o solo dopo Praxbind; se CrCl ≥80 ml/min attendere 72h se 50 < CrCl<79 → 96h se 30 < CrCl<49 →120h se CrCl < 30 sconsigliato	TT, dTT (aPTT) Hemoclot thrombin inhibitor assay
UFHs ev	sospendere infusione 2-4h prima dell'intervento	dopo 4h	aPTT
LMWH dose profilattica	ultima dose pre-operatoria 12h prima	dopo 12h	
LMWH dose terapeutica	ultima dose preoperatoria 24h prima (monitorare il sanguinamento)	dopo 24h	
Clopidogrel Ticlopidina Prasurgrel Ticagrelor	non ritardare l'intervento monitorare il sanguinamento	incompatibile con chirurgia < 48h considerare AG + blocco periferico (sempre in caso di DAPT)	aggregometria POC
Aspirina	non controindicato	non controindicata	

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VKA REVERSAL

EMERGENCY

Recommendation 31

From a pharmacological point of view, neuraxial or deep nerve procedures may be performed in emergency situations following an individual risk–benefit evaluation once the anticoagulant activity of VKA is fully reversed by prothrombin complex concentrate (PCC), INR-dependent dose adjusted and combined with vitamin K (10 mg). 2C

VKA MANAGEMENT

- Discontinue VKA at least 5days before elective surgery
- Assess INR 1-2d prior to surgery, if > 1.5 consider 1-2mg oral vit K
- Urgent Surgery consider 2.5-5mg oral or IV 10mg
- EMERGENCY for immediate reversal consider:
  - PCC 20UI/Kg for INR < 2; 30UI/Kg for INR 2.1-3.9; 40UI/Kg for INR 4-5.9; 50UI/Kg for INR > 6
  - Fresh Frozen Plasma 15ml/Kg

EJA

CHEST 2016

DOACS REVERSAL

EMERGENCY

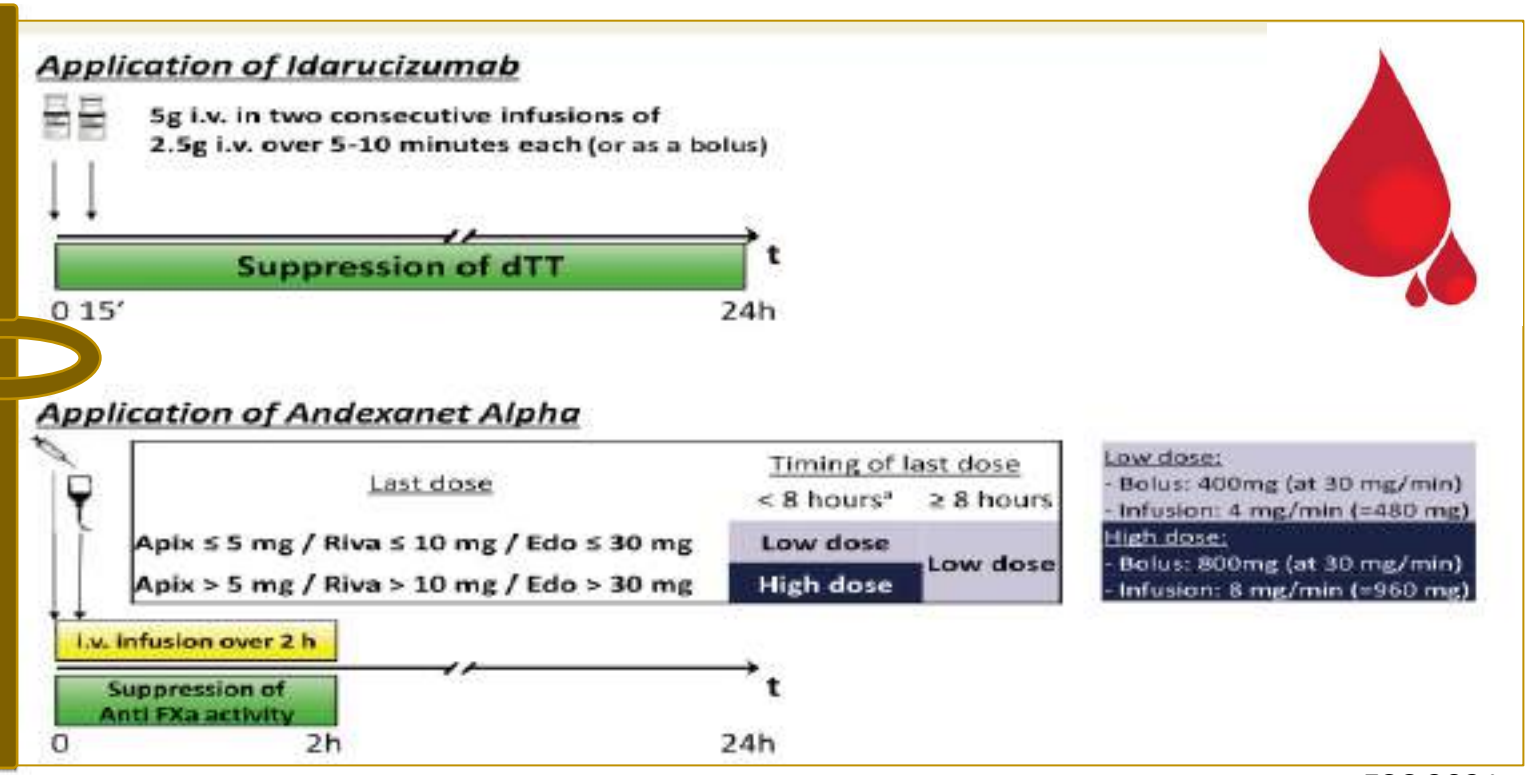
Recommendation 32

Neuraxial or deep nerve procedures may be performed in emergency situations once the anticoagulant activity of dabigatran is fully reversed by the specific antidote idarucizumab. 2C

Nonspecific haemostatic agents (PCC or activated PCC) do not affect time intervals for dabigatran. 2C

Andexanet alpha does not affect time intervals. 2C

Nonspecific haemostatic agents (PCC or activated PCC) do not affect time intervals for DXA. 2C



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ESC 2021

vigilance

RECOMMEND POST INTERVENIONAL VIGILANCE BY MULTIDISCIPLINARY TEAM
FOR SIGNS AND SYMPTOMS RELATE NEW OR PROGRESSIVE NEUROLOGICAL DEFECT: NEW/INCREASING BACK PAIN, NUMBNESS OR WEAKNESS OF THE LEGS, BLADDER DYSFUNCTION, DURATION /EXTENSION OF MOTOR OR SENSORY BLOCK
REGULAR PATIENT ASSESSMENTS BY TRAINED PERSONNEL FOR MINIMUM OF 24 H AND LONGER IN HIGT.RISK PATIENTS
IMMEDIATE IMMAGING RMN
IF INDICATED SURGICAL DECOMPRESSION SHOULD BE PERFORMED WITHIN 6 H

mario.bosco@aslroma1.it

Take home message

FOR PATIENTS RECEIVING ANTICOAGULANT / ANTIPLATELETS DRUGS

- *BE AWARE OF THE RISK OF SERIOUS CLINICAL CONSEQUENCES FROM BLEEDING BEFORE AND THE AFTER HIGH RISK BLOCKs AND DURING INSERTION/REMOVAL OF A CATHETER*
- *BE COMPETENT IN DETECTING AN MANAGING A POSSIBLE COMPLICATION AND MANTEIN A POSTPROCEDURAL VIGILANCE FOR HIGH RISK PATIENTS*

- INFORM THE PATIENTS ABOUT SIGN AND SYMPTOMS OF NEUROLOGICAL DEFICITS
- MULTIDISCIPLINARY ASSESSMENT FOR PATIENTS WITH HIGH THROMBOTIC/HAEMORRAGIC RISK

7 Ottobre

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ASL ROMA 1
DIPARTIMENTO SVILUPPO ORGANIZZATIVO
UOC SICUREZZA PREVENZIONE E RISK MANAGEMENT
DIRETTORE: DOTT.SSA M. QUINTILI
GESTIONE PERIOPERATORIA DELLA TERAPIA ANTIAGGREGANTE E ANTICOAGULANTE
rev. 0 del 10.01.2019 | pag. 1 di 21
PG_SPRM_08

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ASL ROMA 1
DIPARTIMENTO SVILUPPO ORGANIZZATIVO
UOC SICUREZZA PREVENZIONE E RISK MANAGEMENT
DIRETTORE:DOTT.SSA M.QUINTILI
PROFILASSI DEL TROMBOEMBOLISMO VENOSO (TEV) NEI PAZIENTI CANDIDATI AD INTERVENTO CHIRURGICO
REV. 0 DEL 10.01.2019 | PAG. 1 DI 19
PG_SPRM_09

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DIRETTORE: PROF. MARIO BOSCO

REGIONE LAZIO

SICUREZZA IN ANESTESIA LOCOREGIONALE

REV. N. 0 DEL 10.01.2019 | PAGINA 1 DI 30
11B PRO 01

REVISIONE	DATA	REDATTO	VERIFICATO DIRETTORE UOC SPRM	APPROVATO AREA DIREZIONE SANITARIA
Rev.0 (Emissione)	10.01.2019	GdL	Dott.ssa M. Quintili	Dott.ssa P Chierchini

Gruppo di Lavoro
Prof. Mario Bosco: Direttore Area Interdipartimentale di Anestesia e Rianimazione
Dott. Carlo Alberto Monaco: Direttore UOC Anestesia e Rianimazione SFN
Dott. Massimo Perfetti: UOS Gestione Camere Operatorie SFN
Dott.ssa Luciana Minieri Anestesia e Rianimazione SFN

mb

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XXVIII CONGRESSO NAZIONALE

5-7 Ottobre 2023
PALERMO

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NAZIONALE

Uno sguardo verso il Mediterraneo
Il Rischio Clinico

Thanks

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NEURAXIAL BLOCKS AND DEEP NERVE BLOCKS

- CONSEQUENCE OF BLEEDING IS SIGNIFICANT, AND MAY BE CATASTROPHIC
- MANAGEMENT IS DIFFICULT BECAUSE SITE IS DEEP AND NON COMPRESSIBLE.
- SURGICAL CONTROL MAY BE REQUIRED
- *Withdrawal of antithrombotic drugs is recommended*

SUPERFICIAL NERVE BLOCKs

- Consequence of block induced bleeding is of less clinical significance
- Management is easy, at compressible site, less likely to require invasive intervention
- Withdrawal of antithrombotic drug is not compulsory

The guidelines recommend observing specific time intervals:

BEFORE and AFTER neuraxial blockade

Before and after peripheral nerve blockade (deep nerve blocks)

Before and after catheter removal

to reduce the risk of bleeding and of haematoma formation

(Adult surgical patients >16 years, Obstetric patients,Anaesthetic and analgesic blocks)

EJA
PODCAST
GUIDELINES
Eur J Anaesthesiol 2022; **39**:100–132

Regional anaesthesia in patients on antithrombotic drugs
Joint ESAIC/ESRA guidelines

MANAGEMENT OF ANTICOAGULANT THERAPY: VKA

Recommendation 1

Irrespective of the target International Normalised Ratio (INR), ***neuraxial procedures should be performed when VKA treatment has been withheld and the INR has returned to the normal range of the local laboratory (e.g. 1.1).*** ***1C***

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

	High risk of bleeding block (neuraxial and deep nerve blocks)[a]		
Drug and dose	**Time from last drug intake to intervention[c]**	**Target laboratory value at intervention**	**Time from intervention to next drug dose**
VKA	Until target lab value: (about 3 days acenocoumarol; 5 days warfarin, fluindione; 7 days phenprocoumon)	INR normal	

An INR less than 1.5 may be acceptable *in individual patients, if after a careful risk–benefit analysis a general anaesthetic is best avoided and a neuraxial anaesthetic technique should be used.* 2C

A last VKA intake of 3 days (acenocoumarol), 5 days (warfarin), before the procedure is proposed. 2C

Table 3 **Management in high bleeding risk blocks (neuraxial and deep nerve blocks)**

	High risk of bleeding block (neuraxial and deep nerve blocks)[a]		
Drug and dose	**Time from last drug intake to intervention[c]**	**Target laboratory value at intervention**	**Time from intervention to next drug dose**
VKA	Until target lab value: (about 3 days acenocoumarol; 5 days warfarin, fluindione; 7 days	INR normal	

Following neuraxial procedures, the next dose of VKA should be administered according to guidelines on postoperative VTE prophylaxis or therapeutic anticoagulation. 1C

In the presence of an indwelling neuraxial catheter, the next dose of VKA should be administered only after its withdrawal. 1C

In the interim, a low dose of LMWH may be used whilst a neuraxial catheter remains in place. 2C

AVK: ACTIVE REVERSAL STRATEGIES

No specific guidelines

Vitamin K **(oral administration has slower effect than intravenous infusion)**

Prothrombin complex concentrates *(PCCs*)

Fresh frozen plasma (FFP)

SIGN RECOMMENDATION, BSH RECOMMENDATION TO REVERSE ANTICOAGULATION IN PATIENTS WITH HIP FRACTURE to reduce the time to surgery.

Recommendation 3

Superficial nerve procedures may be performed in the presence of VKA, irrespective of the target INR. 2C

Following superficial nerve procedures, the next dose may be administered at the routinely prescribed next time point. 2C

Deep nerve procedures should be performed according to the recommendations for neuraxial procedures (R1). 1C

MANAGEMENT OF DOACs

ACCORDING TO CLINICAL INDICATIONS, DOACS ARE USED AT HIGH OR LOW DOSAGES WITH SPECIFIC TIME INTERVALS BEFORE THE BLOCKADE

MANAGEMENT OF DOACs: DABIGATRAN

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

Drug and dose	High risk of bleeding block (neuraxial and deep nerve blocks)[a] Time from last drug intake to intervention[c]	Target laboratory value at intervention	Time from intervention to next drug dose
Dabigatran low[b]	48 h	No testing	
Dabigatran high	72 h or until target laboratory value (until target laboratory value if CrCl <50 ml min^{-1})	DTI level < 30 ng ml^{-1} (alternative: thrombin time in normal range of local laboratory)	High doses: according to guidelines on therapeutic anticoagulation[f] (about 24 h postop)

DABIGATRAN HIGH DOSES : 72 h

- ***Prevention of stroke in atrial fibrillation***
- ***Treatment of acute venous thromboembolism***

- ***Dosage : 150mg BID***

- ***Dosage adjustments : 110mg BID***
- ***If age >80 years, or concomitant use of verapamil, or CrCl 30-50 ml/min***

MANAGEMENT OF DOACs: DABIGATRAN

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

Drug and dose	High risk of bleeding block (neuraxial and deep nerve blocks)[a] Time from last drug intake to intervention[c]	Target laboratory value at intervention	Time from intervention to next drug dose
Dabigatran low[b]	48 h	No testing	
Dabigatran high	72 h or until target laboratory value (until target laboratory value if CrCl <50 ml min^{-1})	DTI level < 30 ng ml^{-1} (alternative: thrombin time in normal range of local laboratory)	High doses: according to guidelines on therapeutic anticoagulation[f] (about 24 h postop)

DABIGATRAN low DOSES : 48 h

- ***Prophylaxis of venous thromboembolism after major orthopaedic surgey***
- ***Dosage: 220mg/die***
- ***Dosage adjustments : 150 mg/die***

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

Drug and dose	High risk of bleeding block (neuraxial and deep nerve blocks)[a] Time from last drug intake to intervention[c]	Target laboratory value at intervention	Time from intervention to next drug dose
DXA high	72 h or until target laboratory value (until target laboratory value if CrCl <30 ml min^{-1})	DXA level <30 ng ml^{-1} (alternative: anti-Xa ≤ 0.1 IU ml^{-1})	Low doses: according to guidelines on postOP VTE prophylaxis[d] (about 8 h – t_{max} = 6 h postop). Consider prolonged time interval after bloody tap[e]
DXA low[b]	24 h rivaroxaban, edoxaban (30 h if CrCl <30 ml min^{-1}), 36 h apixaban	No testing	

Rivaroxaban
Apixaban
Edoxaban

RIVAROXABAN HIGH DOSES : 72 h

- **Stroke prevention in AF**
- **Acute venous thromboembolism treatment (15mg BID)**

- **Dosage: 20mg/die**
- **15 mg/die if CrCl < 50ml/min**

RIVAROXABAN LOW DOSES

- **VTE prophylaxis after major orthopaedic surgery**
- **Extended prevention of recurrent DVT and PE**

- **Dosage: 10 mg/die**

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

Drug and dose	High risk of bleeding block (neuraxial and deep nerve blocks)[a] Time from last drug intake to intervention[c]	Target laboratory value at intervention	Time from intervention to next drug dose
DXA high	72 h or until target laboratory value (until target laboratory value if CrCl $<30\ ml\ min^{-1}$)	DXA level $<30\ ng\ ml^{-1}$ (alternative: anti-Xa $\leq 0.1\ IU\ ml^{-1}$)	Low doses: according to guidelines on postOP VTE prophylaxis[d] (about 8 h – t_{max} = 6 h postop). Consider prolonged time interval after bloody tap[e]
DXA low[b]	24 h rivaroxaban, edoxaban (30 h if CrCl $<30\ ml\ min^{-1}$), 36 h apixaban	No testing	

Rivaroxaban
Apixaban
Edoxaban

APIXABAN HIGH DOSES:72 h

- **Stroke prevention in AF**
- **Acute venous thromboembolism treatment**

- **Dosage: 5 mg BID**
- **Dosage adjustemnts: 2,5 mg BID (CrCl < 30ml/min, age, weight)**

APIXABAN LOW DOSES:36h

- **VTE prophylaxis after major orthopaedic surgery**
- **Extended prevention of recurrent DVT and PE**

- **Dosage: 2,5 mg BID**

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

Drug and dose	High risk of bleeding block (neuraxial and deep nerve blocks)[a] Time from last drug intake to intervention[c]	Target laboratory value at intervention	Time from intervention to next drug dose
DXA high	72 h or until target laboratory value (until target laboratory value if CrCl <30 ml min^{-1})	DXA level <30 ng ml^{-1} (alternative: anti-Xa ≤ 0.1 IU ml^{-1})	Low doses: according to guidelines on postOP VTE prophylaxis[d] (about 8 h – t_{max} = 6 h postop). Consider prolonged time interval after bloody tap[e]
DXA low[b]	24 h rivaroxaban, edoxaban (30 h if CrCl <30 ml min^{-1}), 36 h apixaban	No testing	

Rivaroxaban
Apixaban
Edoxaban

EDOXABAN HIGH DOSES: 72 h

- **Stroke prevention in AF**
- **Acute venous thromboembolism treatment**

- **Dosage: 60 mg/die**

- **Dosage adjustement: 30 mg/die if CrCl < 50ml/min**

EDOXABAN LOW DOSES NOT APPLICABLE

DOACS : SUMMARY OF RECOMMENDATIONs

In low doses of DOACs[a] the last intake should be a minimum of 24 h for rivaroxaban and edoxaban, 36 h for apixaban, and 48 h for dabigatran before neuraxial procedures. 1C

If CrCl is $< 30\ ml\ min^{-1}$, the last low-dose rivaroxaban, edoxaban intake should be at least 30 h before neuraxial procedures. 1C

In high doses of DOACs[a] the last intake should be a minimum of 72 h before neuraxial procedures. 1C

If CrCl is $< 50\ ml\ min^{-1}$ with high-dose dabigatran treatment or if CrCl is $< 30\ ml\ min^{-1}$ with high dose DXA treatment, neuraxial procedures may be performed if the appropriate laboratory assay is within the normal range of the local laboratory. 2C

Following neuraxial procedures, the next low dose of DOAC should be administered according to guidelines on postoperative VTE prophylaxis or therapeutic anticoagulation. 1C

In the presence of an indwelling neuraxial catheter the next dose of DOAC should be administered only after its withdrawal;1C in the interim a low dose of LMWH or low dose UFH may be used whilst a neuraxial catheter remains in place. 2C

DOACs REVERSAL STRATEGIES: NO SPECIFIC GUIDELINES

LOW MOLECULAR WEIGHT HEPARIN : MANAGEMENT

LMWH low ≤50 IU anti-Xa kg^{-1} day^{-1} enoxaparin ≤40 mg day^{-1}	12 h (24 h if CrCl <30 ml min^{-1})	No testing	
LMWH high	24 h (48 h if CrCl <30 ml min^{-1}) or until target lab value (especially if CrCl <30 ml min^{-1})	anti-Xa ≤ 0.1 IU ml^{-1}	VKA, DOAC, LMWH high, UFH high; should not be administered with a catheter in situ

IN LOW DOSES LMWH THE LAST ADMINISTRATION SHOULD BE A MINIMUM OF 12 HOURS BEFORE NEUROAXIAL PROCEDURES.
IN HIGH DOSES LMWH THE LAST ADMINISTRATION SHOULD BE A MINIMUM OF 24 HOURS.
IF CrCl <30 ml/min THE DOSE OF LMWH SHOULD BE HALVED OR THE INTERVAL TO NEUROAXIAL PRECEDURES SHOULD BE DOUBLED

ANTIPLATELET THERAPY

ANTIPLATELET MEDICATIONS ARE A CORNERSTONE OF THERAPY FOR ATHEROSCLEROTIC CARDIAC AND VASCULAR DISEASES.

THEY ARE USED IN PRIMARY OR SECONDARY PREVENTION

IN ACUTE CORONARY SINDROME DUAL ANTIPLATELET THERAPY (DAPT) WITH ASPIRIN AND A P2Y12 INHIBITOR (CLOPIDOGREL, TICAGRELOR, PRASUGREL) CONFERS GREATER PROTECTION

Table 3 Management in high bleeding risk blocks (neuraxial and deep nerve blocks)

Drug and dose	High risk of bleeding block (neuraxial and deep nerve blocks)[a] Time from last drug intake to intervention[c]	Target laboratory value at intervention	Time from intervention to next drug dose
Aspirin low $\leq$ 200 mg day^{-1}	0	No testing	Routinely prescribed next time point
Aspirin high	3 days (in normal platelet counts) to 7 days	(consider specific platelet function tests in normal range of local laboratory)	6 h
$P2Y_{12}$ inhibitor	5 days ticagrelor 5 to 7 days clopidogrel 7 days prasugrel or until target laboratory value		0-h clopidogrel 75 mg 24 h prasugrel, ticagrelor 2 days clopidogrel 300 mg
Aspirin low + anticoagulant	Aspirin: 0 + time interval of specific anticoagulant	specific laboratory test for combined anticoagulant	Aspirin low: routinely prescribed next time point Combined anticoagulant, antiplatelet drug: according to guidelines on therapeutic anticoagulation, platelet inhibition[f] (about 24 h postOP)
Aspirin low and antiplatelet drug	Aspirin: 0 and time interval of specific antiplatelet drug	(consider specific laboratory test for combined antiplatelet drug)	

THE RISK OF BLEEDING AFTER NEURAXIAL OR DEEP NERVE BLOCKs IS INCREASED IN PATIENTS ON ANTICOAGULANT OR ANTIPLATELETS DRUGS

THE RISK OF DRUG-INDUCED HAEMATOMA IS A CONCERN ***BEFORE AND AFTER THE BLOCK***

THE RISK IS ALSO A CONCERN FOR THE CATHETER REMOVAL

*THE **BLEEDING** RISK IS **DETERMINED BY**:*

- **THE *DOSE OF THE ANTITHROMBOTIC /ANTICOAGULANT DRUG***
- **PATIENTS-RELATED FACTORS SUCH US :**

AGE,
BODY WEIGHT,
RENAL FUNCTION (CrCl)
HEPATIC FUNCTION
CONCOMITANT USE OF OTHER DRUGS

Table 2 Categorisation of nerve blocks

	Deep nerve blocks / neuraxial blocks	Superficial nerve blocks
Examples for blocks		
Head, neck	Stellate ganglion Deep cervical plexus Cervical paravertebral	Occipital Peribulbar Sub-Tenon's Superficial cervical plexus
Upper limb	Infraclavicular	Interscalene Supraclavicular Axillary Suprascapular Ulnar, radial, medial (forearm or wrist level)
Thorax	Epidural Thoracic paravertebral	Parasternal intercostal plane (deep, superficial) Serratus anterior (deep, superficial) Erector spinae plane Intercostal Interpectoral plane and pecto-serratus plane
Abdomen, pelvic		Ilioinguinal Iliohypogastric Transversus abdominis plane (TAP) Rectus sheath Genital branch of genitofemoral nerve Pudendal nerve
Lower limb, back	Lumbar plexus Psoas compartment Lumbar sympatheotomy Lumbar paravertebral Quadratus lumborum Fascia transversalis Sacral plexus Pericapsular nerve group (PENG) Sciatic (proximal approaches) Spinal Epidural Lumbar paravertebral	Femoral Femoral triangle Adductor canal Sciatic (subgluteal, popliteal level) Fascia iliaca Lateral cutaneous nerve of the thigh Femoral branch of genitofemoral nerve Sural, saphenous, tibial, peroneal (deep, superficial)

Distance between the region of interest (nerves) and the body surface is not a criterion to differentiate between deep and superficial blocks. Distance varies depending on anatomy and BMI. The list is neither definitive nor absolute. Institutional or individual block categorisation may vary according to the specific technique applied and to operators' experience and skills. Individual risk-benefit analysis must be made before any block. This is particularly important if the only reason the drug is being withheld is to facilitate regional anaesthesia. Anaesthesiological alternatives (e.g. general anaesthesia) should be considered in patients with high thromboembolic or ischaemic risk where it may be preferable to continue antithrombotic drugs peri-operatively without withdrawal, and in cases wherein the bleeding risk due to the block itself is high and potentially catastrophic.

THE CLINICAL CONSEQUENCE (***Minor Or Severe Consequence, Management Of Complication, Need For Invasive Intervention***) ***OF BLEEDING IS RELATED TO THE PROCEDURE***

ACCORDINGLY NEURAXIAL BLOCKS AND DEEP PNBs (Peripheral Nerve Blocks) are *HIGH RISK BLOCKS*

SUPERFICIAL PNBs ARE *LOW RISK BLOCKS*