



# Perioperative management of patients on NOACS

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- ▶ About 1/4 of anticoagulated patients require temporary cessation for a planned intervention within 2 years
  - ▶ Various societies have issued separate guidelines on the timing of NOAC interruption prior to surgery or interventions
  - ▶ The EHRA practical guide gives unified approach

# Take into account

- ▶ age
- ▶ history of bleeding complications
- ▶ concomitant medication
- ▶ kidney function
- ▶ surgical factors

# Bleeding risk

- ▶ **Minor** bleeding risk
- ▶ **Low** bleeding risk
- ▶ **High** bleeding risk

## Interventions with minor bleeding risk

Dental interventions

Extraction of 1–3 teeth

Paradontal surgery

Incision of abscess

Implant positioning


Cataract or glaucoma intervention

Endoscopy without biopsy or resection

Superficial surgery (e.g. abscess incision; small dermatologic excisions; . . .)

# Minor bleeding risk



- ▶ It is recommended not to interrupt oral anticoagulation
  - ▶ these procedures can be performed 12–24 h after the last NOAC intake
  - ▶ restart 6 h later
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# Minor bleeding risk

		Day -4	Day -3	Day -2	Day -1	<u>Day of surgery</u>	Day +1	Day +2	
<b>Minor bleeding risk</b>	Dabi					<div style="background-color: #d1c4e9; padding: 5px; display: inline-block;">No bridging</div>  <div style="border: 1px solid black; padding: 2px; display: inline-block;">Restart ≥ 6h post surgery</div>			
	Apix								
	Edo / Riva (AM intake)								
	Edo / Riva (PM intake)								

# Low bleeding risk

Interventions with low bleeding risk (i.e. infrequent or with low clinical impact)

Endoscopy with biopsy



Prostate or bladder biopsy

Electrophysiological study or catheter ablation (except complex procedures, see below)

Non-coronary angiography (for coronary angiography and ACS: see Patients undergoing a planned invasive procedure, surgery or ablation section)

Pacemaker or ICD implantation (unless complex anatomical setting, e.g. congenital heart disease)



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- ▶ it is recommended to take the last dose of a NOAC 24 h before the elective procedure in patients with normal kidney function
  - ▶ concomitant dronedarone, amiodarone or verapamil, it may be advisable to add an extra 24 h of interruption

**Table 11** Timing of last non-vitamin K antagonist oral anticoagulant intake before start of an elective intervention

	Dabigatran		Apixaban – Edoxaban – Rivaroxaban	
	No important bleeding risk and/or adequate local haemostasis possible: perform at trough level (i.e. 12 h or 24 h after last intake)			
	Low risk	High risk	Low risk	High risk
CrCl $\geq$ 80 mL/min	$\geq$ 24 h	$\geq$ 48 h	$\geq$ 24 h	$\geq$ 48 h
CrCl 50–79 mL/min	$\geq$ 36 h	$\geq$ 72 h	$\geq$ 24 h	$\geq$ 48 h
CrCl 30–49 mL/min	$\geq$ 48 h	$\geq$ 96 h	$\geq$ 24 h	$\geq$ 48 h
CrCl 15–29 mL/min	Not indicated	Not indicated	$\geq$ 36 h	$\geq$ 48 h
CrCl <15 mL/min	No official indication for use			

# Low bleeding risk

		Day -4	Day -3	Day -2	Day -1	<u>Day of surgery</u>	Day +1	Day +2	
Low bleeding risk	Dabi		 <small>(if CrCl ≥ 30)</small>	 <small>(if CrCl ≥ 50) (if CrCl ≥ 80)</small>		No bridging	 		
	Apix					No bridging	 		
	Edo / Riva <u>(AM intake)</u>					No bridging	 		
	Edo / Riva <u>(PM intake)</u>					No bridging	 		

# Device implantation procedures

- ▶ **BRUISE-CONTROL 2** ( 2017) trial demonstrated similar bleeding and embolic rates in patients with a last intake 48 h before the implantation for rivaroxaban/apixaban vs. continued NOAC until the morning of the procedure
- ▶ standard strategy: intake of the last dose in the morning of the day before the procedure and restarting one day afterwards

Interventions with high bleeding risk (i.e. frequent and/or with high impact)

Complex endoscopy (e.g. polypectomy, ERCP with sphincterotomy etc.)

Spinal or epidural anaesthesia; lumbar diagnostic puncture

Thoracic surgery

Abdominal surgery

Major orthopaedic surgery

Liver biopsy


Transurethral prostate resection

Kidney biopsy

Extracorporeal shockwave lithotripsy (ESWL)

# High bleeding risk


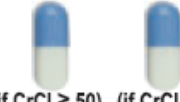












- ▶ it is recommended to take the last NOAC dose 48 h or longer before surgery
  - ▶ preoperative bridging with LMWH or heparin is not recommended in NOAC-treated patients
  - ▶ measurement of NOAC plasma levels may be considered
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# High bleeding risk

	Day -4	Day -3	Day -2	Day -1	<u>Day of surgery</u>	Day +1	Day +2			
<b>High bleeding risk</b>	Dabi  (if CrCl ≥ 30)	 (if CrCl ≥ 50) (if CrCl ≥ 80)	<b>No bridging (heparin / LMWH)</b>		Consider plasma level measurements (in special situations *)	<b>No bridging</b>	★	Consider postoperative thrombo- prophylaxis per hospital protocol	Restart ≥ 48h (-72h) post surgery	
	Apix 									
	Edo / Riva (AM intake) 									
	Edo / Riva (PM intake) 									

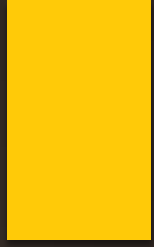


# Take home message

- ▶ The time of interruption depends on the kidney function and type of procedure/surgery
- ▶ Excessive time of interruption raises the risk of embolic events
- ▶ No need for bridging with LMWH



THANK  
YOU



**Patient requiring unplanned surgery**

