

# Precision Perioperative Antithrombotic Management

Navigating the Risk-to-Action Arc: A Visual Synthesis of the 2022 CHEST Guidelines

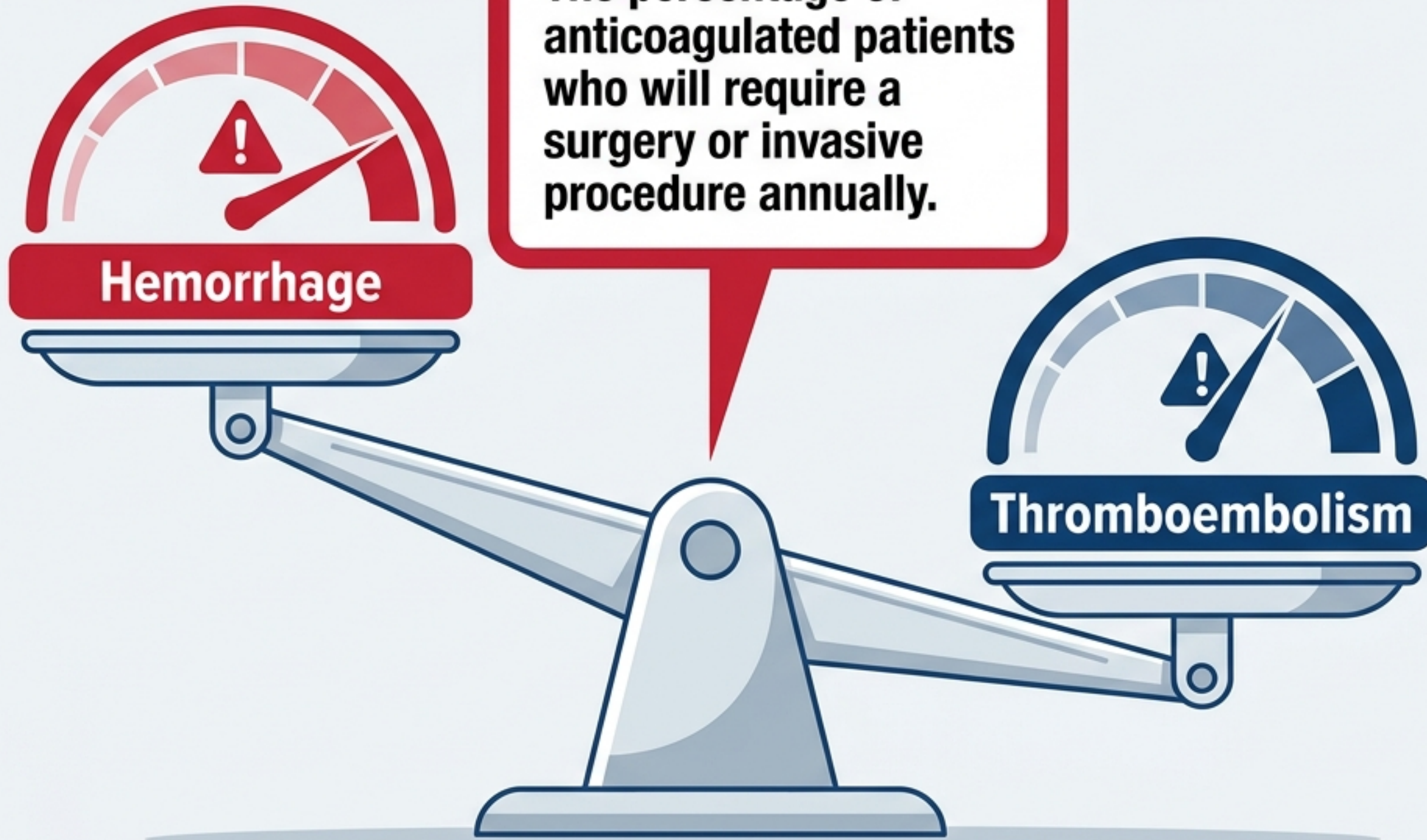


Comprehensive pathways for VKAs, DOACs, and Antiplatelets | 44 PICO Questions Distilled

# The Perioperative Dilemma

**15–20%**

The percentage of anticoagulated patients who will require a surgery or invasive procedure annually.



Managing these patients is no longer an art; it is a calculated science.

- If anticoagulation interruption is too short, the patient **bleeds**.
- If interruption is too long or excessive bridging is used, the patient **clots** (0.5%–1.0% excess risk for disabling stroke).
- The 2022 **CHEST Guidelines** provide the definitive flight path.

# The Clinical Decision Pathway



## Step 1: Assess the Patient

Determine Patient-Specific Thromboembolic Risk (The Clot Risk).



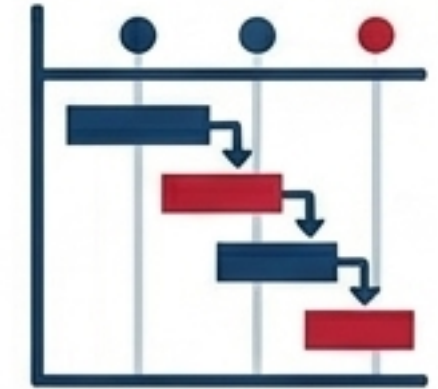
## Step 2: Assess the Procedure

Determine Surgery/Procedure-Specific Bleeding Risk (The Bleed Risk).



## Step 3: Choose the Pathway

Vitamin K Antagonists, DOACs, or Antiplatelets.







## Step 4: Execute the Timeline

Precise interruption, bridging, and resumption flight paths.

# Step 1: Stratifying Thromboembolic Risk

	Mechanical Heart Valve	Atrial Fibrillation	VTE
<b>High Risk</b> ( $>10\%/y$ ATE or $>10\%/mo$ VTE)	Mitral valve w/ stroke risk factors; Caged ball/tilting-disc; Recent ( $<3$ mo) stroke/TIA.	CHA <sub>2</sub> DS <sub>2</sub> VASc $\geq 7$ or CHADS <sub>2</sub> = 5-6; Recent stroke/TIA; Rheumatic disease.	Recent ( $<3$ mo) VTE; Severe thrombophilia; Active high-risk cancer.
<b>Moderate Risk</b> ( $4-10\%$ ATE/VTE)	Mitral valve without stroke risk factors; Bileaflet AVR w/ stroke risk factors.	CHA <sub>2</sub> DS <sub>2</sub> VASc = 5-6 or CHADS <sub>2</sub> = 3-4.	VTE past 3-12 mo; Recurrent VTE; Non-severe thrombophilia; Active/recent cancer.
<b>Low Risk</b> ( $<4\%$ ATE or $<2\%$ VTE)	Bileaflet AVR without stroke risk factors.	CHA <sub>2</sub> DS <sub>2</sub> VASc 1-4 or CHADS <sub>2</sub> 0-2 (no prior stroke).	VTE $> 12$ mo ago.

# Step 2: Stratifying Procedural Bleed Risk

<b>Minimal</b> (~0% 30-day major bleed)	<b>Low-to-Moderate</b> (0-2% 30-day major bleed)	<b>High</b> (≥2% 30-day major bleed)
<b>Full-dose anticoagulation often safe.</b>	<b>Brief interruption acceptable.</b>	<b>Minimal-to-no residual anticoagulant effect required.</b>
<div data-bbox="159 821 369 1028">  </div> Minor dental (extractions, restorations)  <div data-bbox="159 1065 369 1271">  </div> Minor dermatology (excision, biopsy)  <div data-bbox="159 1309 369 1515">  </div> Cataract surgery  <div data-bbox="159 1553 369 1759">  </div> Pacemaker/ICD implantation	<ul style="list-style-type: none"> <li>• Arthroscopy</li> <li>• Cutaneous/node biopsy</li> <li>• Foot/hand surgery</li> <li>• Coronary angio (radial)</li> <li>• GI endoscopy/colonoscopy w/ biopsy</li> <li>• Laparoscopic cholecystectomy</li> <li>• Hernia repair</li> </ul>	<ul style="list-style-type: none"> <li>• Major surgery with extensive tissue injury</li> <li>• Cancer surgery</li> <li>• Major orthopedic/thoracic/urologic</li> <li>• Highly vascular organ surgery</li> <li>• Neuraxial anesthesia (spinal/epidural)</li> </ul>

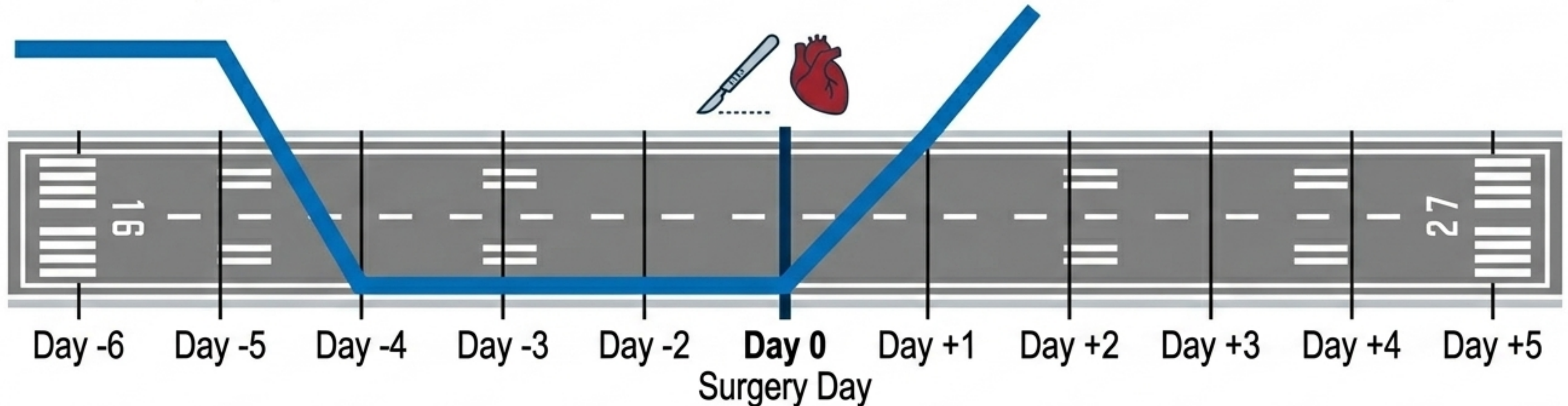
# Pathway 1: Vitamin K Antagonists (The 5-Day Rule)

## Pre-Op Interruption:

- Stop VKA  $\geq 5$  days before elective surgery.
- Allows normal/near-normal INR without routine pre-op Vitamin K.

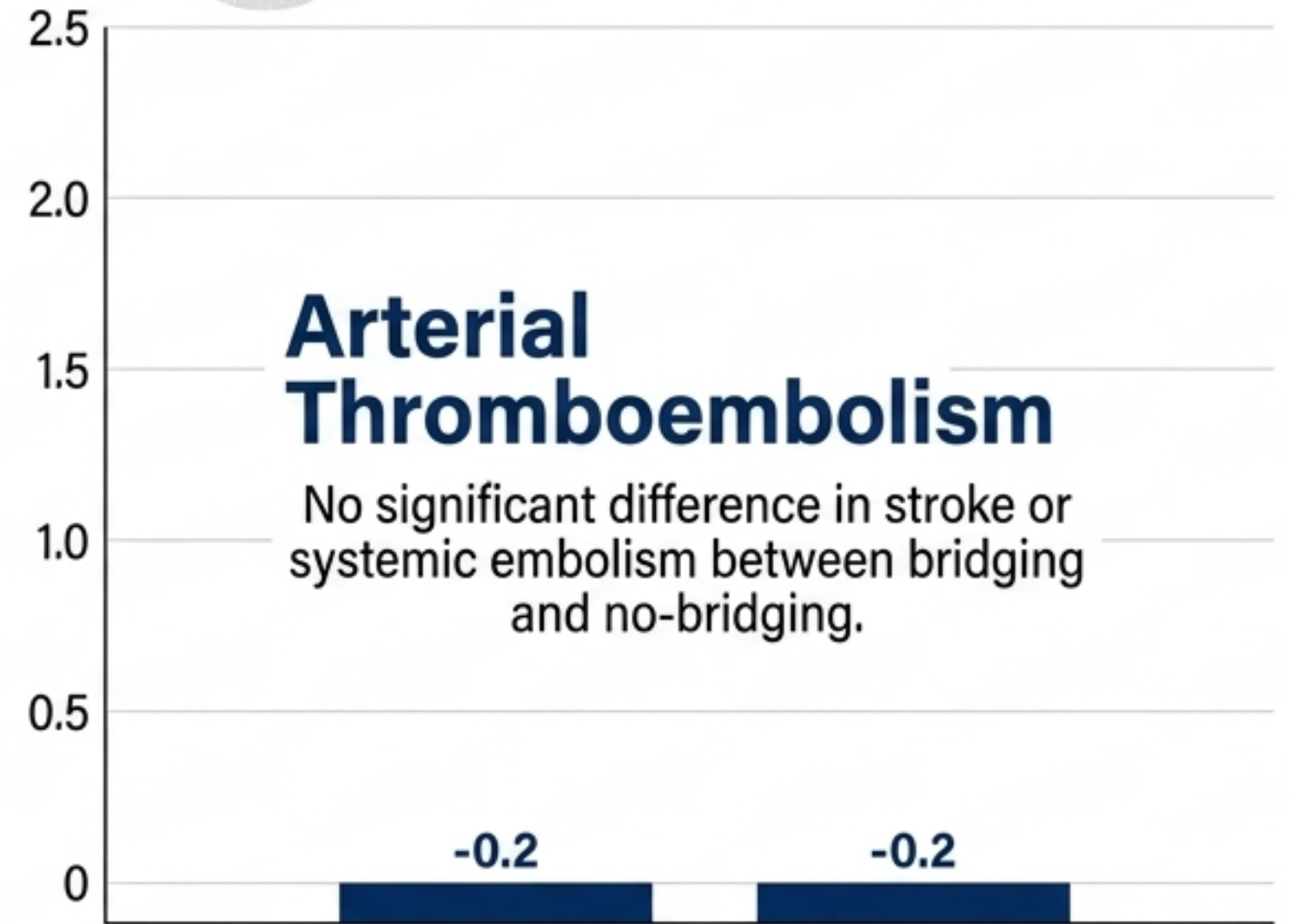
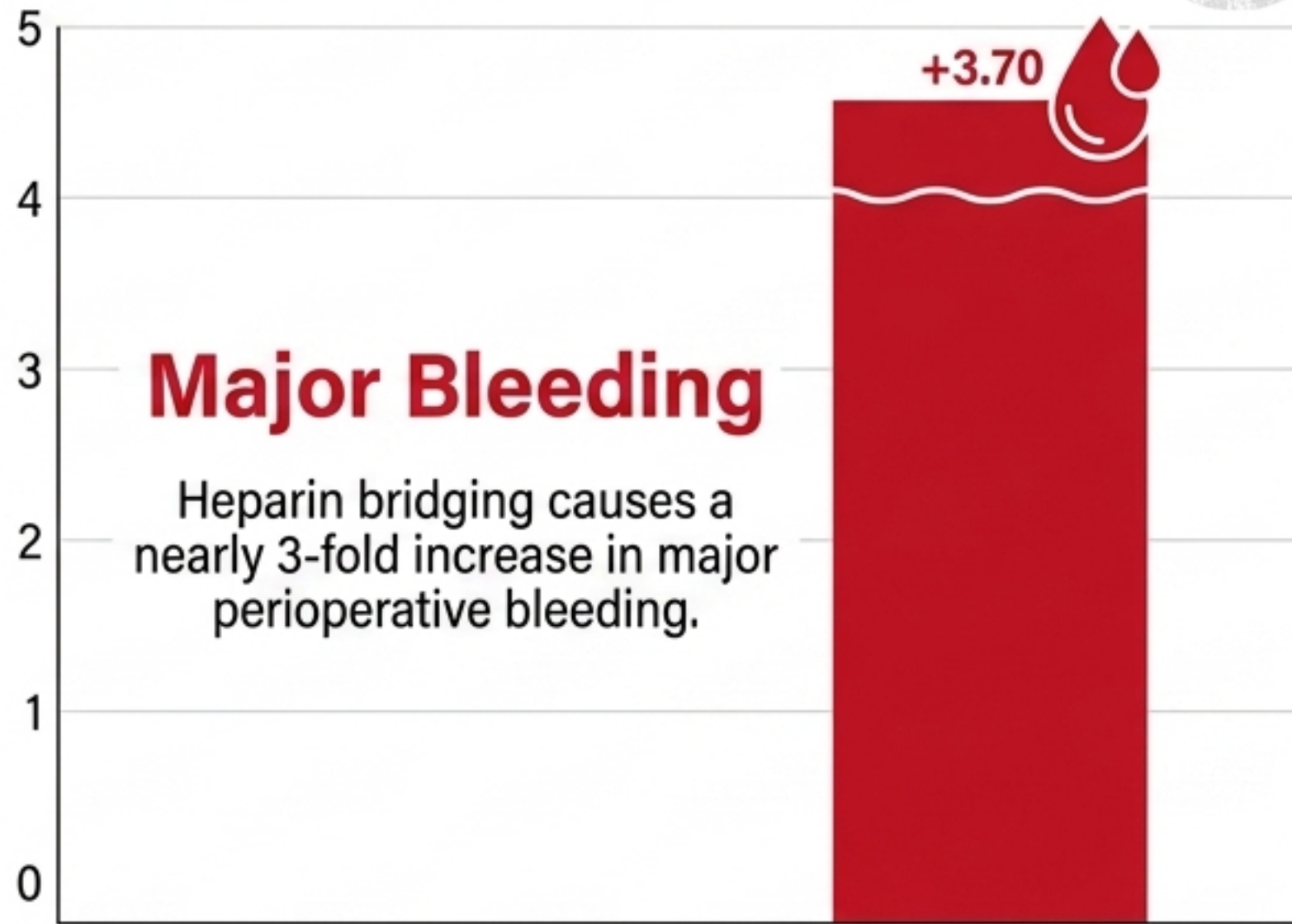
## Post-Op Resumption:

- Resume VKA within 24 hours post-procedure.
- Restart at the patient's usual maintenance dose. Do not double the dose to catch up.



**Clinical Insight:** 5 days off allows the 36-42 hour Warfarin half-life to clear. Full anticoagulant effect (INR > 2.0) naturally returns **4-8 days** after resumption.

# The Bridging Paradigm Shift: Stop Routine Bridging

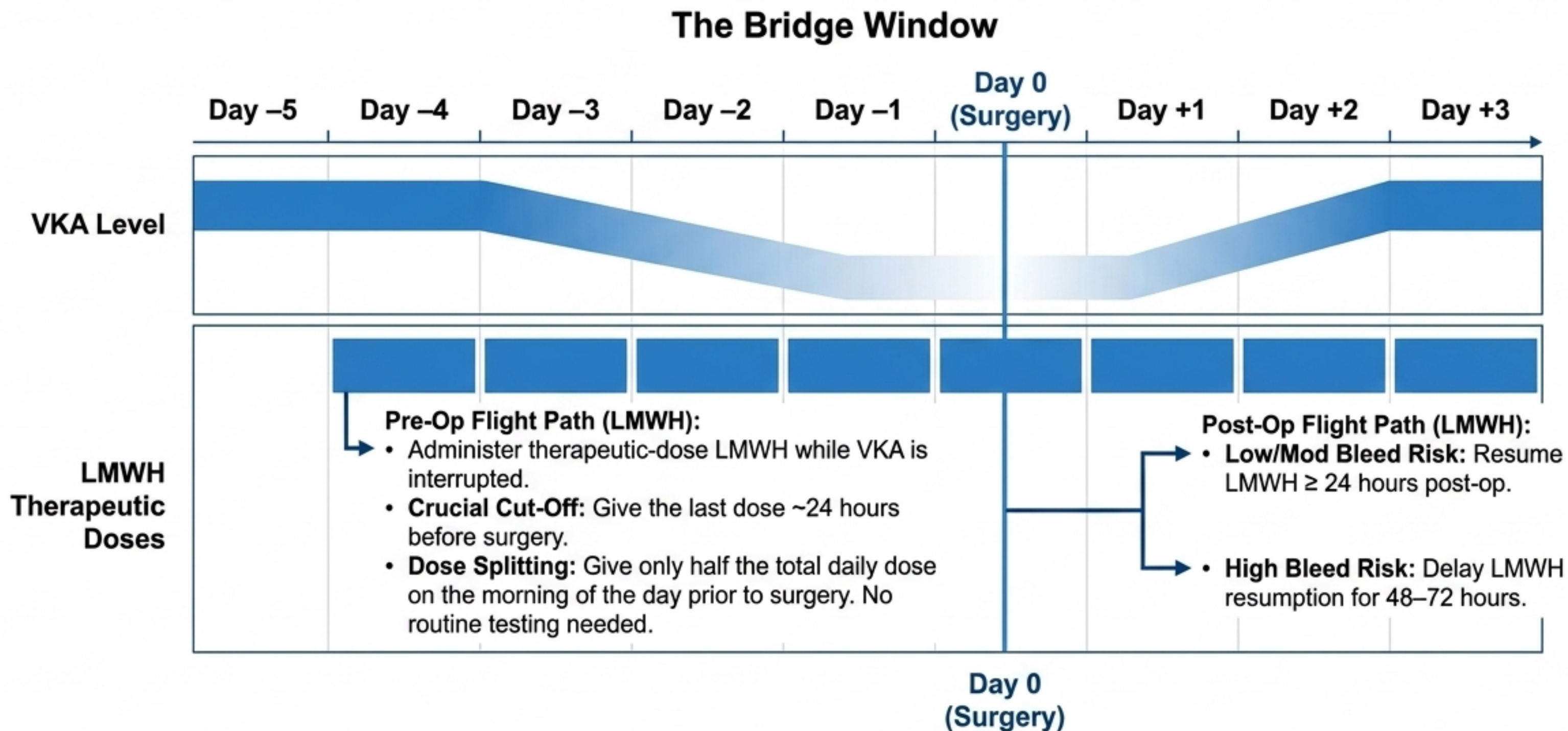


## The 2022 Rules





- Strongly RECOMMEND AGAINST bridging for Atrial Fibrillation.
- Suggest AGAINST bridging for Mechanical Heart Valves.
- Suggest AGAINST bridging for VTE as sole indication.
- Suggest AGAINST bridging for colonoscopy w/ polypectomy.

# The Bridge Window: Managing the High-Risk Exception

**Who Gets Bridged?**  
Only patients classified as **High Risk** for thromboembolism.



# The Master Anticoagulant Matrix

Drug Name	Mechanism	Half-Life	Routine Bridging Needed?
Warfarin (VKA)	Vitamin K Antagonist	36-42h	ONLY High-Risk
Apixaban (DOAC)	Factor Xa Inhibitor 	~12h	NEVER
Dabigatran (DOAC)	Factor IIa Inhibitor 	12-17h (Renal dependent)	NEVER
Edoxaban (DOAC)	Factor Xa Inhibitor 	10-14h	NEVER
Rivaroxaban (DOAC)	Factor Xa Inhibitor 	5-9h (young) to 11-13h (elderly)	NEVER

**Key Insight:** The rapid offset/onset of DOACs completely eliminates the pharmacokinetic justification for Heparin Bridging.

# Pathway 2: DOACs (The 'No Bridging' Era)

## The Pharmacokinetic Reality:

- DOACs have short elimination half-lives (9–14 hours).

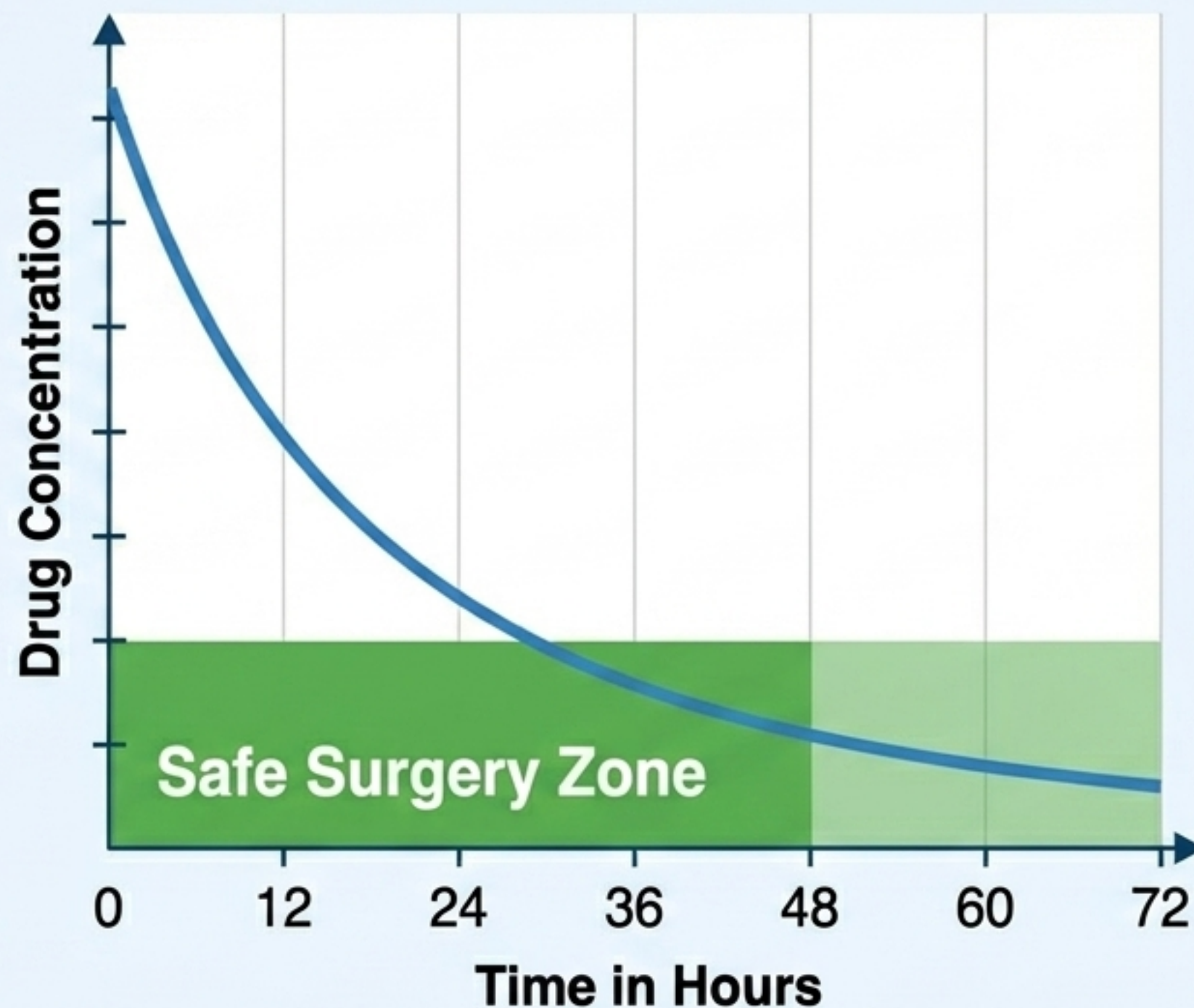
## The Math of Interruption:

- Waiting 1 day (30-36 hours) = ~3 half-lives. Acceptable residual effect for Low-to-Moderate Bleed Risk.
- Waiting 2 days (60-68 hours) = 4-5 half-lives. Minimal-to-zero residual effect, required for High Bleed Risk.

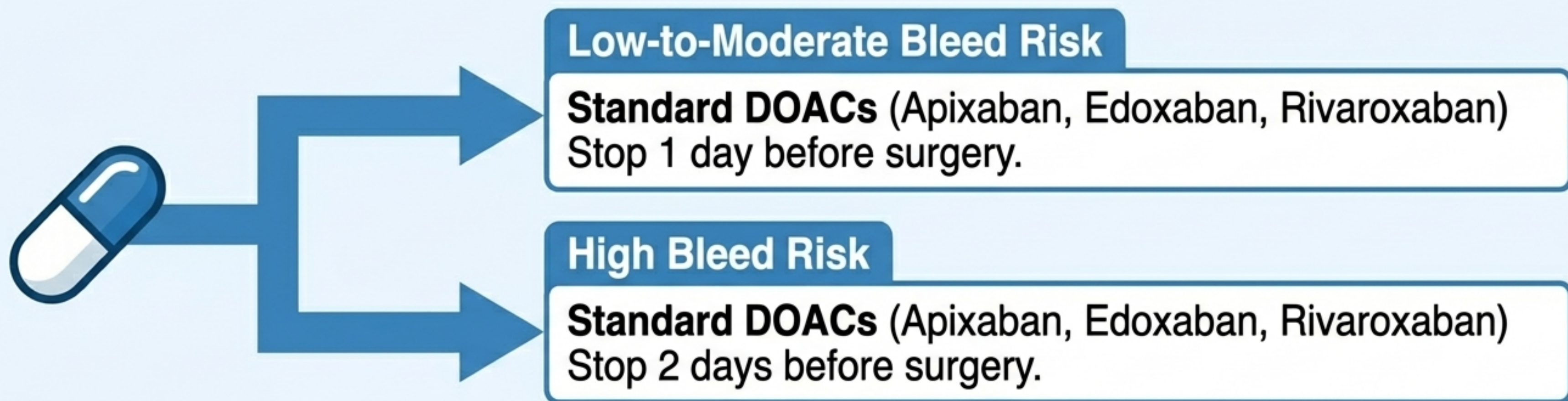
## The Rule:

Interruption is strictly pharmacokinetic. Stop bridging. Stop guessing. Just count the days.

## The Pharmacokinetic Decay Curve



# DOAC Pre-Op Interruption Flight Paths



- ! The Dabigatran Exception**  
Highly reliant on renal clearance (75-80%).
- If CrCl  $\geq$  50 mL/min: Follow standard rules (1 day Low/Mod; 2 days High).
  - If CrCl  $<$  50 mL/min: Stop 2 days for Low/Mod risk; Stop 4 days for High bleed risk.

**Universal Rule: NO DOAC taken on the day of surgery.**

# DOAC Post-Op Resumption & Laboratory Testing



## Resumption Timing:

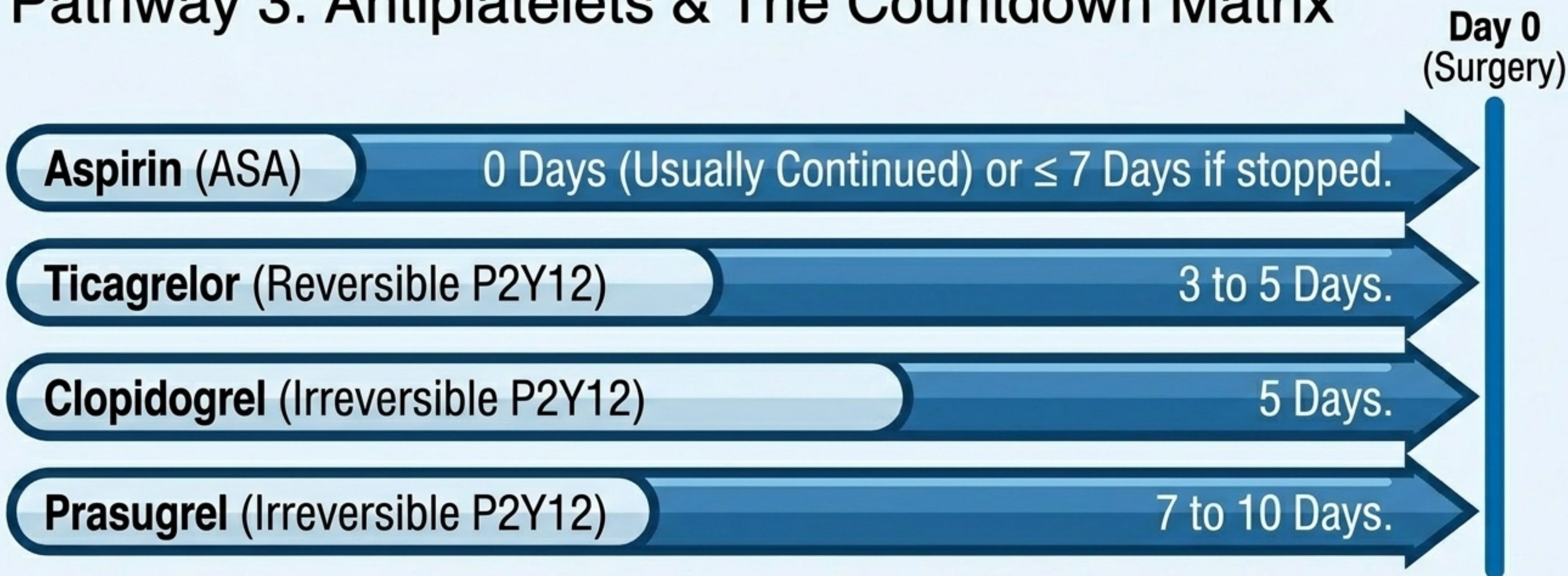
- DOACs hit peak effect in 1-3 hours. Resuming too early causes immediate bleeding.
- **Low-to-Moderate Bleed Risk:** Resume > 24 hours post-procedure.
- **High Bleed Risk:** Delay resumption 48–72 hours post-procedure.



## The Testing Mandate:

- Suggest **AGAINST** routine DOAC coagulation function testing before surgery.
- **Why?** Standard tests (INR, aPTT) are insensitive to DOACs. Specialized tests lack validated clinical thresholds for safety.
- **Action:** Rely on the pharmacokinetic timeline, not the lab.

# Pathway 3: Antiplatelets & The Countdown Matrix



## The Pharmacological Baseline:

Irreversible inhibitors require waiting for platelet regeneration (7-10 day lifespan).  
Reversible inhibitors require drug clearance.

## Resumption:

Resume  $\leq 24$  hours post-surgery for all, barring extreme surgical bleeding risk.

# Navigating Antiplatelets in Surgery

## Non-Cardiac Surgery

**Aspirin:** Suggest CONTINUATION of ASA over interruption. (If surgical risk demands stopping, stop  $\leq 7$  days prior).

**P2Y12 Inhibitors:** Stop according to the Countdown Matrix (3-10 days).

## Coronary Artery Bypass Graft (CABG)

**Aspirin:** Suggest CONTINUATION of ASA perioperatively (reduces mortality, no severe increase in bleeding).

**P2Y12 Inhibitors:** Must be INTERRUPTED perioperatively to prevent life-threatening pericardial tamponade.

**Testing:** Routine platelet function testing is NOT recommended to guide management.

# The Stent Exception: Managing Dual Antiplatelet Therapy



## The Risk:

Stent thrombosis carries up to 50% mortality. Risk is critically high in the first 6 weeks and plateaus after 6 months.

## Recent Stents (6–12 Weeks):

- Continue both agents OR stop only one agent 7-10 days prior.
- If DAPT must continue: Delay the elective surgery if possible.

## Established Stents (3–12 Months):

- Stop the P2Y12 inhibitor prior to surgery. Continue the Aspirin.

## The Bridging Warning:

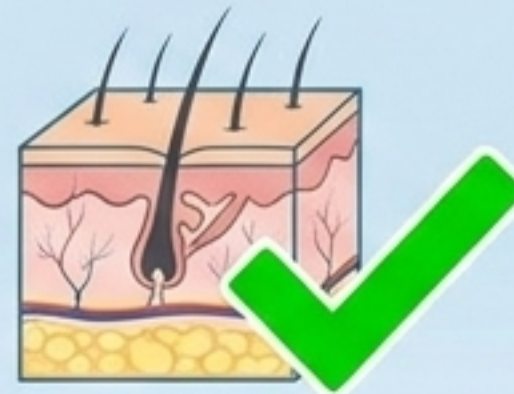
- Suggest AGAINST routine bridging with glycoprotein IIb/IIIa inhibitors (cangrelor, tirofiban) or LMWH.

# Special Scenarios: The 'Continue Therapy' Rule



## Dental

Continue VKA, DOACs, and Antiplatelets. Use local pro-hemostatic agents (tranexamic acid mouthwash) instead of stopping systemic drugs.



## Dermatology

Continue therapy for minor excisions/biopsies. Most bleeds are self-limiting.



## Ophthalmology

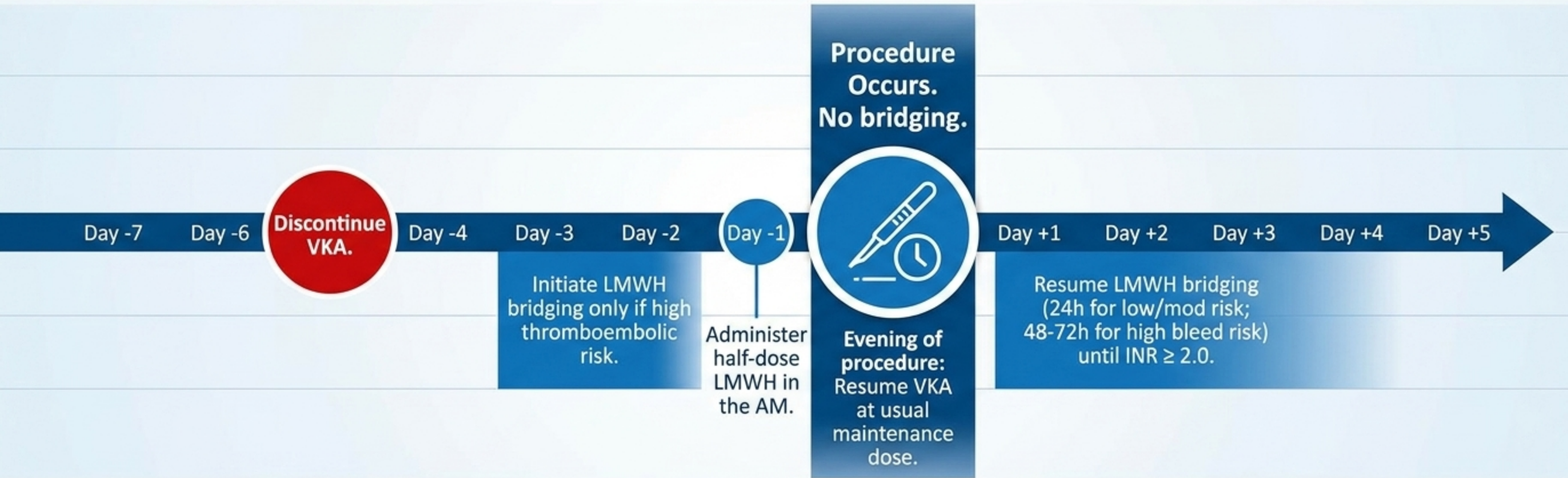
Continue therapy for cataract (phacoemulsification) surgery. Largely avascular procedure.



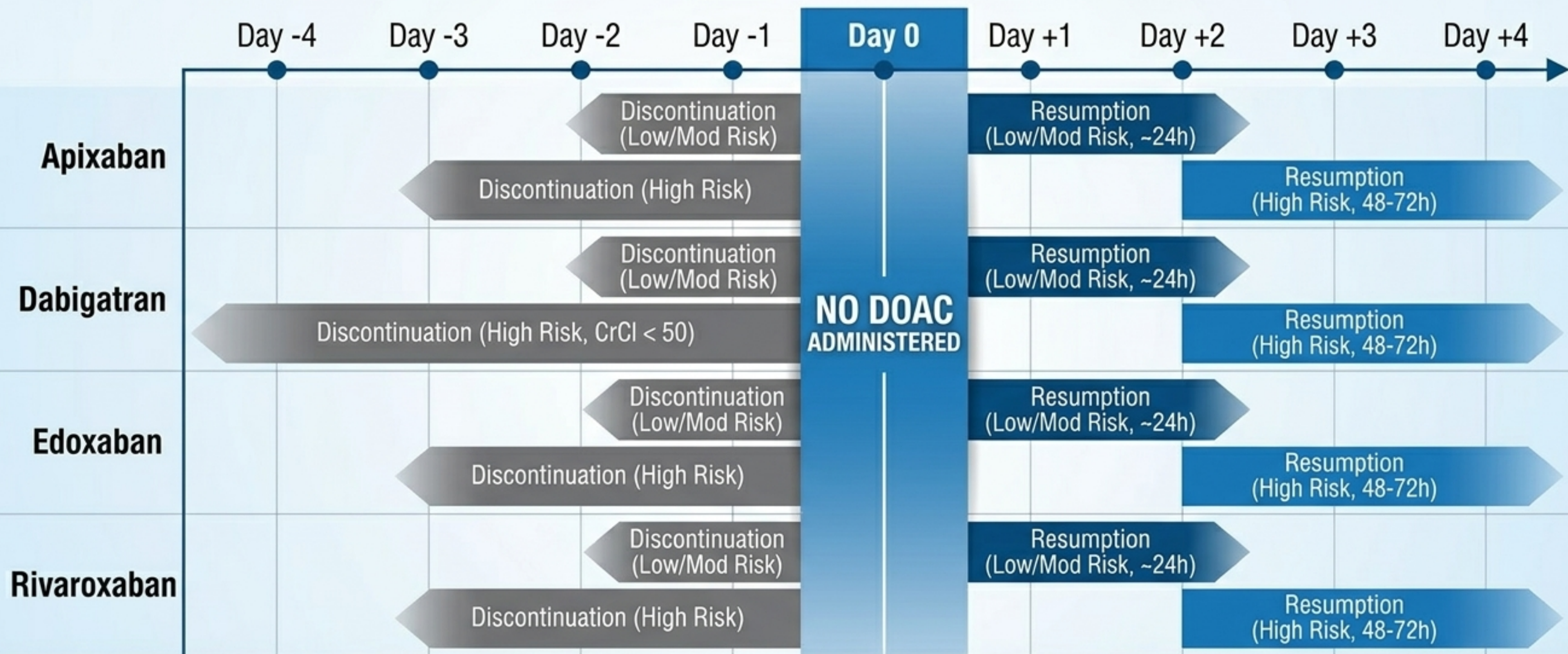
## Pacemakers/ICDs

Strongly Recommend continuation of VKA over interruption and bridging. Minimizes pocket hematomas.

# Master Synthesis: The VKA Flight Path

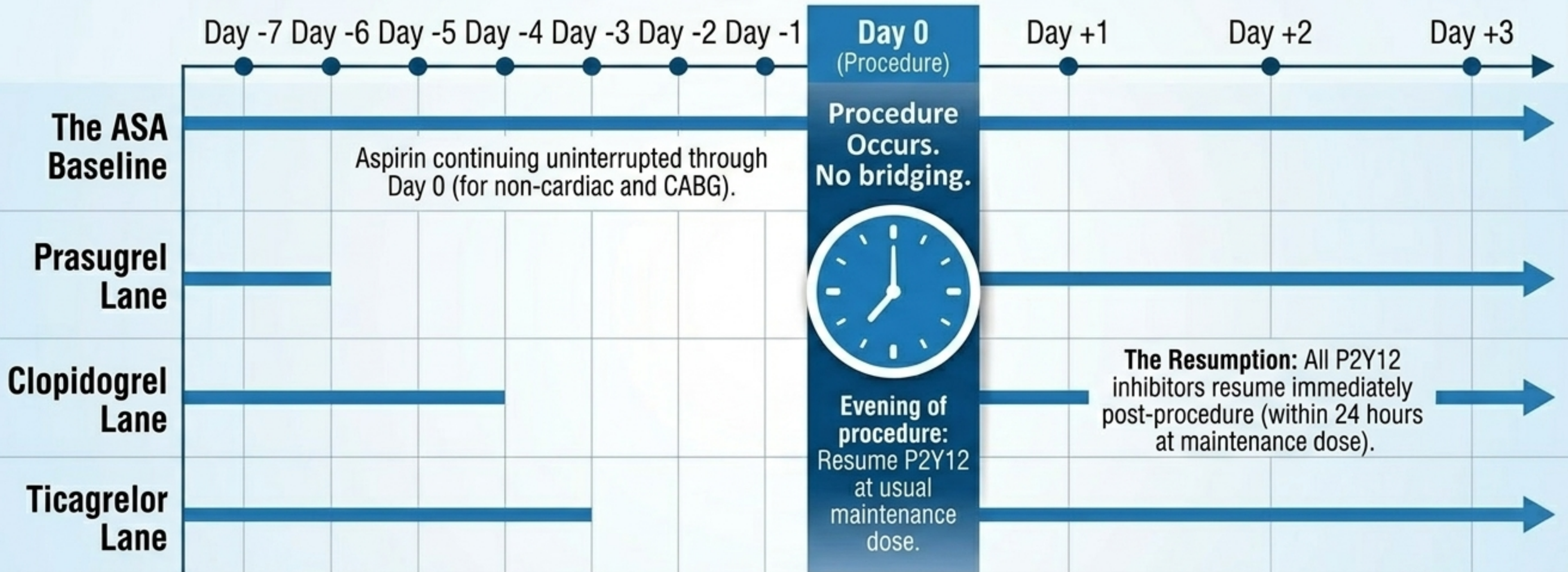


# Master Synthesis: The DOAC Flight Path



Note: No heparin bridging used at any point on this timeline.

# Master Synthesis: The Antiplatelet Flight Path



**Key Takeaway:** A unified rhythm of stopping and starting based on standardized clinical rules, replacing individual guesswork with a calculated science.