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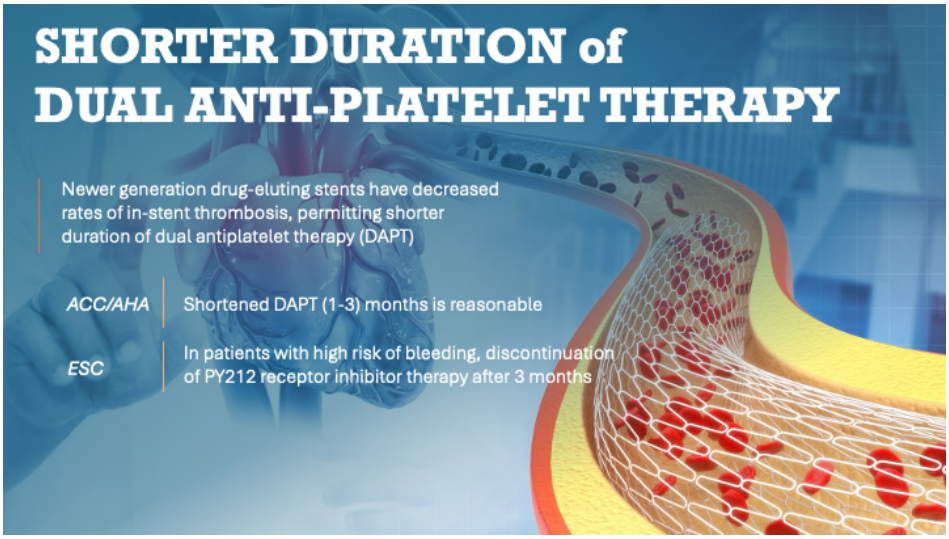
New Drug-Eluting Cardiac Stents and Dual Antiplatelet Therapy: How Short is Too Short?

by Janak Chandrasoma, MD; Abigail Song, BS; Joseph Szokol, MD; and Antreas Hindoyan, MD

INTRODUCTION

The *APSF Newsletter* in 2009 discussed the risk of late thrombosis after drug-eluting stent placement as an ongoing patient safety concern.[1] It found that in-stent thrombosis, though rare, accounted for a 60% myocardial infarction (MI) rate and a mortality of 45% when it occurred. Early animal studies found that complete endothelialization with bare metal stents (BMS) occurred in 28 days, whereas first-generation drug-eluting stents (DES) uniformly showed incomplete healing at 180 days.[2] In 2008, the American College of Chest Physicians (ACCP) recommended delaying elective surgery for 12 months after the placement of a drug-eluting stent,[3] placing burdens on patients needing urgent surgery. As such, the *APSF Newsletter* acknowledged in 2009 the lack of universally accepted protocols for managing patients presenting for noncardiac surgery following recent stent placement. It emphasized the necessity for collaborative decision-making involving the patient, internist, surgeon, anesthesia professional, and cardiologist, stating that this multidisciplinary discussion should consider the type and timing of stent placed, the nature and urgency of the proposed surgery, the management of perioperative antiplatelet therapy, and the choice of facility at which to perform the surgery. If surgery must be performed in patients with recent stent placement, it should ideally take place at a facility with a 24-hour interventional cardiologist available, as emergent percutaneous coronary intervention (PCI) remains the best treatment option for in-stent thrombosis.[1]



DAPT: Dual Antiplatelet Therapy; ACC: American College of Cardiology; AHA: American Heart Association; ESC: European Society of Cardiology

Table 1: High Bleeding Risk (HBR) Criteria.[7]

Defined according to the presence of at least one of the following:
Age ≥ 75 years
Oral anticoagulation planned to continue after PCI
Anemia (Hemoglobin < 11 g/L)
Transfusion within 4 weeks before inclusion
Platelet count < 100,000/mL
Hospital admission for bleeding within the previous 12 months
Stroke within the previous 12 months
History of intracerebral hemorrhage
Severe chronic liver disease
Chronic kidney disease (Creatinine clearance < 40 mL/min
Cancer within the previous 3 years
Planned major, noncardiac surgery in the next 12 months
Glucocorticoids or NSAIDs planned for > 30 days after PCI
Expected nonadherence to >30 days of DAPT

Technology has since evolved dramatically and the recommended duration of dual antiplatelet therapy (DAPT) has changed substantially. First generation stents consisted of a standard bare metallic stent, and a coated polymer mixed with an antirestenotic drug such as sirolimus or paclitaxel. Newer-generation drug-eluting stents such as biodegradable polymer stents or bioresorbable scaffolds are available, which have been shown to lead to lower rates of stent thrombosis. These newer-generation stents may permit a shorter course of DAPT without compromising patient safety.

Perhaps the most important consideration when deciding on the optimal duration of DAPT is balancing the risk of in-stent thrombosis with the risk of bleeding complications. Studies have shown that prolonged DAPT therapy is associated with an increased risk of bleeding, particularly in elderly patients or those with co-morbidities.[4,5] Bleeding complications significantly increase the risk of morbidity and mortality, and high bleeding risk (HBR) is present in approximately 40% of patients presenting for PCI.[5] Tools that evaluate bleeding risk with DAPT include the PRECISE-DAPT Score[6] and the Academic Research Consortium for High-Risk Bleeding (ARC-HBR) Criteria.[4]

SUPPORTING EVIDENCE FOR SHORTER DAPT DURATION

High Bleeding Risk (HBR) is defined according to the presence of at least 1 HBR criteria (Table 1).[7]

Two early studies examined high-risk patients who underwent PCI and completed a short duration of DAPT with either ticagrelor monotherapy or ticagrelor plus aspirin. Ticagrelor is a reversible and direct-acting oral P2Y12 receptor antagonist that provides faster, greater, and more consistent platelet inhibition than clopidogrel. The first study found that

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Newer Generation Stents May Permit a Shorter Course of Dual Antiplatelet Therapy Without Compromising Patient Safety

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ticagrelor in combination with aspirin for 1 month, followed by ticagrelor alone, improved outcomes after PCI compared to standard antiplatelet regimens.[8] The second study examined high-risk patients who underwent PCI and completed 3 months of DAPT, determining that ticagrelor monotherapy was associated with a lower incidence of clinically relevant bleeding than ticagrelor plus aspirin, with no higher risk of death, MI, or stroke.[9]

Several other pivotal trials have recently been published that highlight the safety and efficacy of the earlier discontinuation of dual antiplatelet therapy (Table 2). These newer stents are ideal for patients who are at higher risk of bleeding. These studies have uniformly found lower rates of ischemia, allowing shorter duration of DAPT, which lessens patients' bleeding risk. These newer stents also compare favorably to bare metal stents in terms of all-cause mortality, myocardial infarction, stroke, and ischemia-driven target lesion revascularisation.[10-14]

SOCIETAL GUIDELINES

Based on the available and updated evidence, The American College of Cardiology (ACC) and the American Heart Association (AHA) give a Class 2a (moderate) recommendation for a shorter duration of DAPT. Select patients undergoing PCI may safely transition to P2Y12 inhibitor monotherapy and discontinue aspirin after 1–3 months of DAPT, where the benefits outweigh the risks.[15]

In contrast, the European Society of Cardiology offers the following guidance on DAPT duration.[16] Following PCI for non-ST-segment elevation acute coronary syndrome (NSTE-ACS), DAPT with a potent P2Y12 receptor inhibitor and aspirin is generally recommended for 12 months, regardless of stent type, unless contraindicated. However, in specific clinical contexts, such as high bleeding risk (e.g., based on the PRECISE-DAPT scoring of > 25 or meeting ARC-HBR criteria), clinicians may consider shortening DAPT duration (<12 months) or modifying the regimen based on ischemic and bleeding risks, adverse events, comorbidities, concomitant medications, and drug availability. Notably, in NSTE-ACS patients with stent implantation at high bleeding risk, discontinuation of P2Y12 receptor inhibitor therapy after 3–6 months should be considered. In cases of very high bleeding risk, such as a recent (past 30 days) bleeding episode or imminent nondeferrable surgery, a regimen of 1 month of aspirin and clopidogrel may be appropriate.

Table 2: Summary of Recent Studies Examining Abbreviated DAPT Regimens.

Study	Stent Type	DAPT Duration	Primary Findings
GLOBAL-LEADERS[8]	Various	1 month	1 month of DAPT, followed by ticagrelor alone improved outcomes vs. standard regimens.
Mehran (2019)[9]	Various	3 months	3 months of DAPT, followed by ticagrelor monotherapy is associated with lower bleeding incidence vs. continued DAPT, with no higher risk of death, MI, or stroke.
STOPDAPT Trial[10]	Cobalt-Chromium Everolimus-Eluting Stent (CoCr-EES)	3 months	3 months of DAPT, followed by aspirin monotherapy in selected patients after CoCr-EES implantation was noninferior to a prolonged DAPT regimen.
POEM Trial[7]	Synergy DES (Bioresorbable Polymer-Coated Everolimus-Eluting Stent)	1 month	1-month DAPT, followed by aspirin monotherapy deemed safe, with low rates of ischemic and bleeding events.
SENIOR Trial[11]	Bare Metal Stent (BMS) vs. Drug-Eluting Stent (DES)	1 or 6 months	1-month of DAPT (stable/silent cases) vs. 6 months of DAPT (unstable cases), followed by aspirin monotherapy. DES with short DAPT duration is associated with lower rates of all-cause mortality, MI, stroke, and ischemia-driven target lesion revascularization compared to BMS with a similar DAPT regimen.
EVOLVE Short DAPT Study[12]	SYNERGY EES	3 months	3 months of DAPT, followed by aspirin monotherapy in high-bleeding-risk patients, found favorable rates of ischemic outcomes supporting the safety of abbreviated DAPT.
XIENCE Short DAPT Program[13]	XIENCE CoCr-EES	1 or 3 months	1 or 3 months of DAPT, followed by aspirin monotherapy was noninferior to 6 or 12 months of DAPT for ischemic outcomes, potentially associated with fewer major bleeding events and low stent thrombosis incidence.
STOPDAPT-2 ACS Trial[14]	CoCr-EES	1–2 or 12 months	1–2 months of DAPT, followed by aspirin monotherapy did not establish noninferiority compared to 12 months of DAPT. Despite a reduction in major bleeding events, there was a numerical increase in cardiovascular events in the 1–2 month DAPT group.

DAPT: Dual Antiplatelet Therapy; DES: Drug-eluting Stent; MI: Myocardial infarction

In 2022, the American College of Chest Physicians (ACCP) updated its recommendations regarding the timing of DAPT after DES placement.[17] The ACCP provides a conditional recommendation for patients scheduled for elective surgery who have had stent placement within the last 3 to 12 months and are on DAPT. It recommends the discontinuation of the P2Y12 inhibitor prior to surgery, based on indirect evidence and expert opinion suggesting the safety of stopping P2Y12 inhibitors in patients with stents implanted more than 3 months prior (Table 3, next page).

CONCLUSION

Paradigms within the field of cardiology regarding the duration of DAPT have changed dramatically since the 2009 *APSF Newsletter.* Newer generation stent technology has led to less stent thrombosis, and cardiology experts have in turn reduced their recommended duration of DAPT on these new drug-eluting stents to 1–3 month courses of anticoagulation in patients with stable coronary artery disease. Due to the enhanced performance of these newer stents, BMS have been rendered relatively obsolete and have fallen out of favor, and

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Newer-Generation Stent Technology Has Led to Less Stent Thrombosis

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therefore, not frequently placed. Decisions of duration of DAPT in the setting of urgent surgery should be made by cardiologists, in close cooperation with surgical and anesthesia teams, and may include a very short course of DAPT. Anesthesia professionals must be mindful of these shorter durations of DAPT and be cognizant of the fact that durations of anticoagulation of as little as one month may be recommended for their recently stented patients, based on the evidence of enhanced safety profile of these newer-generation stents.

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Table 3: Societal Recommendations for Shortening DAPT Prior to Surgery.

Society	Level of Recommendation	Evidence	Recommendation
ACC/AHA	2a	A	Shorted DAPT (1–3 months) is reasonable.
ESC	IIa	B	In patients with high risk of bleeding, discontinuation of P2Y12 receptor inhibitor therapy after 3 months should be considered.
ACCP	Conditional Recommendation	Very Low Certainty of Evidence	In patients receiving ASA and a P2Y12 inhibitor who had coronary stents placed within the last 3 to 12 months and are undergoing an elective surgery/procedure, we suggest stopping the P2Y12 inhibitor prior to surgery over continuation of the P2Y12 inhibitor.

ACC/AHA: American College of Cardiology/American Heart Association; ESC: European Society of Cardiology; ACCP: American College of Chest Physicians;

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