

# DUAL ANTIPLATELET THERAPY AFTER PCI- WHAT DO THE GUIDELINES SAY?

## Author

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Dual-antiplatelet therapy (DAPT) is recommended after percutaneous coronary intervention (PCI) for patients presenting with both chronic coronary syndrome as well as acute coronary syndrome. However the use of DAPT as well as its duration remains a topic open for debate for cardiologists and physicians. Usage of optimal duration of DAPT is an art rather than science. Percutaneous Coronary Intervention (PCI), also known as coronary angioplasty or stent placement, is a one of the most commonly used interventional cardiology procedure to treat obstructive coronary artery disease. Following PCI, these patients are at an increased risk of developing thrombotic events due to the basic pathophysiology of platelet activation and clot formation around the stent. To prevent these complications, Dual Antiplatelet Therapy (DAPT) is the standard of care, involving the combination of two antiplatelet agents, typically aspirin and a P2Y<sub>12</sub> inhibitor- ticagrelor or prasugrel.

## I. THE RATIONALE FOR DUAL ANTIPLATELET THERAPY (DAPT)

The primary use of DAPT is aimed at reducing the risk of stent thrombosis and other major adverse cardiovascular events (MACE), be it – ACS or SCD. After PCI, abundance of endothelial disruption and vessel injury occurs, which in turn leads to platelet adhesion and activation, which ultimately leads to stent thrombosis. Both aspirin and P2Y<sub>12</sub> inhibitors target different pathways of platelet activation to provide a more effective antithrombotic strategy.

- 1. Aspirin:** Aspirin irreversibly inhibits the enzyme cyclooxygenase (COX) in platelets, thereby inhibiting the synthesis of thromboxane A<sub>2</sub>, which is a potent platelet aggregator and vasoconstrictor. Low-dose aspirin is typically continued indefinitely in patients with coronary artery disease, including those who have undergone PCI.
- 2. P2Y<sub>12</sub> Inhibitors:** P2Y<sub>12</sub> inhibitors, such as clopidogrel, prasugrel, and ticagrelor, act on the ADP (adenosine diphosphate) receptor on platelets, preventing ADP-induced platelet activation and aggregation. These agents are prescribed in addition to aspirin for a specified duration, depending on the clinical scenario.

## II. DURATION OF DUAL ANTIPLATELET THERAPY

The optimal duration of dual antiplatelet therapy has been a subject of extensive research and one of intense clinical benefit. Traditionally and orthodox opinions had a standard duration of 12 months which was recommended to minimize the risk of stent thrombosis during the critical healing period after PCI. However, recent studies have challenged this approach and advocated for a more personalized and tailored approach to DAPT duration.

- 1. Shorter Duration:** In patients at lower risk of stent thrombosis and increased chances of bleeding complications, shorter durations of DAPT (e.g., 3 to 6 months) have been explored. This approach can help reduce the risk of bleeding while still providing adequate protection against stent-related events.
- 2. Extended Duration:** Some high-risk patients, especially those with complex CAD ( such as complex PTCA, left main disease, presence of extensive calcification) or specific clinical characteristics ( Type 2 Diabetes Mellitus , Dyslipidemia , CKD , smokers) may benefit from an extended duration of DAPT beyond 12 months to ensure ongoing protection against cardiovascular events.

## III. DURATION OF DUAL ANTIPLATELET THERAPY (DAPT)

The optimal duration of DAPT still remains a subject of intense research and debate. The duration depends on various factors, including the type of stent implanted, the patient's bleeding risk, and the indication for doing PCI. The two main types of stents used are:

- 1. Bare Metal Stents (BMS):** These stents are made of metal and do not have any evidence of drug coating. The recommended DAPT duration after BMS placement is typically shorter, around 1 to 3 months, mainly to reduce the risk of early stent thrombosis.
- 2. Drug-Eluting Stents (DES):** These stents have a drug coating that helps prevent restenosis, but they also increase the risk of delayed stent thrombosis. For DES, the DAPT duration is more prolonged, usually ranging from 6 to 12 months or even up to 18 months in certain specific clinical cases.

## IV. DUAL ANTIPLATELET THERAPY AFTER PERCUTANEOUS CORONARY INTERVENTION: BALANCING EFFICACY AND SAFETY

**Introduction:** Percutaneous Coronary Intervention (PCI), also known as coronary angioplasty or stent placement, is a widely used interventional cardiology procedure to treat obstructive coronary artery disease. Following PCI, patients are at an increased risk of developing thrombotic events due to platelet activation and clot formation around the stent. To prevent these complications, Dual Antiplatelet Therapy (DAPT) is the standard of care, involving the combination of two antiplatelet agents, typically aspirin and a P2Y12 inhibitor. This article explores the rationale, duration, and challenges associated with DAPT after PCI.

## V. THE RATIONALE FOR DUAL ANTIPLATELET THERAPY (DAPT)

DAPT is aimed at reducing the risk of stent thrombosis and other major adverse cardiovascular events (MACE), such as heart attack or death. After PCI, endothelial disruption and vessel injury occur, leading to platelet adhesion and activation, which can ultimately lead to stent thrombosis. Both aspirin and P2Y12 inhibitors target different pathways of platelet activation to provide a more effective antithrombotic strategy.

- 1. Aspirin:** Aspirin irreversibly inhibits the enzyme cyclooxygenase (COX) in platelets, thereby inhibiting the synthesis of thromboxane A<sub>2</sub>, a potent platelet aggregator and vasoconstrictor. Low-dose aspirin is typically continued indefinitely in patients with coronary artery disease, including those who have undergone PCI.
- 2. P2Y12 Inhibitors:** P2Y12 inhibitors, such as clopidogrel, prasugrel, and ticagrelor, act on the ADP (adenosine diphosphate) receptor on platelets, preventing ADP-induced platelet activation and aggregation. These agents are prescribed in addition to aspirin for a specified duration, depending on the clinical scenario.

## VI. DURATION OF DUAL ANTIPLATELET THERAPY (DAPT)

The optimal duration of DAPT remains a subject of intense research and debate. The duration depends on various factors, including the type of stent implanted, the patient's bleeding risk, and the indication for PCI. The two main types of stents used are:

- 1. Bare Metal Stents (BMS):** These stents are made of metal and do not have a drug coating. The recommended DAPT duration after BMS placement is typically shorter, around 1 to 3 months, to reduce the risk of early stent thrombosis.
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## VII. CHALLENGES AND CONSIDERATIONS

While DAPT is effective in reducing the risk of stent-related thrombotic events, it also poses some challenges:

- 1. Bleeding Risk:** The most significant concern associated with DAPT is an increased risk of bleeding, which can be of particular concern in patients with a history of bleeding or those requiring surgery. Balancing the benefits of preventing thrombotic events with the risk of bleeding is of utmost importance.
- 2. Patient Compliance:** DAPT requires strict adherence to the prescribed medications. Non-compliance, premature discontinuation, or even missed doses can significantly increase the risk of adverse outcomes like stent thrombosis, in-stent restenosis or even ACS. Cardiologists should educate patients about the importance of sticking to the treatment plan.

3. **Novel P2Y12 Inhibitors:** While clopidogrel has been the most widely used P2Y12 inhibitor, newer agents like prasugrel and ticagrelor offer faster and more potent platelet inhibition. However, these newer drugs may also increase bleeding risk, necessitating careful patient selection.
4. **Role of Genetic Testing:** Genetic testing to determine a patient's response to P2Y12 inhibitors has been explored in various forums. Some individuals may have reduced drug metabolism, leading to decreased efficacy or increased bleeding risk. Tailoring treatment based on genetic testing is an area of ongoing research.

### VIII. TRIALS IN DAPT AFTER PCI

Various studies and trials had compared the duration of DAPT between 12 months and beyond. The study by Park et al [1] revealed that the use of DAPT in DES for a period of more than 12 months revealed that there was no excess benefits with DAPT as compared to Aspirin Monotherapy. The OPTIDUAL trial [2] suggested that extended DAPT was not superior in reducing the net adverse clinical events compared to 12 months of DAPT post placement of DES. Similarly the PRODIGY [3] trial evaluated the impact of 6weeks versus 24months of DAPT – which revealed that 24months of clopidogrel was not significantly more effective than 6months of clopidogrel. However the SMART – DATE trial suggested that 6 months of DAPT is less effective than > 12 months of therapy ; which suggests that prolonged DAPT in patients with an ACS without excessive risk of bleeding should remain the standard of care.

### IX. SUMMARY

Overall extended term DAPT was associated with a higher risk of major bleeding than other DAPT groups. In comparison with 12 month DAPT , the net clinical benefits appears to favour short term DAPT followed by P2Y12 inhibitor monotherapy instead of aspirin in select patients, although there is definite evidence that extended term DAPT has a role for patients who have low bleeding risk but with higher ischaemic risk such as ACS.

### REFERENCES

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