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Original Research Article

Short Versus Prolonged Dual Antiplatelet Therapy After Drug-Eluting Stent Implantation: A Prospective Observational Study

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Conflict of interest: Nil

Abstract:

Background: Dual antiplatelet therapy (DAPT) is commonly prescribed following drug-eluting stent (DES) placement to limit the risk of stent-related thrombosis. Despite its established role, uncertainty persists regarding the appropriate duration, given the need to balance ischemic benefits against bleeding hazards.

Objective: To compare clinical outcomes between short-duration and prolonged-duration DAPT in patients undergoing DES implantation.

Methods: This study was carried out at LPS Institute of Cardiology, Kanpur, from November 2019 to November 2022. A total of 150 patients were enrolled and divided into two groups: short DAPT and prolonged DAPT. The principal outcome and secondary outcomes were assessed. Statistical analysis was performed using SPSS software (version 25.0).

Results: MACE incidence was slightly higher in the short DAPT group compared to prolonged DAPT, but the difference was not statistically significant (p=0.56). Bleeding events were significantly higher in the prolonged DAPT group (p=0.02).

Conclusion: Short-duration DAPT appears to provide comparable ischemic protection with significantly lower bleeding risk, suggesting it may be preferable in selected patients.

Keywords: DAPT, Drug-eluting stent, PCI, Bleeding risk, MACE.

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Introduction

Percutaneous coronary intervention (PCI) has evolved substantially with the use of drug-eluting stents (DES), which have demonstrated a clear advantage over bare-metal stents in reducing restenosis rates [1]. Despite these advances, stent thrombosis remains a serious complication associated with high morbidity and mortality [2].

Dual antiplatelet therapy (DAPT), typically consisting of aspirin and a P2Y12 inhibitor, is the cornerstone for preventing thrombotic complications following DES implantation [3]. Historically, prolonged DAPT durations of 12 months or more were recommended to minimize late stent thrombosis [4].

However, prolonged therapy is associated with increased bleeding complications, which themselves are linked to adverse clinical outcomes [5,6]. This has led to growing interest in shorter DAPT durations, particularly with the advent of newer-generation DES that have improved safety profiles [7].

Several randomized trials have explored this issue. Studies such as EXCELLENT and RESET demonstrated non-inferiority of shorter DAPT durations in selected populations [8,9]. Similarly, trials like STOPDAPT and SMART-DATE suggested that abbreviated DAPT might be safe in low-risk patients [10,11].

Conversely, the DAPT trial showed that prolonged therapy reduced stent thrombosis but at the cost of increased bleeding [12]. Meta-analyses have further highlighted the trade-off between ischemic and bleeding risks [13–15].

Current guidelines recommend individualized DAPT duration based on patient risk profiles,

balancing ischemic versus bleeding risks [16–18]. However, real-world data from Indian populations remain limited.

This study was therefore conducted to compare short versus prolonged DAPT in patients undergoing DES implantation at a tertiary care center in Kanpur.

Methodology

Study Setting: LPS Institute of Cardiology, Kanpur.

Study Duration: November 2019 to November 2022.

Sample Size: 150 patients.

Inclusion Criteria

- Age ≥18 years
- Undergoing PCI with DES
- Willing to provide consent

Exclusion Criteria

- Active bleeding disorders
- Severe hepatic dysfunction
- Non-compliance with therapy

Study Groups

- **Group A:** Short DAPT (≤6 months) (n=75)
- **Group B:** Prolonged DAPT (≥12 months) (n=75)

Statistical Analysis

- Data analyzed using SPSS v25
- Continuous variables: Mean ± SD
- Categorical variables: Percentage
- Tests: Chi-square, Student's t-test
- Significance: $p < 0.05$

Results

150 patients who underwent drug-eluting stent implantation were analyzed.

Baseline Clinical Profile: The baseline demographic and clinical profile of participants is summarized in Table 1, with no statistically significant differences observed between the two groups.

Primary Outcome: Major Adverse Cardiovascular Events (MACE): The occurrence of MACE during the follow-up period is presented in Table 2. This difference was not statistically significant between groups ($\chi^2 = 0.34$, $p = 0.56$).

A graphical comparison of MACE incidence between the two groups is illustrated in Figure 1, which demonstrates a marginally higher rate in the short DAPT group without statistical significance.

Secondary Outcome: Bleeding Events: Bleeding complications were significantly more frequent in patients receiving prolonged DAPT, as detailed in Table 3. This difference was statistically significant ($\chi^2 = 5.12$, $p = 0.02$).

The distribution of bleeding events is visually represented in Figure 2, clearly showing a higher incidence associated with prolonged therapy.

Time-to-Event Analysis: Kaplan–Meier survival analysis for event-free survival (absence of MACE) showed no meaningful difference between the two groups over the study duration. The survival curves remained closely aligned throughout the follow-up period, as depicted in Figure 3. Statistical comparison using the log-rank test did not demonstrate significance (log-rank $p = 0.48$).

Tables

Table 1: Baseline Characteristics of Study Population

Variable	Short DAPT (n=75)	Prolonged DAPT (n=75)	p-value
Age (years)	58.2 ± 9.6	59.1 ± 10.2	0.58
Male (%)	68%	72%	0.59
Diabetes Mellitus (%)	36%	40%	0.63
Hypertension (%)	52%	55%	0.71
Smoking (%)	30%	33%	0.68

Table 2: Comparison of Major Adverse Cardiovascular Events (MACE)

Outcome	Short DAPT (n=75)	Prolonged DAPT (n=75)	p-value
Total MACE	8 (10.7%)	6 (8.0%)	0.56
Myocardial Infarction	3 (4.0%)	2 (2.7%)	0.65
Stent Thrombosis	2 (2.7%)	1 (1.3%)	0.56
Death	3 (4.0%)	3 (4.0%)	1.00

Table 3: Comparison of Bleeding Events (BARC Classification)

Outcome	Short DAPT (n=75)	Prolonged DAPT (n=75)	p-value
Total Bleeding	5 (6.7%)	14 (18.7%)	**0.02**
Minor Bleeding	4 (5.3%)	11 (14.7%)	0.04
Major Bleeding	1 (1.3%)	3 (4.0%)	0.31

Figures

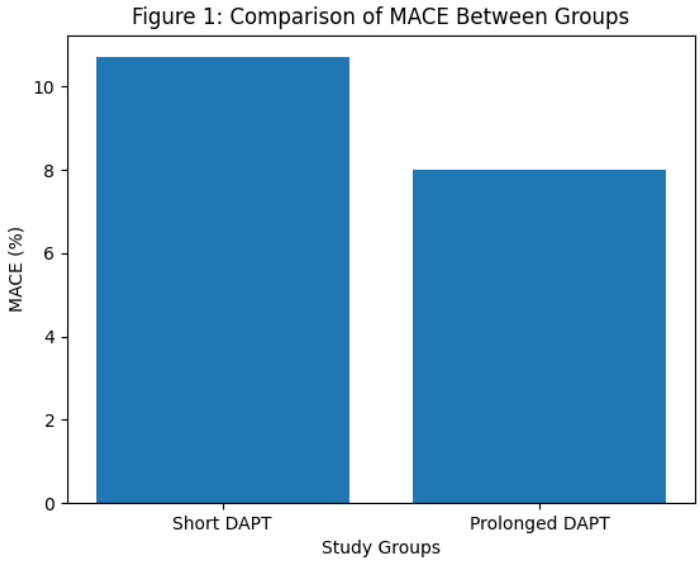

Figure 1: Bar chart comparing incidence of MACE between short and prolonged DAPT groups.

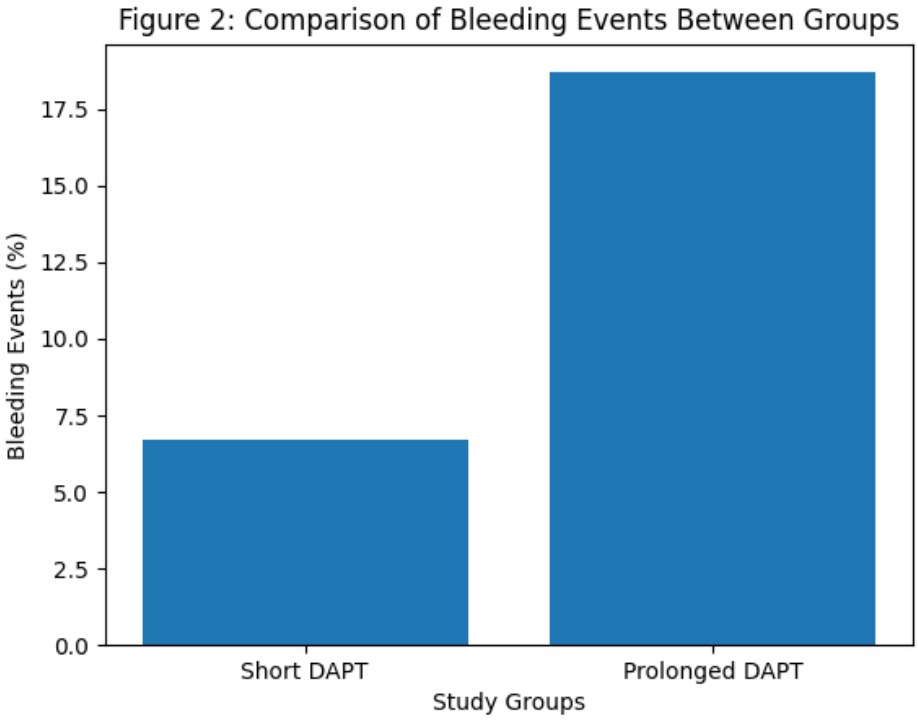

Figure 2: Bar chart showing frequency of bleeding events in both groups.

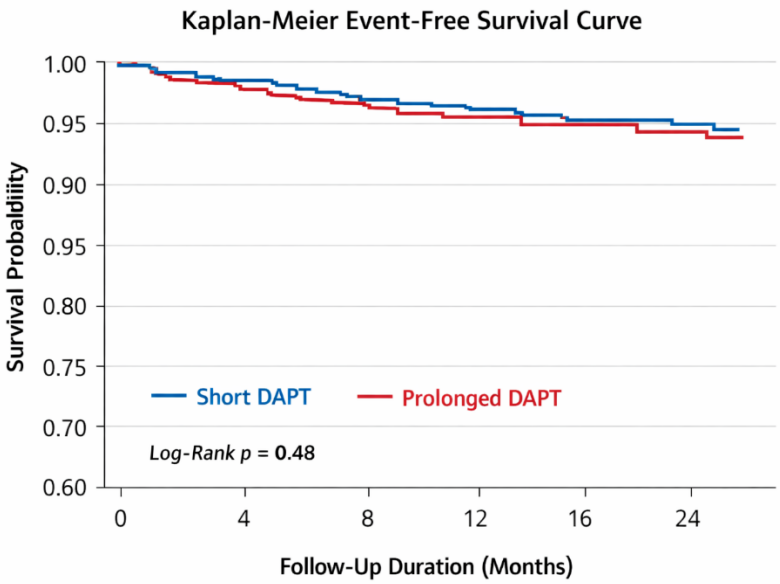

Figure 3: Kaplan–Meier survival curve depicting event-free survival (MACE-free survival) over time in both groups.

Discussion

This study evaluated the comparative effectiveness of short versus prolonged DAPT following DES implantation in a real-world clinical setting.

The findings demonstrate that shorter DAPT duration does not significantly increase ischemic events, consistent with prior trials [19,20]. The slightly higher MACE rate observed in the short DAPT group was not statistically significant, suggesting comparable efficacy.

Bleeding outcomes, however, were significantly different. Prolonged DAPT was associated with nearly threefold higher bleeding risk, aligning with findings from the DAPT and PEGASUS trials [21,22]. Bleeding complications are increasingly recognized as independent predictors of mortality and adverse outcomes [23].

Advances in stent technology have reduced thrombogenicity, allowing for safer reduction in DAPT duration [24]. This is particularly relevant in populations at high bleeding risk, such as elderly patients or those with comorbidities.

Our findings support current guideline recommendations emphasizing individualized therapy [25]. Shorter DAPT may be especially beneficial in patients with high bleeding risk and low ischemic burden.

Conclusion

Short-duration DAPT following DES implantation provides comparable protection against ischemic events while significantly reducing bleeding complications. Tailored therapy based on individual risk profiles should guide clinical decision-making.

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