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T-Stenting With Small Protrusion

The Default Strategy for Bailout Provisional Stenting?

Data from several randomized trials have indicated that most bifurcation lesions can be appropriately managed by a provisional strategy (1). However, in up to one-third of cases the operator may need to switch to a two stent strategy after main branch stent implantation (1). The T-stenting with small protrusion (TAP) technique ensures complete coverage of the side branch (SB) ostium, causes minimal deformation to the SB stent, and minimizes stent overlap while being relatively less technically demanding. To date, several case series have reported outcomes involving predominantly first-generation stents (2–5). We sought to analyze the outcomes of TAP stenting with second generation drug-eluting stents. Data were examined from 57 de novo bifurcation lesions treated with provisional 2-stenting using second-generation drug-eluting stents at 2 centers in Milan, Italy between December 2007 and June 2015. All patients provided informed consent for both the procedure and subsequent data collection and analysis.

The decision to cross-over from a provisional strategy to a 2-stent strategy was dependent on the following 3 main factors after main branch stenting:

1. A type B or higher dissection in the SB;
2. A reduction in TIMI (Thrombolysis In Myocardial Infarction) flow (<3) in the SB; and
3. A residual stenosis of >70% in the SB.

The primary endpoint measured at follow-up was target lesion failure, defined as composite of cardiac death, myocardial infarction, and target lesion revascularization. In addition, patients were followed for instances of target vessel revascularization and definite stent thrombosis. Myocardial infarction was defined as the presence of pathologic and new Q waves on an electrocardiogram, or an increase in creatinine kinase-myocardial band level to >5× the upper limit of the normal range. Table 1 depicts the baseline characteristics of the patients. The mean age of patients was 66.5 ± 10.0 years; 75.4% were male and 21.1% diabetic. The mean ejection fraction of

TABLE 1 Patient and Procedural Characteristics

Age (yrs)	66.5 ± 10.0
Male	43 (75.4)
Diabetes mellitus	12 (21.1)
Insulin dependent	3 (5.3)
Dyslipidemia	31 (54.4)
Hypertension	38 (66.7)
Current smoker	7 (12.3)
LVEF (%)	53.4 ± 10.5
Previous MI	17 (29.8)
Previous PCI	27 (47.4)
Previous CABG	2 (3.5)
Family history of CAD	24 (42.1)
SYNTAX score	23.2 ± 11.3
PCI in setting of	
ACS	8 (14)
Stable	49 (86)
Site of bifurcation	
LAD/diagonal	35 (61.4)
LCx/OM	9 (15.8)
Distal left main	11 (19.3)
RCA/PDA	2 (3.5)
True bifurcation	48 (84.2)
ACC/AHA class B2/C	37 (64.9)
Main branch	
Stent diameter (mm)	3.1 ± 0.42
Number of stents	1.53 ± 0.83
Total stent length (mm)	34.9 ± 18.0
Maximum dilation pressure (atm)	19 ± 5.30
Side branch	
Stent diameter (mm)	2.6 ± 0.36
Number of stents	1.16 ± 0.37
Total stent length (mm)	19.2 ± 10.8
Maximum dilation pressure (atm)	15.2 ± 5.33
Type of DES	
Everolimus	28 (49.1)
Zotarolimus	9 (15.8)
Sirolimus	6 (10.5)
Biolimus	12 (21.1)
Amphilimus	2 (3.5)

Values are mean ± SD or n (%).

ACC/AHA = American College of Cardiology/American Heart Association; ACS = acute coronary syndrome(s); CABG = coronary artery bypass grafting; CAD = coronary artery disease; LAD = left anterior descending artery; LCx = left circumflex artery; LVEF = left ventricular ejection fraction; MI = myocardial infarction; OM = obtuse marginal; PCI = percutaneous coronary intervention; PDA = posterior descending artery; RCA = right coronary artery.

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TABLE 2 Outcomes of T-Stenting With Small Protrusion Stenting

	1 Year	3 Years
Target lesion failure	6 (10.5)	7 (13.3)
Cardiac death	3 (5.3)	3 (5.3)
Myocardial infarction	1 (1.9)	2 (4.7)
Target lesion revascularization	3 (5.8)	3 (5.8)
Main branch	1 (1.9)	1 (1.9)
Side branch	2 (3.7)	2 (3.7)
All-cause death	3 (5.3)	4 (7.6)
Target vessel revascularization	3 (5.6)	4 (8)
Definite stent thrombosis	0 (0)	0 (0)

Values are n (%). Calculated by Kaplan-Meier analysis.

the cohort was 53.4 ± 10.5% and the mean SYNTAX score 23.2 ± 11.3. The most common indication for percutaneous coronary intervention was stable (stable angina, silent ischemia) in 86% of patients. The most common site of bifurcation treated was the left anterior descending or diagonal in 61.4% of patients; 19.3% involved the left main bifurcation and 84.2% were true bifurcations. The mean stent diameter was 3.1 ± 0.42 mm in the main branch and 2.6 ± 0.36 mm in the SB, and the everolimus-eluting stent was the most common stent used (49.1%). The median follow-up was 33.0 months (interquartile range: 14.7 to 60.0). Reasons for cross-over from provisional stenting were 38.6% (n = 22) type B or higher dissection, 57.9% (n = 33) >70% residual stenosis of SB, and 3.5% (n = 2) reduced TIMI flow in SB. Table 2 depicts the outcomes at 1 and 3 years. The cumulative target lesion failure rate at 3-year follow-up was 13.3%. The rates of cardiac death, target lesion revascularization, and myocardial infarction were 5.3%, 5.8% and 4.7% at 3 years, respectively. The rate of target vessel revascularization was 8% at 3 years. There were no cases of definite stent thrombosis during the follow-up period. These results indicate that TAP stenting has acceptable long-term outcomes when second-generation drug-eluting stents are implanted and are comparable with previous studies (2–5). The TAP strategy could be considered a preferred option when the operator needs to cross over to a 2-stent strategy. Further randomized studies are needed to compare TAP to other provisional 2-stent strategies.

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State of Structural and Congenital Heart Disease Interventional Training in United States and Canada

An Assessment by the American College of Cardiology Fellows-in-Training Section Leadership Council

The field of adult and pediatric interventional cardiology (PIC) has expanded considerably over the last decade. Given the recent advances like transcatheter aortic valve replacement, percutaneous mitral valve repair, and left atrial appendage closure, many cardiology training programs are offering dedicated fellowship for training in structural heart interventions.

In 2011, the Society of Cardiovascular Angiography and Interventions found significant deficiencies in a survey of structural heart disease (SHD) interventional training programs. These included the lack of