Double-Kissing Stenting Style Crushes Rival

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The stenting technique called double-kissing (DK) crush bested the culotte method in tricky bifurcated lesions in patients with high-risk left main coronary disease, the DKCRUSH-III randomized trial found.

More than twice as many patients in the culotte group experienced major adverse cardiovascular events (MACE) at 1 year compared with the double-kissing crush group (16.3% versus 6.2%, $P<0.05$), according to Shao-Liang Chen, MD, of Nanjing Medical University in Nanjing, China, and colleagues.

Significantly high rates of target vessel revascularization with the culotte technique were the main drivers of the high MACE rate (11% versus 4.3%, $P<0.016$), the researchers wrote in the study published early online in *Journal of the American College of Cardiology*.

Those in the culotte group also had higher rates of target lesion revascularization (6.7% versus 2.4%, $P=0.037$).

The DK crush group had better numbers for definite stent thrombosis and in-stent restenosis in the side branch ($P=0.037$ for the latter). Kaplan-Meier survival-free analyses favored the DK crush procedure at 1 year for cumulative target lesion revascularization, target vessel revascularization, and MACE.

All 419 patients in the DKCRUSH-III randomized trial had an unprotected left main artery, which means there were no functional bypass grafts to the left anterior descending or left circumflex arteries.

Studies have found that results from stenting low-risk lesions in an unprotected left main artery or lesions located ostial or mid-vessel are comparable to coronary artery bypass grafting (CABG), researchers noted in their introduction.

But distally bifurcated lesions in an unprotected left main artery are a different story. These are more challenging and often require two stents, the authors noted in their introduction. And implanting two stents at one time at a bifurcation carries its own set of challenges.

Various two-stent techniques have emerged with names that reflect their configuration, such as T stenting, modified T stenting, V stenting, simultaneous kissing stenting (SKS), crush, mini crush, step crush, and double-kissing crush.

Individual two-stent techniques have been validated, but evidence from random comparisons pitting various techniques against each other is largely lacking, Chen and colleagues said.

So they designed the DKCRUSH-III randomized study to determine which technique, when used in unprotected left main coronary artery distal bifurcation lesions, would be better at reducing MACE.

The double-kissing (DK) crush technique allows the tip of the side branch stent to extend into the main branch proximally. The main branch stent squeezes the tip of the side branch stent against the arterial wall. Both stent tips are now side-by-side. The simultaneously balloon inflation of both stents is the "double kiss."

In the culotte technique, the main branch stent overlaps the protruding tip of the side branch proximally, thus resembling how pant legs meet at the waist.

Randomization

Patients in the DKCRUSH-III trial were enrolled in 18 centers in China. To be included, patients needed to have de novo left main lesions with a classification of Medina 1,1,1 or 0,1,1.

Researchers randomized 419 patients on a 1:1 ratio. Baseline characteristics were similar, except the DK crush group included a significantly higher percentage of hypertensive patients (70% versus 61%, $P<0.05$) and patients with previous percutaneous coronary intervention (22% versus 15%, $P<0.05$).

The median age was 64, nearly 80% were men, one-third had diabetes, one-quarter were current smokers, and 80% presented with unstable angina.

About 70% of patients had three-vessel disease and about 70% were assessed with intravascular ultrasound. A majority of patients (58%) received their stents transradially. Median length of the main branch stent was 34 mm, and 26 mm for the side branch.

Procedural success was 97.1% for the DK crush group and 99.5% for the culotte group. The median procedural time was under an hour (55 minutes), while the median fluoroscopy time was 27 minutes.

The primary endpoint was the MACE rate at 1 year for the composite of myocardial infarction, cardiac death, and/or vessel revascularization. The secondary endpoint was in-stent restenosis, and stent thrombosis was a safety endpoint.

At 1 year, the amount of individual events for culotte versus DK crush were:

- Cardiac death -- 1.0% versus 1.0%
- Myocardial infarction -- 5.3% versus 3.3%
- Target lesion revascularization -- 6.7% versus 2.4%
- Target vessel revascularization -- 11.1% versus 4.3%

Researchers identified a subgroup of challenging patients with a distal bifurcation angle ≥70 degrees, a new risk stratification (NERS) score ≥20, a SYNTAX score

≥23, or diabetes. The odds of not having an event significantly favored the DK crush group:

- Bifurcation angle ≥70 degrees -- OR 0.20 (0.08 to 0.49)
- Diabetes -- OR 0.27 (0.07 to 1.00)
- NERS ≥20 -- OR 0.40 (0.20 to 0.79)
- SYNTAX ≥23 -- OR 0.36 (0.21 to 0.48)

The overall odds ratio for the combined subgroup was 0.31 (0.21 to 0.48).

The authors noted these limitations of the study: some angle restrictions should have been included, there was no CABG comparator group, and results might not apply to low-volume centers.

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