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DK Culotte: Why, Where and How?

A video of DK-Culotte stenting recently done by us in a 58 y old male is shown in Video 1. The following features of the bifurcation lesion are seen

1. Medina (1,1,1)

2. Both branches are good sized. The diagonal appears to be larger than LAD

3. Very narrow bifurcation angle

The steps of DK-Culotte are depicted in Fig 1.

Amongst all the dedicated two stents techniques for bifurcation lesions, DK Culotte definitely earns its place when both the branches are equally sized and the bifurcation angle is narrow. It competes with DK Crush as an alternative technique in such situations.

Advantages:

1. Excellent side-branch ostial coverageBoth the main vessel and side branch ostia are fully scaffolded, reducing the risk of geographic miss—especially useful when both branches have significant disease.

2. Symmetrical metal distributionCreates a relatively uniform stent architecture at the carina and bifurcation, which can translate into good long-term patency when performed correctly.

3. Works well when branch diameters are similarParticularly advantageous in true bifurcation lesions where the main vessel and side branch are of comparable size (e.g., LAD–LCx).

4. High final kissing balloon success rateThe technique facilitates optimal final kissing balloon inflation and good stent apposition in both branches.

5. Good long-term outcomes in experienced handsClinical studies show acceptable restenosis and target lesion revascularization rates when technique is meticulous (proximal optimization, kissing balloon, re-POT).

6. Flexible and widely applicable techniqueCan be used with most modern DES platforms and adapted depending on which branch is stented first.

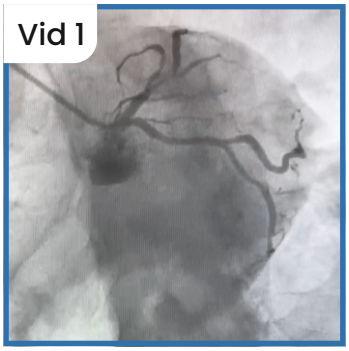
7. Better than T-stenting for complex true bifurcationsEspecially when the side branch angle is narrow or when ostial disease is long and cannot be adequately treated with provisional stenting.

Disadvantage

1. Double layer of metal in the proximal main vessel

Leads to increased metal burden, which can predispose to:

- Higher restenosis rates
- Delayed endothelialization



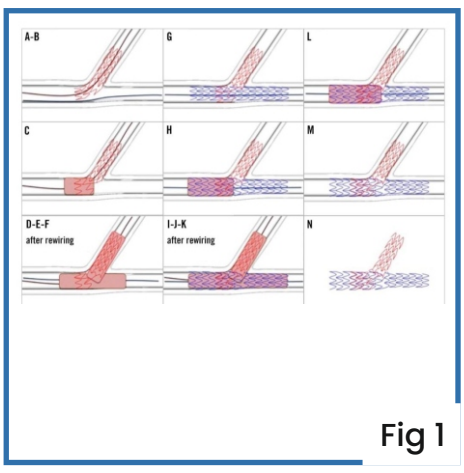


Fig 1

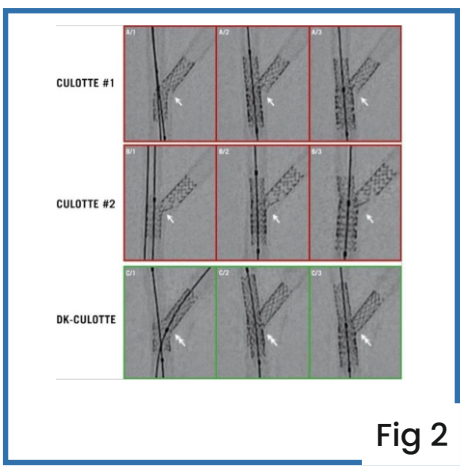


Fig 2

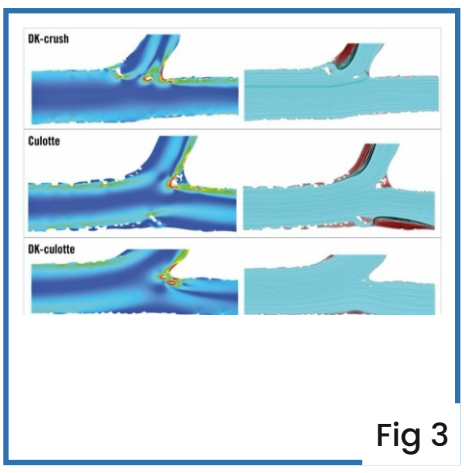


Fig 3

- Potentially higher stent thrombosis risk

if optimization is suboptimal

2. Technically demanding procedure

Requires multiple critical steps (rewiring, POT, kissing balloon, re-POT).

Any mistake in sequencing can result in malapposition or distortion of stents.

3. Longer procedure time

Compared to provisional stenting, it involves:

- More steps
- Longer fluoroscopy time
- Higher contrast volume

4. Difficult in large proximal / small distal vessel mismatch

Not ideal when the proximal main vessel is much larger than either branch (e.g., left main bifurcation), because overlapping stents may not expand uniformly.

5. Challenging re-crossing into the side branch

After the first stent is deployed, rewiring the other branch can be difficult and may risk:

- Strut deformation
- Incomplete side branch opening

6. Risk of stent deformation or crush during second stent deployment

The second stent may distort the first stent if not carefully positioned and optimized.

7. Less suitable for wide bifurcation angles (>70–90°)

In wide-angle bifurcations, culotte geometry becomes less favorable and alternative techniques (T/TAP or DK-crush) are often better.

8. Requires high operator experience

Outcomes are highly dependent on technique quality; not beginner-friendly.

9. Not ideal in heavily calcified bifurcations

Calcification makes full expansion of overlapping stents difficult, increasing risk of underexpansion and restenosis.

DK Culotte (Double-Kissing Culotte) is a modified Culotte bifurcation stenting technique that incorporates two mandatory kissing balloon inflations, similar in concept to DK-Crush, but applied to the Culotte strategy. In simple terms:

- It is Culotte stenting + an early kissing balloon step after the first stent, before placing the second stent. (Video 1 and Fig 1)
- Compared with classical Culotte, DK Culotte aims to:
- Improve stent expansion and symmetry
- Reduce malapposition and strut distortion
- Make second stent delivery easier

Improve side-branch ostial scaffolding as documented on bench studies (Fig 2). Upper 2 panels of Fig 2 show SB stent deformation during MB opening and MB stenting in the culotte technique, resulting in difficult SB access for final kissing dilation. DK-culotte (lowest panel) allows the maintenance of the SB result during MB preparation and stenting, resulting in a favourable SB access for final kissing dilation. Computational fluid dynamics analysis reveals the same (Fig 3).

Potentially reduce restenosis and thrombosis It borrows the philosophy of DK-Crush (two kissing inflations) but keeps the culotte geometry instead of crushing.

Summary

Bench tests suggest that the double-kissing approach can significantly facilitate the performance of the culotte technique. The additional kissing balloon dilation allows significant reduction in the total procedural duration, while resulting in better optimised overall final strut apposition. In this respect, DK-culotte may be superior not only to conventional culotte, but also when compared to the DK-crush technique, which is currently often performed. The clinical validity of the present findings remains to be confirmed in a larger in vivo study population.

Reference

1. Toth GG et al , Double-kissing culotte technique for coronary bifurcation stenting. EuroIntervention 2020;16:e72