MECHANISM OF SIDE BRANCH JAILING IN BIFURCATION LESION: PLAQUE OR CARINA SHIFT?

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Background: The mechanism of side branch (SB) luminal narrowing after main branch (MB) stent implantation in coronary bifurcation lesions is not completely understood. We sought to investigate the mechanism of geometric changes after MB stent implantation in bifurcation lesions using volumetric intravascular ultrasound (IVUS) analysis.

Methods: 77 patients with de novo bifurcation lesions who underwent provisional SB intervention were prospectively enrolled from 8 Korea, Japan and US centers. MB IVUS was performed before and after MB stent implantation. Both quantitative coronary angiography (QCA) and IVUS were analyzed by an independent core laboratory at Stanford University Medical Center.

Results: The vessel volume index (VI) of both the proximal and distal MB was increased after stenting. The plaque VI decreased in the proximal MB (9.1±3.0 to 8.4±2.4mm3/mm, p=0.001), implicating plaque shift, but not in the distal MB (5.4±1.8 to 5.3±1.7mm3/mm, p=0.227), implicating carina shifting to account for the change in vessel size. When each 1-mm volume segment was compared, all changes in vessel and lumen VI after stent implantation were significant (p<0.0001). However, the change in plaque VI was significant only at P-1 to P-2 segments (p<0.0001), P3 to P-4, and D1 segment (p<0.05) (Figure). Plaque volume between segments D2-D5 did not change after stenting.

Conclusions: Both plaque shift from the MB and carina shift contribute to the creation/aggravation of a SB ostial lesion after MB stent implantation.

Figure: Absolute changes in volume indices according to the distance from a side branch.
* P<0.0001, ** P<0.05; comparison between pre- and post-stent implantation indices