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An Effective Bailout Technique using child catheters for the Non-deflatable Balloon that obstructs Coronary Artery Flow

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Background: Non-deflatable balloon in coronary artery is one of the most severest complications during percutaneous coronary intervention (PCI), although it rarely occurs. Few methods using a tip-cut catheter have been reported to rupture a stuck balloon. Aim: The aim of this study is to evaluate whether the method using tip-cut catheters are conducted effectively and safely in vivo (porcine coronary artery), and to compare over-the-wire type catheter with monorail type catheter to conduct the bailout procedure. Methods: Three types of tip-cut catheter were prepared: 1) 5F ST01 (cut vertically, over-the-wire type) (ST), 2) GUIDEZILLA (cut vertically, monorail type) (GZ), and 3) GuideLiner (cut diagonally, monorail type) (GL). With standard PCI procedure, we delivered a set of semi-compliant balloon and each tip-cut catheter into porcine coronary artery and tried to rupture the inflated balloon by using ST, GZ, and GL. After this procedure, the intima injury of porcine artery was estimated by optical frequency domain imaging (OFDI). Results: Both ST and GZ ruptured the inflated balloon in porcine coronary artery in thirty seconds, but GL didn't succeed to rupture that. In OFDI findings, the intima injury was not at all observed after inserting each catheter into each coronary artery, although their tips looked spiky. Conclusions: It is useful for the tip-cut child catheter to rupture non-deflatable balloon safely in coronary artery, regardless of catheter types. However, monorail type catheters might accomplish the bailout procedure more rapidly compared with over-the-wire type catheters, because the catheter can be managed more simply.