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[Purpose] Balloon deflation failure is a rare but potentially life-threatening complication during percutaneous coronary intervention (PCI). We report a case of deflation failure of a perfusion balloon and its successful bailout. [Case Presentation/Methods/Results] An man in his 80s presented with ST-segment elevation myocardial infarction complicated by cardiogenic shock and underwent emergency PCI. Coronary angiography demonstrated an occluded ostial left circumflex artery (LCX) and severely calcified stenosis at the ostial left anterior descending artery (LAD). An Impella CP was inserted for hemodynamic support, resulting in restoration of LCX flow. Lesion preparation was performed using a 2.0-mm cutting balloon followed by a 3.0-mm perfusion balloon with guide extension support across the lesion. The perfusion balloon failed to deflate despite repeated attempts, including high negative-pressure aspiration, replacement of the inflation medium with saline, and advancing the guide extension catheter over the balloon shaft. As a bailout strategy, the tip of a 5-Fr ST01 catheter was cut to expose its metal edge, which was used to puncture and rupture the balloon, allowing successful retrieval. Post-procedural inspection revealed deformation of the mid-portion of the balloon shaft at a location corresponding to the distal edge of the guide extension catheter, suggesting mechanical interference as the cause of balloon deflation failure. [Conclusion] An undeflatable perfusion balloon can be successfully retrieved by puncturing it with a modified 5-Fr ST01 catheter. This technique may serve as a useful bailout option when conventional methods fail.