

Citius, Altius, Fortius: The impact of guide catheter extensions in contemporary percutaneous coronary intervention

The Olympic motto *Citius, Altius, Fortius* (Latin for “faster, higher, stronger”) nicely summarizes the role of guide catheter extensions in contemporary percutaneous coronary interventions (PCI).

The concept behind guide catheter extensions is simple: the closer you get to the lesion, the easier it is to deliver equipment. Guide catheter extensions allow deep intubation of the vessel (sometimes even through the target lesion), extending the reach of the guide catheter (1–5). Multiple benefits follow:

First, guide catheter extensions make the procedure faster (*Citius*). Efficiency is important in the cardiac catheterization laboratory, both for optimizing patient safety (the shorter the procedure, the lesser the chance for adverse events to happen, for anticoagulation effect to wane, for adverse events related to additional equipment use, etc.), thereby improving the workflow of the laboratory, and for reducing procedural costs. If a stent can be delivered within 5 vs. 30 minutes, both the patient and operators benefit.

Second, guide catheter extensions allow successful completion of procedures that previously might have been much more challenging or even impossible—effectively raising the bar on what can be achieved (*Altius*). Development of guide catheter extensions is in part responsible for the recent explosion in chronic total occlusion (CTO) and high-risk complex PCI (6), allowing the operators to “push the envelope.” The Guideliner reverse controlled antegrade and retrograde tracking and dissection (CART) technique is a beautiful example of guide catheter extension use to facilitate one of the most challenging steps of retrograde CTO PCI by effectively moving the ostium of the coronary artery distally into the vessel and facilitating guidewire externalization (7, 8).

Third, guide catheter extensions markedly increase guide catheter support (*Fortius*), facilitating delivery of guidewires, balloons, and stents across challenging anatomy—for example, in tortuous and calcified lesions (9), CTOs (10), and saphenous vein graft lesions (11).

Do all these benefits come at a price? Yes, both literally and metaphorically. Guide catheter extensions carry a cost, which may, however, be offset by savings in additional equipment that would have been required to facilitate the procedure. They also carry a risk of complications: deep engagement can lead to vessel dissection (4, 6, 12), and advancing equipment through

the extension may result in deformation or equipment loss (13, 14). Moreover, it is important to know what can and what cannot pass through a guide catheter extension, since it effectively decreases the inner guide lumen by approximately 2 French. Understanding these risks and taking preventive (or, if needed, corrective) actions is critical for everyone using these devices.

The authors of the two-center description of Guideliner-assisted PCI published in this issue of the Journal are to be congratulated for providing a thorough review of the beneficial outcomes after implementation of the Guideliner catheter in their practice, especially since they achieved excellent results without an increase in complications (15). Their series illustrates in action how *Citius, Altius, Fortius* can be achieved with proper use of novel equipment by operators committed to delivering the best outcomes for their patients.

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References

1. Kumar S, Gorog DA, Secco GG, Di Mario C, Kukreja N. The GuideLiner “child” catheter for percutaneous coronary intervention - early clinical experience. *J Invasive Cardiol* 2010; 22: 495-8.
2. Mamas MA, Fath-Ordoubadi F, Fraser DG. Distal stent delivery with Guideliner catheter: first in man experience. *Catheter Cardiovasc Interv* 2010; 76: 102-11. [\[Crossref\]](#)
3. Rao U, Gorog D, Syzgula J, Kumar S, Stone C, Kukreja N. The GuideLiner “child” catheter. *EuroIntervention* 2010; 6: 277-9. [\[Crossref\]](#)
4. Luna M, Papayannis A, Holper EM, Banerjee S, Brilakis ES. Transfemoral use of the GuideLiner catheter in complex coronary and bypass graft interventions. *Catheter Cardiovasc Interv* 2012; 80: 437-46. [\[Crossref\]](#)
5. de Man FH, Tandjung K, Hartmann M, van Houwelingen KG, Stoel MG, Louwerenburg HW, et al. Usefulness and safety of the GuideLiner catheter to enhance intubation and support of guide catheters: insights from the Twente GuideLiner registry. *EuroIntervention* 2012; 8: 336-44. [\[Crossref\]](#)

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6. Brilakis ES, editor Manual of Coronary Chronic Total Occlusion Interventions. A Step-By-Step Approach. Waltham, MA: Elsevier, 2013.
7. Vo M, Brilakis ES. Faster, easier, safer: "guideliner reverse CART" for retrograde chronic total occlusion interventions. Catheter Cardiovasc Interv 2014; 83: 933-5. **[Crossref]**
8. Mozid AM, Davies JR, Spratt JC. The utility of a guideliner catheter in retrograde percutaneous coronary intervention of a chronic total occlusion with reverse cart-the "capture" technique. Catheter Cardiovasc Interv 2014; 83: 929-32. **[Crossref]**
9. Chan PH, Alegria-Barrero E, Foin N, Paulo M, Lindsay AC, Viceconte N, et al. Extended use of the GuideLiner in complex coronary interventions. EuroIntervention 2015; 11: 325-35. **[Crossref]**
10. Kovacic JC, Sharma AB, Roy S, Li JR, Narayan R, Kim DB, et al. GuideLiner mother-and-child guide catheter extension: a simple adjunctive tool in PCI for balloon uncrossable chronic total occlusions. J Interv Cardiol 2013; 26: 343-50. **[Crossref]**
11. Farooq V, Mamas MA, Fath-Ordoubadi F, Fraser DG. The use of a guide catheter extension system as an aid during transradial percutaneous coronary intervention of coronary artery bypass grafts. Catheter Cardiovasc Interv 2011; 78: 847-63. **[Crossref]**
12. Chang YC, Fang HY, Chen TH, Wu CJ. Left main coronary artery bidirectional dissection caused by ejection of guideliner catheter from the guiding catheter. Catheter Cardiovasc Interv 2013; 82: E215-20.
13. Papayannis AC, Michael TT, Brilakis ES. Challenges associated with use of the GuideLiner catheter in percutaneous coronary interventions. J Invasive Cardiol 2012; 24: 370-1.
14. Bhat T, Baydoun H, Tamburino F. A unique complication with use of the GuideLiner catheter in percutaneous coronary interventions and its successful management. J Invasive Cardiol 2014; 26: E42-4.
15. Dursun H, Tastan A, Tanriverdi Z, Özel E, Kaya D. GuideLiner catheter application in complex coronary lesions: Experience of two centers. Anatol J Cardiol 2016; 16: 333-9.



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