

The great debate in vascular closure: a meta-analysis points to a clear winner

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The revolutionary forms of transcatheter interventions share a critical Achilles' heel: the large-bore arterial access site, a primary source of complications that can increase morbidity, mortality, and healthcare costs¹. Consequently, achieving reliable haemostasis is fundamental. Two competing vascular closure device strategies have dominated: the suture-based ProGlide (Abbott) and the plug-based MANTA (Teleflex). The debate over which is superior has been fuelled by conflicting data from observational studies and underpowered trials, leaving the clinical community in equipoise².

In this issue of EuroIntervention, Dumpies and colleagues provide much-needed clarity with a robust, individual patient-level meta-analysis of the key randomised trials – MASH-TAVI³ and CHOICE-CLOSURE⁴. By isolating the highest-quality randomised data, their work cuts through the noise of confounding and selection bias that has clouded previous analyses, offering a decisive perspective⁵.

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The authors performed a rigorous individual patient-data meta-analysis of the MASH-TAVI and CHOICE-CLOSURE trials, including 722 transcatheter aortic valve implantation (TAVI) patients randomised to either suture- or plug-based closure. The primary endpoint was in-hospital major and minor vascular complications according to Valve Academic Research Consortium-3 criteria.

The findings were decisive: the suture-based technique was superior, with a significantly lower rate of the primary vascular complication endpoint (11.0% vs 18.6%; odds ratio [OR] 0.54) and of access site-related bleeding (2.2% vs 5.3%; OR 0.41). While overall device failure rates were similar, plug-based device failures were more likely to require invasive

bailout with surgery or stenting (2.8% vs 0.8%; OR 0.22). No subgroup favoured the plug-based technique.

The strength of this analysis lies in its methodology. By conducting an individual patient-level meta-analysis, the authors provide a granular analysis that synthesises the highest-quality randomised evidence, bringing clarity to a debate long muddled by the selection bias inherent in observational studies⁵.

While those earlier studies suggested plug-based closure was equivalent or even superior to suture-based closure, this was likely due to operators instinctively choosing the plug-based device for patients with more favourable anatomy². This meta-analysis confirms the signal from the pivotal CHOICE-CLOSURE trial: when bias is removed through randomisation, the suture-based strategy proves to be safer⁵.

The implications for clinical practice are therefore direct: a suture-based strategy should be considered the default approach. The frequent need for an additional suture-based closure device or adjunct device should be recontextualised not as a failure but as a feature of a flexible and ultimately more forgiving strategy that leads to fewer clinically significant complications.

This redefines the role of a plug-based closure device. Its primary place should be as a valuable bailout option for catastrophic suture-based closure device failure. However, the analysis also carves out a specific anatomical niche in which it may be considered. A statistically significant interaction was found between device choice and common femoral artery diameter ($p=0.039$). The safety profile of plug-based devices improves in larger vessels, becoming comparable to suture-based closure devices in arteries >9.5 mm. This provides a data-driven rationale for viewing plug-based closure devices as a reasonable alternative in this highly select subgroup of

patients. Ultimately, good closure starts with good access: no device can overcome a suboptimal puncture, and in this regard, ultrasound-guided puncture should be considered the gold standard when using large-bore sheaths.

Despite its clarity, this meta-analysis is necessarily limited by its source data – two randomised controlled trials focused on TAVI. Therefore, its findings leave important questions unanswered for operators facing different clinical scenarios. The true impact of severe, circumferential calcification on each device's performance remains a critical knowledge gap.

Perhaps the most compelling direction for future research, however, stems from a non-prespecified finding within the analysis itself: a hybrid strategy combining a suture-based closure device with a small plug-based device significantly reduced complications compared to plug-based closure devices⁵. This suggests the future may not be a binary choice between suture or plug but an intelligent combination of both – a strategy that urgently requires evaluation in a dedicated randomised trial.

The patient-level meta-analysis by Dumpies and colleagues delivers a landmark verdict. By isolating high-quality randomised data, their work resolves the ambiguity from conflicting observational studies, demonstrating that a suture-based strategy results in fewer vascular and bleeding complications than using the plug-based device. This analysis provides the evidence to establish the suture-based closure technique as the standard of care in all but highly selected cases. The path forward is clear: future research should focus on optimising this suture-based approach, prioritising the prospective evaluation of promising hybrid strategies in dedicated randomised trials.

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Conflict of interest statement

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