



Reply: Pleural and intra-abdominal long-term drainage: comparison of a novel double-loop and a conventional single-loop catheter

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Dear Editor,

We thank the correspondents¹ for their careful reading of our article on the novel double-loop drainage catheter (nDLC)² and respond to their points in turn. As Cho et al.³ reported, double-pigtail drainage catheters reduce dysfunctional retraction compared with conventional single-pigtail catheters. We too used a DLC retaining side holes in the proximal loop for a period of clinical practice. With this catheter, one of the two principal causes of catheter dysfunction, catheter retraction, was substantially reduced; however, the other principal cause, catheter blockage, continued to occur in a considerable proportion of cases. As noted in our Discussion, when retraction occurs, the pulled-out side holes can become obstructed within the chest wall, leading to catheter dysfunction. Regardless of how many side holes a double-loop catheter possesses, occlusion of even a single hole by fibrin or cellular debris accumulation is sufficient to compromise catheter function. In our experience with the double-loop catheter retaining proximal side holes, we repeatedly observed that the proximal-loop side holes were still drawn into the chest wall through retraction and subsequently obstructed. To address this limitation, we devised a modified model in which the side holes were eliminated from the proximal loop.

We accept the criticism of the control group without qualification. A three-arm comparison including a double-pigtail catheter retaining proximal side holes would isolate the incremental benefit of side-hole omission, which our study design cannot do. Our study was pragmatically framed around the catheter that constituted the standard of care in our practice, asking whether the suture-free nDLC outperforms that standard. The mechanistic question of which design component confers the benefit requires a different study design, and the prospective randomized trial now being planned will include a conventional double-pigtail arm for this reason.

We likewise agree that no biomechanical validation was performed. We would note that we did not attribute the outcomes solely to side-hole omission: The reduction in simple blockage was numerically favorable but not statistically significant, and our limitations state that this mechanism remains suggestive. The anchoring function, by contrast, rests on a directly observed endpoint rather than on inference. Dysfunctional retraction occurred in none of the 135 patients treated with the nDLC despite the complete absence of sutures, compared with 10 of 221 patients treated with sutured single-loop catheters ($P < 0.001$). Bench evaluation, including pull-out force measurement and in vitro flow testing, was not undertaken and should accompany further development.

Finally, we welcome the opportunity to clarify the device and to correct an ambiguity created by our figure legend. The suture visible in Figure 2 is not a cutaneous anchoring suture. It is the internal locking string of the nDLC, a component of the device that forms and stabilizes the proximal coil. A locking string is present only in the proximal coil; the distal coil is a conventional self-forming pigtail. No patient treated with the nDLC received skin suture fixation, as stated in the Methods. For exchange or removal, releasing the locking string allows both coils to be straightened over a guidewire or by simple traction, and no removal difficulty was encountered in 135 placements.

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We thank the correspondents for a critique that accurately identifies the two principal limitations of our work, both of which the planned prospective study addresses.

Footnotes

Conflict of interest disclosure

The authors declared no conflicts of interest.

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