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Comment on: “Robotic and Endoscopic Minimally Invasive Breast Surgery: A Narrative Synthesis on Divergent Global Adoption and Emerging Trends”

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Dear Editor,

We read with great interest the narrative synthesis by Vidya et al. (1) on divergent global adoption patterns in minimally invasive breast surgery (MIBS). Their review is both timely and important, as it shifts the discussion beyond feasibility, safety, and oncologic non-inferiority toward a more clinically relevant question: how minimally invasive nipple-sparing mastectomy (NSM) can be disseminated effectively across different healthcare systems. The authors demonstrate that minimally invasive mastectomy is not a single entity but a family of procedures shaped by infrastructure, training, the integration of reconstruction, cost, and institutional priorities. This classification provides a valuable framework for understanding robotic and endoscopic NSM as context-dependent solutions.

A particularly insightful aspect is the contrast between robotics-driven adoption in high-income countries and endoscopic innovation at scale in upper-middle-income settings. Robotic NSM, while enabled by advanced platforms and institutional investment, remains resource-intensive and concentrated in specialized centers. In contrast, endoscopic NSM represents a more scalable and cost-conscious solution adaptable to high procedural volumes. This distinction highlights that the

evolution of MIBS is driven as much by system-level constraints as by technical capability.

This raises an important implication: the future of MIBS may not rest on a binary choice between conventional endoscopy and full robotic surgery, but on developing intermediate solutions that address the ergonomic limitations of rigid endoscopic instruments without imposing the full infrastructural burden of robotic platforms. This intersects with a key yet underexplored question in breast surgery: whether reproducible, ergonomically improved, and scalable techniques can be developed that bridge the extremes of rigid endoscopy and high-cost robotics.

In our recent technical report, we described single-port endoscopic NSM using a handheld motorized articulating system in selected patients (2). The rationale was straightforward: straight laparoscopic instruments remain limiting, whereas articulating instruments improve angulation and facilitate dissection in constrained planes while preserving direct manual control. We therefore positioned this approach as an intermediate, minimally invasive technique between fully robotic systems and endoscopic techniques.” In subsequent work, we emphasized that the central challenge in minimal-access NSM is no longer

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feasibility alone, but technical reproducibility and ergonomic sustainability (3).

This perspective is also consistent with contemporary outcome data. Minimally invasive NSM has been shown to achieve oncologic outcomes comparable to conventional approaches (4), while emerging prospective data suggest non-inferior—and in some analyses lower—early postoperative complication rates (5). These findings extend the relevance of minimal-access techniques beyond cosmetic benefit, reinforcing the importance of expanding access through reproducible and scalable approaches.

Seen through the lens of Vidya et al. (1), the “middle-ground” concept is not a niche technical curiosity, but a direct response to the health-system challenges they describe. If robotic NSM remains concentrated in well-resourced centers and endoscopic NSM represents the more scalable option, technologies that enhance endoscopic ergonomics without requiring a full robotic program may facilitate broader dissemination.

Importantly, this relevance is not purely economic. The authors highlight that learning curves, structured training pathways, and institutional experience are central to safe adoption (1). Outcomes improve with experience, yet training frameworks and reporting remain inconsistent. This underscores that the challenge is not whether the procedure can be performed but whether it can be standardized, taught, and reproduced beyond early-adopter centers.

For this reason, ergonomics and reproducibility should be viewed as global safety issues rather than technical refinements. A technically elegant operation that cannot be reliably reproduced will have limited impact. In contrast, reproducible workflows that integrate into existing endoscopic infrastructure may expand access to safe surgery more broadly (3).

Another strength of the study is its avoidance of technological triumphalism. By highlighting that the evolution of MIBS is driven “not only by technical feasibility but increasingly by system-level determinants,” the authors redirect attention from platforms to processes (1). In this context, intermediate articulating technologies should be viewed not as alternatives to robotics, but as complementary tools within a spectrum of solutions.

Ultimately, we agree with the authors that the future of MIBS will depend on more than technical proof of concept. Reproducibility, training, and context-sensitive implementation will be equally important. Between rigid endoscopy and full robotics, there exists a space where ergonomically improved and scalable solutions may help extend the benefits of minimally invasive NSM more safely and globally.

Footnotes

Authorship Contributions

Surgical and Medical Practices: V.K., A.T., A.M., I.P.; Concept: V.K., A.T., A.M., I.P.; Design: V.K., A.T., I.P.; Data Collection and Processing: V.K., A.M., I.P.; Analysis and/or Interpretation: V.K., A.T., A.M., I.P.; Literature Search: V.K., A.M., I.P.; Writing: V.K., A.T.

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