The transaxillary approach and enhanced recovery after surgery: the perfect wedding

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For many decades, innovation in cardiac surgery was largely synonymous with technical achievements. From the early 1990s, smaller incisions, advanced instrumentation, robotic assistance, and increasingly sophisticated operative strategies progressively redefined the concept of minimally invasive cardiac surgery (MICS).

Chitwood (1) defined MICS as a "philosophy" towards cardiac procedures, entailing specific strategies for different types of surgery. Despite the introduction of these new surgical approaches, patients often underwent technically "minimally invasive" procedures while still experiencing prolonged hospital recovery, significant pain, delayed mobilization, and the physiological consequences of traditional perioperative care pathways. The incision had become smaller, but recovery had not evolved at the same rate and quality.

In the late 1990s, the abdominal surgeon Kehlet (2) pioneered in Denmark the enhanced recovery after surgery (ERAS) concept, challenging traditional surgical practices and proposing for the first time a combination of multiple, evidence-based techniques to reduce surgical stress, speed up postoperative recovery and prevent complications.

This initial ERAS concept inspired the publication of the first cardiac ERAS (ERACS) guidelines in 2019 (3). These recommendations established evidence-based pathways covering preoperative counseling, nutrition, glycemic control, opioid-sparing analgesia, early extubation, early mobilization, and standardized postoperative recovery protocols. The primary objective was to reduce perioperative variability and to translate general ERAS principles into the cardiac surgical setting.

The encounter of MICS and ERACS became more explicit in the 2024 update of the ERACS recommendations (4). In fact, the authors expressed clearly that minimally invasive access alone could not guarantee an accelerated recovery unless embedded within a comprehensive perioperative program. This updated consensus statement emphasized a more patient-centered and multidisciplinary model, incorporating new evidence accumulated in the meantime and expanding recommendations across all perioperative phases.

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This formal integration of MICS into ERACS pathways represented an important evolution in cardiac surgical care. Rather than considering the minimally invasive surgical access as an endpoint of perioperative optimization, most recent literature frames MICS as only one component within a broader multidisciplinary recovery strategy (5).

As a result, ERACS and MICS are increasingly described as synergistic rather than independent concepts. Contemporary reviews (6-9) emphasize that optimal outcomes derive from combining minimally invasive operative techniques with standardized recovery pathways, with a focus on prehabilitation, multimodal analgesia, opioid sparing/opioid free anesthesia, on-table extubation, early mobilization and early hospital discharge.

The transaxillary surgical approach, described by Wilbring and coworkers in 2021 (10), appears as a cornerstone of this synergy. By avoiding sternotomy, preserving chest wall stability, and facilitating respiratory mechanics, it creates ideal conditions for a rapid recovery. Although there is still limited research on minimally invasive techniques, recent evidence highlighted that even high-risk patient groups could benefit from transaxillary access. Furthermore, the transaxillary access, unlike other MICS techniques, is not restricted to patients with favorable anatomical features. For this reason, this "all-comer" surgical approach appears as the perfect choice for every hospital-wide ERACS pathway (11,12).

The surgical access no longer represents the central trauma from which the patient must recover, but rather one component within a broader system designed to minimize the perioperative physiologic stress. Patients no longer perceive themselves as having undergone a "classic" cardiac operation associated with prolonged immobilization and visible disruption of physical self-appearance. This often-underestimated psychological dimension seems to contribute significantly to recovery dynamics and patients' well-being.

Di Eusanio and coworkers (13,14) emphasized that, together with a structured ERACS pathway, the innovative potential of the transaxillary approach clearly emerges and should become part of a comprehensive physiological strategy aimed at preserving the patient's functional reserve before, during, and after surgery. This strategic goal is of the utmost importance. In fact, surgical trauma is not determined only by the size of the incision. It is the cumulative result of pain, inflammatory activation, opioid exposure, prolonged ventilation, immobility, nutritional impairment, sleep disruption, anxiety, and loss of autonomy. The ERACS pathway addresses these interconnected factors simultaneously throughout the so-called 'multimodal perioperative optimization'. The aim of this multimodal pathway is not intended as a simple acceleration of recovery, but as an active prevention of the negative effects of postoperative physiological deterioration.

The "perfect wedding" between the transaxillary approach and ERACS lies exactly in this convergence. The first minimizes surgical trauma; the second minimizes systemic perioperative stress. One changes the surgeons' point of view; the other one changes patients' recovery after surgery (15). Current evidence suggests that together they might redefine not only MICS, but potentially the future identity of cardiac surgical care itself. Hence, the transaxillary approach appears no longer as a minimally invasive surgical intervention; it becomes a procedural expression of the ERACS philosophy. It is noteworthy to emphasize that ERACS is not limited to the transaxillary approach but

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applies to nearly all minimally invasive surgical techniques, specifically to right-anterior mini-thoracotomy, to partial (mini) sternotomy and to robotic surgery.

Other well-known effects of this "perfect wedding" are seen in perioperative pain management. Pain remains one of the principal drivers of delayed recovery after cardiac surgery. Excessive opioid administration contributes to respiratory depression, delirium, nausea, ileus, immobility, and prolonged intensive care stay. The transaxillary approach, combined with contemporary fascial plane blocks, intercostal nerve preservation strategies, cryoanalgesia, and multimodal analgesic pathways, offers the possibility of redefining postoperative pathways. As a result, patients are increasingly extubated earlier, mobilized within hours, and discharged faster with improved functional outcomes (16). Interestingly, this integration may have implications beyond individual patient recovery. In an era of aging populations, increasing frailty, and escalating healthcare costs, the combination of transaxillary surgery and ERACS may contribute to a more sustainable cardiac surgical model. Reduced intensive care unit (ICU) stay, earlier mobilization, lower complication rates, and faster rehabilitation should all translate into improved resource utilization while simultaneously improving patient and family experience. This combination of clinical excellence and healthcare management optimization is likely to become one of the challenges of future cardiac surgery programs.

Traditionally, cardiac surgery was defined by complexity, length of intervention, and overall invasiveness. Today, we are moving towards a different definition of excellence: achieving maximal therapeutic efficacy with minimal physiological disruption. From this point of view, the transaxillary surgical approach and ERACS are not simply complementary innovations—they are an expression of a cultural transformation. The future of cardiac surgery may depend less on how sophisticated our technology becomes and more on how intelligently we integrate surgery within the biology of recovery. The real innovation is no longer performing complex surgery through smaller incisions alone but designing perioperative pathways in which the patient recovers faster because the entire system has been engineered to achieve better physiological preservation.

Minimally invasive transaxillary surgery together with early recovery after cardiac surgery pathways—perfect partners for a perfect wedding.

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Footnote

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