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# Commentary: A limit of 0?

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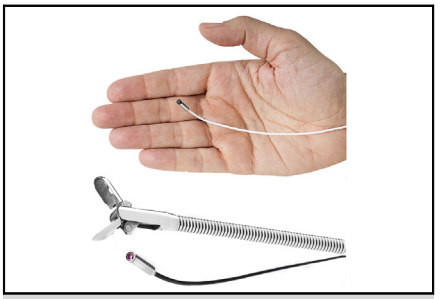
The article by González-Rivas and colleagues[1] implies that a uniportal approach can be applied to almost any complex thoracic procedure, therefore having no limits (to answer the titular question). Their experience builds on minimally invasive techniques and equipment innovations accrued over time and accelerated by iterative refinements occurring at institutions like the authors' high-volume hospitals. When presenting such experiences, investigators have not been required to publish their overall use of that approach (counting both conversions and intended open cases in the denominator), so it is hard to know its complete impact. However, it is probably safe to say that once surgeon anatomic lobectomy crosses the 90% minimally invasive threshold, complex cases like those described in this paper are being attempted with moderate successes.

Rather than unlimited capability, it might be better to focus on what constrains us. A limit of zero refers to the aggregate incision size to which minimal access surgeons aspire. Smaller and fewer wounds limit nerve injury caused directly by incision trauma and indirectly by instrument torque. The uniportal approach makes it easier to communicate and possibly standardize techniques because all the action (retraction, optics, dissection) is happening through one relatively consistent access incision. With multiport options, there is very high surgeon-driven procedural variability. Even with their standardized platform, high variability was demonstrated using a heatmap of port placement derived from robotic surgeon survey responses.[2]

The following facts and global trends are likely to influence our practices and push us toward uniportal methods.



Examples of miniature medical cameras.

**CENTRAL MESSAGE**

Uniportal surgery is part of the minimally invasive journey toward eliminating noticeable wounds.

Medical optics are becoming smaller, wireless, more powerful, and less likely to require a dedicated port site other than to insert them (Figure 1). The lung is relatively light (72 g per segment) and therefore reasonable to retract and manipulate with low-profile instruments, internally

**FIGURE 1.** Miniature cameras (3 mm *top*, 1.2 mm *bottom*) designed for medical applications. The author was granted permission by ScoutCam to use images from their Web site (www.scoutcam.com) for academic publications.[3]

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anchored tethers, and even externally applied magnetic forces. Sealing structures like pulmonary blood vessels with low profile energy instruments is gaining popularity. Low-profile stapling devices have arrived, with more in development.

Moreover, single-port and needlescopic operations are being developed for complex intra-abdominal operations that will undoubtedly influence thoracic surgery. And, it seems reasonable to challenge the notion that anatomic lung specimens have to removed in the same way as they have been for the last century. Accepting this challenge, surgeons may be able to safely prepare specimens intracorporeally following good pathologic principles to allow smaller paths of egress.

While I support the authors' direction, it is less clear to me that every surgical manipulation has to happen through the uniport itself. Other virtually scar-free routes of "needle" access (whether for a drainage catheter, a retraction suture, or a minicamera) may provide better exposure and dissection options and free the main incision from the risk of torque or crowding pressure nerve injuries. Another obvious access point to facilitate sleeve airway reconstruction would the natural orifice of the opened bronchus. While the exact future of all these competing technologies are uncertain, it is reasonable to expect that uniportal methods will set standards that other approaches will need to emulate.

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