Commentary: What is now proved was once only imagined: Pulmonary artery branch division with energy

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Central Message

A novel surgical technique can be scientifically evaluated and cautiously adopted.

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Pulmonary artery (PA) dissection is fundamental to the field of general thoracic surgery. A thin-walled, fragile artery that safeguards the high-volume pulmonary circulation, the PA is universally respected by surgeons. PA branch division is central to anatomic lung resection and requires a delicate dissection technique, as injury can unleash rapid, high-volume bleeding. PA branches were traditionally suture ligated and divided during the earlier eras of open surgery. The advent and evolution of surgical staplers greatly facilitated the widespread adoption of minimally invasive lung resection, and these devices account for the most common method for PA branch division.

This technique, however, is far from perfect. In the confines of the chest, particularly during minimally invasive surgery, navigating the stiff and seemingly oversized stapler around a PA can be cumbersome and unforgiving. The VATS PA study working group began addressing this problem in 2013 and has since published a step-wise progression of articles outlining the safe introduction of a new method for dividing small PA branches (7 mm or less) with energy.¹⁻⁴ The Harmonic scalpel, an ultrasonic vessel-sealing device, is low profile, easier to place circumferentially around small PA branches, and can also be used as a dissecting instrument.

The authors must be congratulated for their methodic progression from ex vivo and animal studies, to an open lobectomy trial, to a phase I video-assisted thoracoscopic surgery (VATS) lobectomy trial, and now to a phase II VATS lobectomy trial.¹⁻⁵ In their current study, Liberman and colleagues⁵ compared division of PA branches (≤ 7 mm) with the Harmonic scalpel with linear staplers (approximately 10-12 mm in width). Failure to seal the PAs was not different between either method (1.3% failure in the Harmonic group and 2.2% in the stapler group), although the staplers treated larger vessels and generally had only minor bleeding. The Harmonic-sealed vessels that failed were able to be controlled with VATS technology but had a greater amount (300-500 cc) of blood loss.

The extent to which energy devices will be adopted to divide PA branches is hard to predict and will be dictated by surgeon experience, particularly with failures. In their article, the authors have outlined a series of conceptual and technical guidelines for PA branch division with the Harmonic scalpel that will prove useful for surgeons wishing to adopt this technology for this indication. Reciprocally, aside from the obvious advantage of the surgical stapler in dividing larger PAs, there are cases in which the requirements for dividing small PA branches with a stapler is less stringent. For example, small PA branches adjacent to the line of fissure can often be incorporated into the fissure staple line and do not require their complete circumferential dissection, particularly in anatomic resection for benign disease.

This article demonstrates that minimally invasive lung resection continues to evolve, that its technique is not universal, and that new surgical technology can and should be carefully and scientifically evaluated. The VATS PA Study Working Group is setting an appropriately high bar for the cautious introduction of new technology into the operating suite. Liberman and colleagues should be perceived as a model group for the scientific investigation of a surgical technique and provide an exemplary road map for surgeon-scientists to follow in studying new technology in a high-stakes setting.

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