That's one small step...

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Goudie and colleagues,¹ in their study of pulmonary artery sealing during open lobectomy with an ultrasonic energy device, have taken a paradoxically brave yet cautious first step in what I would hypothesize as their ultimate goal: making pulmonary lobectomy a faster and simpler operation. The maximum diameter of vessels sealed with the device was 7 mm, and of the 28 branches divided during the study, only 50% of them met this criteria. Vessels that were 5 to 7 mm in size were sealed with the “Advanced Hemostasis” function of the Harmonic ACE Shears (Ethicon, Cincinnati, Ohio), whereas vessels less than 5 mm were sealed with the “Min” function of the device. The small numbers in this study should be duly noted. The safety of using ultrasonic energy to seal pulmonary arteries in no way can be compared with the safety of vascular staplers, the failure rate of which has been estimated to be 0.1% to 0.3%.^{2,3} Although there were no sealing failures or bleeding complications resulting from the 14 vessels sealed in these 10 patients, a study with at least 2 orders of magnitude more vessels divided (100×) would need to be performed to provide evidence that ultrasonic energy sealing of pulmonary vessels is “safe,” if we define “safe” as having a failure rate equal to or less than our existing technology.

However, stapler failure is probably the rarest of the bleeding complications that can occur during pulmonary lobectomy; vessels are more commonly injured while dissecting, manipulating, and isolating them, and during passage of the stapler anvil around them. These injuries would not be reported as stapler “failures.” The ability to minimize the dissection or clearance needed around vessels by using an ultrasonic energy device rather than a stapler could lead to fewer bleeding complications and thus conversions. Although 5-mm vascular staplers, such as the Microcutter (Dexera Surgical, Redwood City, Calif), are being used in patients and could potentially decrease these injuries, their safety has not been demonstrated in large retrospective series.

The authors should be applauded for taking a careful and stepwise approach to studying the feasibility of using ultra-

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Central Message

Goudie and colleagues report their early experience with using an ultrasonic energy device to seal pulmonary arteries in human subjects.

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sonic energy for pulmonary vessel sealing, beginning with animal studies and now demonstrating its use in open lobectomy.⁴ The next logical steps would be to increase the number of patients undergoing operation to further demonstrate safety and then to use the device in patients undergoing minimally invasive lobectomy. Beyond safety, though, the benefit of the technology needs to be proven for other parameters: speed, cost, and rate of conversion. Given the 7-mm limitation on vessel size, ultrasonic energy technology in its current form would appear to complement, not replace, stapling during pulmonary lobectomy. If the addition of ultrasonic energy sealing can make minimally invasive lobectomy faster, cheaper, or more likely to be performed (and hopefully all three), a compelling rationale for its use would exist.

References

1. Goudie E, Thiffault V, Jouquan A, Lafontaine E, Ferraro P, Liberman M. Pulmonary artery sealing with ultrasonic energy in open lobectomy: A phase I clinical trial. *J Thorac Cardiovasc Surg*. 2017;153:1600-7.
2. Yano M, Iwata H, Hashizume M, Shigemitsu K, Adachi K, Tokui T, et al. Adverse events of lung tissue stapling in thoracic surgery. *Ann Thorac Cardiovasc Surg*. 2014;20:370-7.
3. Asamura H, Suzuki K, Kondo H, Tsuchiya R. Mechanical vascular division in lung resection. *Eur J Cardiothorac Surg*. 2002;21:879-82.
4. Goudie E, Khoreba M, Tahiri M, Hegde P, Thiffault V, Hadjeres R, et al. Pulmonary artery sealing with an ultrasonic energy device in video-assisted thoracoscopic surgery lobectomy: an animal survival study. *Ann Thorac Surg*. 2016;102:1088-94.