



Robotic segmentectomy: is the game really worth the candle?

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The recent paper published by Zhou *et al.* (1) is an enthusiastic report concerning robotic surgery and anatomic segmentectomies, two topics of great and increasing relevance in the context of the treatment of non-small cell lung cancer (NSCLC). In particular, they compared the short-term outcomes of patients submitted to robotic sublobar resections to those operated with video-assisted thoracoscopic surgery (VATS) or open techniques.

The first consideration concerns the widespread tendency to resect less parenchyma as possible among thoracic surgeons, preferring in most of the cases segmental resections instead of lobectomy. This debate is still open: we know that the last available *Chest* guidelines (2) recommend lobectomies in medically fit patients with stage I and II NSCLC while sublobar resections in patients with major increased risk of perioperative mortality or competing causes of death (age or comorbidities related) or in case of ground glass opacities ≤ 2 cm. We have to take into account that these guidelines were published almost ten years ago and in the meantime the scenario has changed. Several studies during these last years have investigated oncological and survival outcomes of sublobar resections even though a homogeneous consensus on the non-inferiority of segmentectomy compared with lobectomy has not been achieved yet.

For example, making a simple search on PubMed typing "lobectomy versus segmentectomy meta-analysis" you can find more than 20 results in the last ten years of which 9 in the last 2 years (3-11) without homogeneous results and conclusions. Recently, also two randomized trials have been published on this topic (12,13). The first one (12) found no differences in terms of peri-operative and short-

term outcomes between the two techniques but without reporting long-term data on the overall and disease-free survival. The second one (13) provided results on long-term outcomes showing a superiority of segmentectomy over lobectomy in 5-year overall and relapse free survival. They concluded assessing that segmentectomy should be the standard procedure in patients with small-sized peripheral NSCLC. Giving these updated evidences, it would not be surprising to assist to a change of indications in the upcoming guidelines. Despite a growing number of evidences suggesting that segmentectomy is a reliable option rather than lobectomy in selected cases, there is lack of data regarding long-term results of robotic segmentectomy and also in this study data on long-term outcomes are not provided.

Another noteworthy finding reported by this study (1) is the increasing rate over time of complex segmental resections performed with robotic platform. Complex segmentectomies, intended as any single and/or multiple individual segmentectomies of upper segments, lingula, right middle lobe, or basilar segments and not included as "simple", are the most challenging for the issues in identifying the intersegmental plane and the proper bronchovascular supply. The rate of complex segmentectomies reported was significantly higher in the robotic group (45% *vs.* 15% in the VATS group and 22% in the thoracothomic one). This reflects the unquestionable great accuracy and ability of dissection achievable by the robotic technology associated to the high magnification of the field of vision and the three-dimensional optics during surgery. Again, in support to a more precise surgical dissection technique with a "smart stapling" technology

in the new generation robot (Da Vinci Xi), they reported lower rate of prolonged air leak in the robotic group (4% compared to 13% in the VATS group) with a lower rate of conversion to open.

Having in mind all these considerations, we feel we can share the enthusiasm of Zhou *et al.* (1) in performing robotic segmentectomies but there is also the other side of the coin to consider.

First, robotic technique to be safely performed, needs a robust learning curve: a recent study reported that almost 40 surgeries are needed to achieve technical competencies (14). It's reasonable to think that at the beginning of the learning curve the outcomes of the robotic arm might not be so optimistic, with a higher rate of complications, conversions, operative times and consequently costs so a comparison between the outcomes of the different techniques in different eras should be reported.

Again, no well-powered and multicentre randomized trials have been performed yet to show the superiority of robotic surgery compared to VATS and open in performing sublobar resection and the current available evidence is only based on non-randomized trial with conflicting results. We have to consider that the reported outcomes are highly influenced by the surgical technique with which the center and the surgeons are most confident.

In conclusion, we think that both robotic surgery and sublobar resections have a great potential in the setting of treatment of NSCLC and we expect that their popularity will increase more and more in the next years but this must be balanced with the surgeon's confidence with the technique and the center's expertise, always guaranteeing the best quality of care to the patients.

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