

Does the number of incisions in video-assisted thoracoscopic surgery matter?

Henrik Jessen Hansen¹, Gonzalo Varela², René Horsleben Petersen¹, William S. Walker³

¹Department of Cardiothoracic Surgery, University Hospital of Copenhagen, Rigshospitalet, Copenhagen, Denmark; ²Division of Thoracic Surgery, Salamanca University Hospital, Salamanca, Spain; ³Department of Cardiothoracic Surgery, Royal Infirmary of Edinburgh, Edinburgh, UK

Correspondence to: Henrik Jessen Hansen, MD. Chief Surgeon, Department of Cardiothoracic Surgery, University Hospital of Copenhagen, Rigshospitalet, Blegdamsvej 9 2100 Copenhagen, Denmark. Email: Henrik.Jessen.Hansen@regionh.dk.

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The main goal for any doctor should be to give the patients the best possible treatment for their medical condition, whatever it is. The decision regarding treatment should be based on scientific evidence, ideally via clinical trials. This can often be quite straight forward in pharmaceutical medicine, where you can design randomized and double blinded studies in order to identify evidence for the superior treatment. In surgery, however, the preferred technique quite often is more eminence than evidence based. It is difficult to design adequately large studies and very difficult to do so in a double blinded fashion. Senior peer pressure and difficulty with constructing effective clinical surgical trials (often interlinked phenomena) leads to conservatism and resistance to radical new ideas.

Consider the decade long debate about video-assisted thoracoscopic surgery (VATS) lobectomies for treatment of lung cancer after the first cases published back in 92/93. By 2000 it was well demonstrated that there were superior short term advantages and in 2003 non-inferiority in cancer treatment was showed (1). Papers published in 2008/9 (2,3) then indicated a possible cancer superiority toward VATS and finally the 2013 ACCP guidelines stated that a minimal invasive approach should be the preferred technique in early stage lung cancer (4). Now—more than 20 years after the first VATS lobectomies were performed—major retrospective studies (5) and a blinded randomized study support this technique (6). Further questions remain.

Few opinion leaders dare to answer the question: If it is beneficial to do VATS for early stage cancer, would it also be applicable to more advanced stages if the technique is mastered by the surgeon?

A similar question can be raised about the technique of VATS lobectomy: can it be redefined and further improved to the benefit of the patient? Can we—without compromising the long-term outcome—make it more gentle, less invasive and more attractive to the patient? From that perspective, the idea of uniportal VATS becomes interesting. In general thoracic surgery this is now the new hot topic. It first appeared over 10 years ago for wedge resections (7) and has now in this decade moved dramatically forward and many papers—mainly case reports—have shown that it is feasible and can be applied to even very advanced procedures (8). But, as with other new surgical strategies, uniportal VATS needs to find its own role and should be subject to the full rigour of scientific scrutiny. Therefore, the paper from Perna (9) deserves to be read with great interest and the conclusion has to be noted: uniportal video-assisted thoracoscopic lobectomy does not present better postoperative outcomes than other video-assisted thoracoscopic lobectomy techniques. This paper raised a heated debate in the *European Journal of Cardiothoracic Surgery (EJCTS)* (10-12). Debate about how much pain you need to have to reach significance on

the VAS score and a debate about whether the Duke approach is a multiport approach or a modified uniportal. Besides Perna *et al.*, also in a retrospective analysis the authors have found uniportal and multiport VATS to be comparable in terms of pain and hospital staying (13). Results from McElroy *et al.* were also commented in an editorial (14) claiming that at least a minimum of science should support uniportal approach.

It is salutary to recall that in the area of minimal invasive surgery there have been other new techniques that hit the surgical world as the new “hot” thing. For example, 15 years ago in coronary bypass surgery OPCAB (off-pump coronary arterial bypass) promised fewer cerebral complications. However, several years later major multi-institutional studies could not demonstrate any benefit and even indicated possible problems with graft patency. In the Danish DOORS study, the proportions of patent grafts was statistically significantly in favor of on-pump surgery ($P=0.01$) (15). In a review of ten “low-bias” trials involving 4,950 patients derived from a total of 86 RCTs comparing off-pump with on-pump surgery, the authors showed that while off-pump CABG increased all-cause mortality compared with on-pump CABG; the effect was even more pronounced in those trials at low risk of bias: [(6.2%) off-pump *vs.* (4.6%) on-pump, RR 1.35; 95% CI: 1.07 to 1.70; $P=0.01$]. This translates to a 30% higher risk of all-cause mortality after off-pump CABG compared with on-pump CABG (16).

In laparoscopic surgery the “buzz words” a few years ago were Single Incision Laparoscopic Surgery (SILS) and Natural Orifice Transluminal Endoscopic Surgery NOTES which was promoted 10 years ago as the divine end stage of minimal invasive surgery. A newly published review on SILS and NOTES, however, concludes: “In an attempt to reduce the invasiveness of laparoscopic cholecystectomy, surgeons have developed single-incision laparoscopic cholecystectomy (SILC), minilaparoscopic cholecystectomy (MLC) and natural orifice transluminal endoscopic surgery (NOTES), which are hereby evaluated. SILC cannot be recommended as it can be associated with an increased risk of bile duct injury. NOTES cholecystectomy is still experimental, although hybrid transvaginal cholecystectomy is gaining popularity. As it is standardized and almost identical to the standard laparoscopic technique, MLC could lead to limited benefits without exposing patients to increased postoperative complications, being therefore adoptable for routine elective cholecystectomy” (17). Similarly, a systematic review and meta-analysis of single-

incision versus conventional multiport appendectomy did not show any difference except that single-incision was associated with a significantly longer operating time (18).

Is uniportal VATS a step forward or does it in fact end up with the same disappointing results as OPCAB and SILS? Almost all papers on the topic are case reports and case series. The topic cries out for proper studies and until now the paper from Perna is the best published. It might not be perfect and you can debate methodological aspects such as whether the mix of two methods might blur the result. But, equally, a three port technique might prove superior to the uniportal approach in another setting. The only conclusion you can make from the article is that the described methods seem to be equal with no major differences in the studied endpoints. This supports what both the authors of the paper and of the editorial conclude i.e., that further, detailed studies are needed. We must reach beyond the era of “see what I can do” papers!

What creates most surgical trauma in VATS? Several instruments through one incision or several small incisions with one instrument in each? Bearing in mind that the normal space between two ribs is around 1 cm what then about the idea of scaling down to 5 mm cameras and instruments in order to spare nerves and the ribs? What about a subxiphoid incision? Nobody can answer these questions at present. We would like to see studies about the surgical trauma that we know very well from other surgical fields, and actually earlier has been used to demonstrate difference between open and thoracoscopic surgery (19).

Most likely the major step forward in minimizing trauma was the transition from a thoracotomy to a VATS procedure. It may be very difficult to show any significant difference in between the different VATS approaches described. In our view the surgeon most standardize his technique and keep it simple as it is well-known that everybody can make a simple procedure look difficult but only the true masters make a difficult case look simple.

We must bear in mind that the majority of our patients within thoracic surgery are elderly and have a malignant disease. Their main concern is to be cured of their deadly disease and they are less concerned about number or length of incisions. We must learn from the reports on outcome of OPCAB (15) and SILS cholecystectomies (15) where outcomes might be negatively affected by the drive to introduce new “fancy” techniques. Therefore, in this debate, the most interesting and important data will be provided by studies reporting on comparative survival and local recurrence data between various access strategies.

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Footnote

Conflicts of Interest: HJ Hansen speakers bureau of Medtronic. RH Petersen speakers bureau of Medtronic. The other authors have no conflicts of interest to declare.

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