



Primum non nocere: do we really need non-intubated thoracic surgery and robotic assisted thoracic surgery for tracheal airway resection and reconstruction?

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It is a privilege of being invited to discuss the paper written by Li *et al.* (1) entitled “Non-intubated Robotic-Assisted Thoracic Surgery for Tracheal/Airway Resection and Reconstruction” published in the *Annals of Surgery*.

It is a privilege but it is also a big responsibility because it requires self-reflection and mental freedom. In medicine when difficulties arise the medical epithet “primum non nocere”, written by Hippocrates more than 2000 years ago, offer solid guidance when there is the necessity of much thinking about the ethical implications of a new operation (2,3) (*Figure 1*). In few words “primum non nocere” remember us to go ahead with caution, and this caution will be the driving force throughout this editorial.

The authors report a series of 5 patients suffering of tracheal and endobronchial diseases with a mean diameter of 1.2 cm. Reading the title it seems that there is nothing new under the sun, instead much progress has been made. The authors demonstrated for the first time the feasibility of performing a complex operation using robotic assisted thoracic surgery (RATS) with satisfactory outcomes without muscle relaxant and tracheal intubation. Furthermore, the authors suggest that spontaneous ventilation could improve the anastomosis and operating time. Operative time

ranged from 5 h 5 min to 9 h 55 min and included the total preparation of the robotic system. Intraoperative frozen sections were performed and the resection margin were negative in all patients. Patients’ postoperative pathology was mucoepidermoid carcinoma; lymphoepithelioma-like carcinoma, adenoid cystic carcinoma, and squamous cell carcinoma. The main conclusion was that RATS for tracheal/carinal/airway surgery under non-intubated spontaneous ventilation is feasible in carefully selected patients at the preliminary practice.

I recall that non-intubated thoracic surgery (NITS) has been introduced more than 20 years ago for minor procedures (4-6). Nowadays, indications have been expanded, and some surgeons and anesthesiologists demonstrated that select patients with more complex thoracic diseases can undergo NITS (6,7). Nevertheless, I am sure that many surgeons, including myself, never expected that NITS could also be performed for very complex reconstructive thoracic surgery using VATS and RATS approaches (1,7).

Therefore, the presented series represent an exceptional advancement in our specialty, and all team involved in this procedure should be congratulated. However, some doubts and numerous questions arise: is this true progress?

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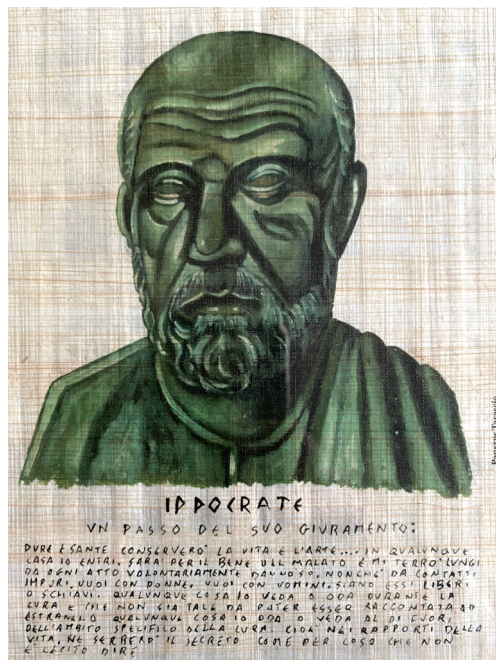


Figure 1 Hippocratic Oath written on papyrus. Photo taken from the personal gallery of the author.

Were the indications clearly stated? Which are the criteria to include patients for this procedure? Was this project accepted by the ethical committee? Did the authors consider rigid bronchoscopy as the procedure of choice before undertaking such an extensive operation? Is the expensive robot necessary? Was survival longer? Should this operation be performed in other centers? Should the authors continue to perform such a procedure?

As there are many questions, let me try to answer to some of them. The authors wrote: five patients fulfilling the criteria for non-intubated surgery were selected for this novel approach. I am sure that readers would like to know what are the criteria to avoid perplexity about this new procedure. In fact, reading with attention the paper unclear are the indications and unclear are the contraindications for this procedure. No information is available on cardiopulmonary status, cardiac arrhythmias, hypoxic respiratory distress, previous surgery, and the role of PET scan. Indications should have been clearly stated and discussed.

In addition, looking the position of the tumors in the figure 1 (1), it seems evident that frail patients with comorbidities could have been operated via a rigid bronchoscopy. It is known that good long term results have

been reported using rigid bronchoscope (8-11), but the authors did not discuss the reason why rigid bronchoscopy has not been used. Nevertheless, with the advent of robot system for rigid bronchoscopy it will be easier in the future to treat endoluminal tracheo-bronchial tumors (12).

The authors stated that “with the robotic arm’s extra maneuverability, we found that the anastomosis suturing was relatively easier in RATS than the VATS approach under a similar non-intubation setting”. Although this is a speculative sentence based on personal experience of the authors, it is evident from the literature that some surgeons are more disposed to use VATS and others to use RATS (13,14). Nonetheless, in the near future new powered surgical instruments can easily replace large and expensive robotic system with the same results (15-17).

Moreover, authors preferred the continuous suture, instead of the interrupted suture technique, to decrease the long operative time. I disagree as continuous suture should be performed because the association with better outcome, and not to decrease operative time.

An alarming and disappointing point of this procedure is the fact that because intraoperative mediastinal swing can be a life-threatening problem during surgery, the authors wrote that the risk can be decreased by selecting the appropriate patients, with a vagus nerve block and “tacit” cooperation between surgeons and anesthesiologists. Do we really want this? Do we need a “tacit” cooperation? Should these risks become standard practice? What happen if something goes wrong? How the authors would have treated in case of bleeding or respiratory problems? Was a protocol ready to be followed in case of an intraoperative disaster? I am sure that nobody, patients, surgeons and anesthesiologists would like to work with such a “sword of Damocles” hanging on their heads. My personal experience says that instead of an environmental burden we need to create a calming atmosphere when extended elective cancer surgeries are performed.

Leaving these important problems separately, the next and the most significant question arises: is the reported NITS-RATS procedure prolonging survival? The authors left us without an answer as no short or long-term survival has been included in the manuscript. Moreover, with a lot of respect for the learning curve, but 5 to 10 h to finish a complex operation is difficult to accept.

As a surgeon I have treated patients with endotracheal and endobronchial cancers, and therefore I am concerned about the potential implications of this paper. Particularly in Europe, UK and I presume also USA, medico-legal

issues could arise concerning the use of NITS in tracheo-bronchial cancers. I also believe that there is a potential responsibility risk for the surgeon who on the basis of this paper start performing such a risky NITS procedure without proper indications, and data on survival.

It appears obvious that the feasibility that has been demonstrated using this technique does not guarantee, at this moment, long term survivals and reliability: moreover, until more evidence is available a general change in anesthetic management in tracheo-bronchial surgery is not justified (18,19).

To conclude, when a new technique, approach or procedure is presented at the medical community the capacity to distinguish between what's new and what's good is fundamental. I feel comfortable to affirm that Li *et al.* (1) experience is new but it is too early to say that it is good. Currently, I am certainly not willing to take such a risk, since a very high level of evidence is necessary to respect the Hippocrates Oath in medicine "primum non nocere".

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References

1. Li S, Ai Q, Liang H, et al. Non-intubated Robotic-Assisted Thoracic Surgery for Tracheal/Airway Resection and Reconstruction: Technique Description and Preliminary Results. *Ann Surg* 2021. [Epub ahead of print]. doi: 10.1097/SLA.0000000000004887.
2. Gillon R. "Primum non nocere" and the principle of non-maleficence. *Br Med J (Clin Res Ed)* 1985;291:130-1.
3. DeAngelis CD, Fontanarosa PB. Ensuring integrity in industry-sponsored research: primum non nocere, revisited. *JAMA* 2010;303:1196-8.
4. Rusch VW, Mountain C. Thoracoscopy under regional anesthesia for the diagnosis and management of pleural disease. *Am J Surg* 1987;154:274-8.
5. Migliore M, Giuliano R, Aziz T, et al. Four-step local anesthesia and sedation for thoracoscopic diagnosis and management of pleural diseases. *Chest* 2002;121:2032-5.
6. Migliore M, Borrata F, Nardini M, et al. Systematic review on awake surgery for lung metastases. *Video-assist Thorac Surg* 2017;2:70.
7. Gonzalez-Rivas D. Uniportal thoracoscopic surgery: from medical thoracoscopy to non-intubated uniportal video-assisted major pulmonary resections. *Ann Cardiothorac Surg* 2016;5:85-91.
8. Moghissi K, Dixon K, Hudson E, et al. Endoscopic laser therapy in malignant tracheobronchial obstruction using sequential Nd YAG laser and photodynamic therapy. *Thorax* 1997;52:281-3.
9. Moghissi K, Dixon K. Update on the current indications, practice and results of photodynamic therapy (PDT) in early central lung cancer (ECLC). *Photodiagnosis Photodyn Ther* 2008;5:10-8.
10. Flannery A, Daneshvar C, Dutau H, et al. The Art of Rigid Bronchoscopy and Airway Stenting. *Clin Chest Med* 2018;39:149-67.
11. Spatola C, Tocco A, Marletta D, et al. Adenoid cystic carcinoma of trachea: long-term disease control after endoscopic surgery and radiotherapy. *Future Oncol* 2020;16:33-9.
12. Gafford JB, Webster S, Dillon N, et al. A Concentric Tube Robot System for Rigid Bronchoscopy: A Feasibility Study on Central Airway Obstruction Removal. *Ann Biomed Eng* 2020;48:181-91.
13. Migliore M. Video-assisted thoracic surgery techniques for lung cancer: which is better? *Future Oncol* 2016;12:1-4.

14. Nosotti M, Musso V. A different video-assisted thoroscopic approach for every patient or for every surgeon? *Future Oncol* 2020;16:21-5.
15. Dunning J. Disruptive technology will transform what we think of as robotic surgery in under ten years. *Ann Cardiothorac Surg* 2019;8:274-8.
16. Nardini M, Bilancia R, Dunning J. Perspective on uniportal thoracic surgery: where do we stand and what is the future. *J Vis Surg* 2017;3:164.
17. Trevis J, Chilvers N, Freystaetter K, et al. Surgeon-Powered Robotics in Thoracic Surgery; An Era of Surgical Innovation and Its Benefits for the Patient and Beyond. *Front Surg* 2020;7:589565.
18. Schieren M, Defosse J. To tube or not to tube: a skeptic's guide to nonintubated thoracic surgery. *Curr Opin Anaesthesiol* 2021;34:1-6.
19. Migliore M, Halezeroglu S, Mueller MR. Making precision surgical strategies a reality: are we ready for a paradigm shift in thoracic surgical oncology? *Future Oncol* 2020;16:1-5.

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