Peer Review File

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Thank you very much for the extensive work and the attention of all three reviewers in order to improve the quality of my original manuscript. All of their concerns were meticulously balanced, nuanced and contextualised and reflections/amedments made accordingly. I tried to do my best in this mansucript, I intend this submission to be a sort of my swansong, as far as my lone ranger papers are concerned. I submit my synthetic work of an academic surgeon in the hope, that the reviewers consider my replies understandable and acceptable.

Technical details:
Bold: Reviewers comment – thin letters – my reflection.
YELLOW: modifications / new texts according to the Reviewers' comments.
Reference Indexes: original numbers.dot. added new reference (References has been properly indexed in the paralelly submitted text/revised file)

Reviewer A

Author submitted his manuscript entitled « Dark side of the Moon: the price to pay in minimally invasive thoracic surgery (MITS)", a review article of minimally invasive surgery in thoracic surgery through the years.
I congratulate the author for this manuscript, but still I have some comments:

1. **English is ok. A few typos are still found in the manuscript, to be corrected.**
   Thank you, corrected the typos (hope I eradicetd all of them, but all of us know: this is a mission impossible. At least, I tried hard.

2. **In my opinion, there are way too much metaphors and other stylistic form of expression. A well written study is appreciable, but I rather prefer a meaningful paper over a literary essay.**
   I wrote a good many literary essays, but this particular paper does not fall into this category. Network of references, referenced objective data (secondary database/pool) serve as supporting pillars. A literary essay would discuss fictional issues, while the present topic is rock hard thoracic surgery. I implemented a short paragraph on explaining the style issue. ("Le style c`est l`homme…" Georges-Louis Leclerc de Buffon 1753 …)

   APPROACH AND MODUS OPERANDI
   The complexity and depth of the topic commands a deviation from the standard approach, therefore a chimera was conceived in which basic features of a narrative review are fused with the logic of an essay enforced by the safety net of references in order to achieve its aim: presenting a perspective from an unconventional angle at our state-of art, contemporary form of MIST. Metaphors and similar stylistic forms are unavoidable yet hopefully pardonable tools in an intentionally debatable paper. The structure of this two parts analysis and autopsy handsomely serves as the roots – history (part one) – and is followed up with close and

subjective yet in places painful look at the present (part two). All in order to depict an image of the future.

3. **Nice list of references. However, Line 226, I suppose that the author suggested Diego Gonzales Rivas and not Diego Garcia.**
   Deeply sorry, thank you so much – I corrected. (Printer's Devil was responsible)
   Spaniard Diego Gonzales Rivas, the Italian Gaetano Rocco (31) and Marcello Migliore (32). The challenge of the classic surgeon's position operating from the back of the patient lying in a lateral decubitus position by the anterior approach (32.2 Hansen, Henrik Jessen , Petersen, René Horsleben , Christensen, Merete Video-assisted thoracoscopic surgery (VATS) lobectomy using a standardized anterior approach Surg Endosc . 2011;25(4):1263-9.) was both technical and symbolic at the same time.

4. **As this paper is about a surgical approach, I lack a dedicated paragraph on VATS or RATS with intraoperative conversion. This situation is more and more frequent as we are broadening the indication of VATS in challenging cases, sometime resulting in "planned" conversion.**
   Pages 18 & 19: I completely agree with rhe reviewer, and the importance of the issue was dig into the linesof the original submission, maybe too deep.. Here I am adding two new references to support the issue.
   Added references:
   62.2
   Decaluwe H, Petersen RH, Hansen H, et al. Major intraoperative complications during video-assisted thoracoscopic anatomical lung resections: an intention-to-treat analysis. *Eur JCardio-Thorac Surg 2015;* 48, (4): 588–599,
   62.3
   Safdie FM, Sanchez MV, Sarkaria IS Prevention and management of intraoperative crisis in VATS and open chest surgery: how to avoid emergency conversion J Vis Surg. 2017; 3: 87.

5. **I appreciate the fact that author emphasize more on quality metrics on surgery (LN, margins etc…), over technical aspects (number of ports…), however this should be more highlighted.**
   Accepted, fully agree, further references were implemented: on pages 17 & 19.
   40.2
   Lardinois D, Suter H, Hakki H, Rousson V, Betticher D, Ris HB Morbidity, survival, and site of recurrence after mediastinal lymph-node dissection versus systematic sampling after complete resection for non-small cell lung cancer. .Ann Thorac Surg. 2005 ;80(1):268-274.
   40.3
   Eberhardt R, Gompelmann D, Herth FJF Electromagnetic navigation in lung cancer: research update, Expert Review of Respiratory Medicine, 2009; 3:5, 469-473.

6. **The training aspect is not highly mentioned from the senior point of view. It seems harder to train a junior in MITS compared to open surgery.**
   Thank you, completely shared view. There is a problem with the word numbers – but yes; the question would deserve a full article on its own. My experience is a little it different (cultural? regional? generation gap? – I am from Central Europe) – our junior staff comes from the joystick generation, it is at their fingertips, and are home /born in the virtual reality. The „you tube generation" is more prepared to engage with the visual reality of operation field (no more over the shoulder/from the corner of the 2nd assistant) than any previous junior staff when he/she comes to the OP to assist you, or quite soon, when replaces you. Not to speak about the value of an after the procedure debriefing of a given procedure – replay; here or there we should be better etc…) But this is an issue, what a letter to the editor (or even another paper…) can expose – increasing the citation index of the journal…

7. **A review article should be more logical than an original article in my opinion**
   Thank you, actually I did not intend to write a complete review article- as the extent of the subject would be unmanagably wide. My intention was to offer a coherent reflection from the receiving end – word of the silent majority. However I restructure the paper in the first paragraphs in the hope, that it looks more logic and cohesive.
   I refer to my explanation to question 2 – hope it is acceptable by now.

Reviewer B

In this narrative review, authors placed themselves as devil' advocate and have presented an asymmetric article about danger and mistakes of minimally invasive surgery. This viewpoint is quite interesting and can be applied for different new topic in Medicine in order to warm all car givers but also the scientific community.

In the beginning of all innovative surgery procedure concerning lung cancer treatment, novelty was presented by "old school surgeons" as a "bad, uncomplete" treatment as : - lobectomy compared to pneumonectomy in the 50,s; - or VATS compared to open due an uncomplete lymph node dissection… It's interesting to have a look back to identify mistakes, in order to finally improve health care of our patients.

More a narrative review, it's an historical review concerning surgical procedures and concepts and also surgical devices. This "historical presentation" is a good plan.
Thank you – actually the history part is only one leg (and a little bit shorter than the other one) of the presentation. History offers only a basement, a sort of perspective – without the reader would not understand the present and no way to

look into the future; steps leading for floor one, where we live today - lookig at the stairway to the next floor – still to be built.

Line 201: This is the major argument against MIS, the lowest rate of nodal up-staging compared to open surgery and today it's still debated. Can you just give more details.

New references 40.2 and 40.3 are serving this purpose. Unfortunately, I cannot see much debate on the equal rights of open surgery – as VATS is publicized longum et latum everywhere. ESTS, USA TS congresses have independent sessions on the number of ports, tricks and tips – leaving the survival questions to be discussed by the oncologists…We are not simple plumbers…

Lines 243 to 247: Can you briefly give more details about the "two major obstacles" with ref?

Lymphnodes removed and intraparenchymal navigation were the two obstacles in those days. Lggls are OK by now (more technically, less in the mentality of non dedicated TSs) while intraoperative navigation for very small lesions is still a problem to be solved. I added new references – 40.2 and 40.3.

58.2

By 2010 there was an undeclared consensus (39,40), in which further progress regarding major lung resections required solving two major problems; proper lymphnode harvesting (40.2: Lardinois D, Suter H, Hakki H, Rousson V, Betticher D, Ris HB Morbidity, survival, and site of recurrence after mediastinal lymph-node dissection versus systematic sampling after complete resection for non-small cell lung cancer. .Ann Thorac Surg. 2005 ;80(1):268-74) and target (40,3 Eberhardt R, Gompelmann D, Herth FJF Electromagnetic navigation in lung cancer: research update, Expert Review of Respiratory Medicine, 2009; 3:5, 469-473,) identification. Suboptimal intraroperative nodal staging in light of the IASCLC recommendations and insufficient detectability of small (<10mm) intraparenchymal lung lesions deep below the surface needed tackling (41).

Line 276: Open thoracotomy is still the gold standard, MIS could be recommended if the surgeon could conduct a good surgical procedure according international recommendation, so anatomical lung resection and a complete lymph node dissection for early stage NSCLC.

While open thoracotomy is gold standard for Stage II NSCLC and above (the fight is going on for N1 positive cases to overtake open surgery) – the surgeon „doing open" for Stage one cases is going to loose referrals quite quickly. In Hungary > 50% of NSCLC cases are done by VATS, and the European database is quite informative in this aspect.

Open thoracotomy lost its general gold standard position throughout Europe and the thoracic surgery centers in the USA at the end of the second decade in spite of more limited thoracotomy incisions (muscle sparing thoracotomy and axillary thoracotomy) and increased efficacy of postoperative pain management and physiotherapy.

Line 280: ERAS is "a magic word" today, but was badly called "Fast track" before wich is an uncomplete protocol.

Thank you – I amended the sentence. One more pressure on the back of the surgeon – and in many cases no further resources are offered. One day surgery – same old story….

Enhanced Recovery After Surgery (ERAS) became a magic bullet (47), as the consumerism (provider vs surgeon, client vs. patient) prioritized time sparing „fast track" operations in direct contrast to patient safety.

Agree – extended the sentence – see above.

Epoch 3: One thing is missing, the important role of the Copenhagen thoracic surgical team, which have reported at the beginning of 2010's a standardized VATS procedure. That standardization was one of the main factor of the VATS development, helped by staplers and dissection devices.

Thank you for calling my attention to this very important aspect. References updated:

43.2

Jensen, K, Petersen, RH, Hansen JH et al. A novel assessment tool for evaluating competence in video-assisted thoracoscopic surgery lobectomy. Surgical Endoscopy. 2018; 32. 10.1007/s00464-018-6162-8.

43.3

Raja M. Flores Video-Assisted Thoracic Surgery (VATS) Lobectomy: Focus on Technique World J Surg (2010) 34:616–620

Now, its look like this:

The publication profile regarding the last decade proves, VATS became an established method in all domains of lung cancer surgery. Standardization protocols such as the Danish model (43.2 Jensen, K, Petersen, RH, Hansen JH et al. A novel assessment tool for evaluating competence in video-assisted thoracoscopic surgery lobectomy. Surgical Endoscopy. 2018; 32. 10.1007/s00464-018-6162-8.

(43.3) Raja M. Flores Video-Assisted Thoracic Surgery (VATS) Lobectomy: Focus on Technique World J Surg (2010) 34:616–620 and others contributed significantly to the progress. All levels of lung resections and standard lymphnode dissection via VATS became accepted standard procedures. Minimally invasive segmentectomy – a prime candidate for equal right choice for Stage One NSCLC by the early 2020s (44) won acceptance in spite of the technical ambiguity regarding the definion of intersegmental demarcation lines and uncertainties concerning orientation and target identification below a certain size. The limits of the VATS/RATS are currently undergoing permanent expansion towards more advanced cancer stages.

Stage II: One idea is missing. VATS has modified our surgical procedure and fissureless technics was a necessary adaptation for an "easier" resection and "better" short-term outcomes. On the other side, RATS allows surgeons to mimic open surgery and this approach have seduced refractory-VATS surgeons. Give more details if you have some data about those facts.

Thank you, I amended this part, referencig for important publications

Articulated endostaplers with built in cutting function modified our classic, fissure centered lobectomy concepts, as the new fissureless technique allowed quick and

safe access to the hilar structures (33.2 és 33.3: Balsara KR, Balderson SS, D'Amico TA Surgical techniques to avoid parenchymal injury during lung resection (fissureless lobectomy). Thorac Surg Clin. 2010 Aug;20(3):365-9.
33.3 Decaluwe H, Sokolow Y, Deryck F, et al. Thoracoscopic tunnel technique for anatomical lung resections: a 'fissure first, hilum last' approach with staplers in the fissureless patient. Interact Cardiovasc Thorac Surg. 2015 ;21(1):2-7.
32.2
Hansen, Henrik Jessen , Petersen, René Horsleben , Christensen, Merete Video-assisted thoracoscopic surgery (VATS) lobectomy using a standardized anterior approach Surg Endosc . 2011;25(4):1263-9.

Stage III: Non-surgical lung cancer treatments have evolved and targeted therapies and immunotherapies are modifying our surgical procedures and also concerns MIS.
Thank you for calling my attention to this burning issue – yes the competitors are approaching. And this is, where we dig our own graves: telling the patient (and pneumonologist) – we are very very minimally invasive – they reply – „oh yes, thank you, but you still cut. We offer an alternative without visible scare at all…" much more minimally invasive….If I were writing an essay, I would have space tor explaining it – but my paper is not an essay…
I modified my text
Will resective procedures maintain their pivotal role in lung cancer treatment, or will emerging systemic treatments such as targeted and immunotherapy delegate surgery into a highly limited role? We saw it unfolding in the case regarding tuberculosis (7) and the recent stent-driven intervention profile change in reference to cardiovascular surgery (58.2 Grant SW, Kendall S Goodwin AT et al Trends and outcomes for cardiac surgery in the United Kingdom from 2002 to 2016 JTCVS Open 2021;7:259-269) is a warning sign of dire straight up ahead. The emergence of non-surgical ablative procedures such as stereotactic radiotherapy, radiofrequency, thermal and chemical ablation (58.3.58.4 58.3 de Baere T , Farouil G, Deschamps F Lung cancer ablation: what is the evidence? Semin Intervent Radiol . 2013 Jun;30(2):151-6. 58.4 Tandberg DJ, Tong BC, Ackerson BG, Kelsey CR Surgery versus stereotactic body radiation therapy for stage I non-small cell lung cancer: A comprehensive review. Cancer. 2018 15;124(4):667-678) is another issue. Are they ousting the surgical approach or integrating into the operative (VATS/RATS) arsenal ? A question poised to the imminent future.

Line 326: in the US, many resections are still done by thoracotomy. Most of them in small center / hospital.
Thank you – this is for the price of the procedure – a TS specialist as an operator is much more expensive than a general surgeon doing a lung resection. I did not want to dig deeper, but I hinted at the social aspects/responsibilities of medicine/surgery. I added the word: TS centers in USA – our patients are luckier here in West and Central Europe.
In my reading VATS/RATS are also thoracotomies (tomia thoracalis) – so I differentate as open thoracotomy vs portal thoracotomy. (Actually sternotomy is a thoracotomy as well – as it enters the chest.)

I refined the gold standard role of OTvs VATS – and also highlighted th esignificant difference within the USA – as I see from a safe distance.
Open thoracotomy lost its general gold standard position throughout Europe and the thoracic surgery centers in the USA at the end of the second decade

Line 336: AI is an interesting new imaging technology and data are published about it's diagnosis rate for benign lesions and NSCLC lesions.
Thank you – the wolf under the garden fence; CT screening will (already is) challenging TS speciality; 3-6 mm lesions being subjects/objects of concern (and potentially litigation….) I added some references.
60.2
Schreuder A, Scholten ET, Bram van Ginneken B et al. Artificial intelligence for detection and characterization of pulmonary nodules in lung cancer CT screening: ready for practice? Translational Lung Cancer Research 2021; 10; 5
60.3
Wilson JW Virchow's Contribution to the Cell Theory J Hist Medicine Allied Sci 1947; 2 (2):163-178
However the consequence of Virchow's aphorism: „omnis cellula e cellula" (60.3 Wilson JW Virchow's Contribution to the Cell Theory J Hist Medicine Allied Sci 1947; 2 (2):163-178) meaning, we still need a cell-based diagnosis is not entirely cancelled… yet.

Lines 363 to 383: Interesting development of the different surgeons' generations.
Thank you – it is quite un-PC / muddy waters. We are talking about gender issues among TS longum et latum – but are quite quiet about age – an equally important issue – but not as sexy…

Line 409 to 427: Education of young surgeons evolved from the inside to outside of the surgical field with the "skin border". But at the opposite, training on surgical simulator is particularly dedicated for MIS. Not completely agree with the "no B-plans" concerning new wave of surgeons, because many recent articles are dealing with surgical trouble and safety. One of the main concern is the feeling of fail during conversion, also for anesthetic trouble (double lung ventilation).
I softened up the B-plan sentence, as I recognised its too harshness and sharpeness. Hope the new version is acceptable.
Tomorrow's new wave of surgeons are arriving with highly limited contingency or B-plans to solve surgical technical problems (64.2 64.3 Decaluwe H, Petersen RH, Hansen H, et al. Major intraoperative complications during video-assisted thoracoscopic anatomical lung resections: an intention-to-treat analysis *Eur JCardio-Thorac Surg 2015;* 48, (4): 588–599, 64.3 Safdie FM, Sanchez MV, Sarkaria IS Prevention and management of intraoperative crisis in VATS and open chest surgery: how to avoid emergency conversion J Vis Surg. 2017; 3: 87.) or even anesthetic trouble associated with failed double lumen intubation since they are technically undereducated to convert procedure.

I also added a new paragraph to highlight the importance of training:

How to proceed ?
It seems clear, the surgical community must practice a far more critical attitude towards surgical technologies than is currently underway. More research and discussion regarding the numbers of lymphnodes to be removed and/or to be oncologically correct rather than hot debate on the numbers of accessing ports (88) is required. A negatively impressive number of lung cancer surgeries are performed in Europe and in the USA without correct lymphnode staging (3xN1;3xN2) while many are heralding their use friendly VATS/RATS procedures. Readiness to VATS/RATS > open procedure conversion as in the case of pilots are trained in emergency procedures must be promoted. Preferring VATS over open techniques as a general rule is representative unfair pressure and a precipitous example heaped upon our junior staff. Absolute priority of the proven negative bronchial ring/resectional line during surgery is a mantra and one in which we must keep chanting.

Line 459: Ecological trouble and OR wastes are a new topic of interest and "surgeons" are the biggest caregivers polluter due to "safety and sterile" packaging. Could be developed.
Agree – but this is a management and economy (price and profit, of course) issue. We are puppets of our masters – an issue I did not want to go deeper. I wrote a lot about the steel staplers (Tas and the old Russian workhorses) and their disposable cartridges – not only in peace, but in war surgery as well. (Load, space etc…) No echo – so this time I was not to repeat myself…

Line 528 to 538: And what about "surgeons's performance index"? About short-term outcomes, operating times, long-tem outcomes; Quality of life and patient satisfactory? And also educational role with student and the society. Some points are developed after, but could be more detailed. Compared to medical treatment, suregon's community is always evaluating and comparing theirs technics and effects. Not necessary with a randomized and controlled trial – difficult to conduct in surgery – but by cohorts and retrospective studies.
Thank you, agree completelely. However the word number, extent of the paper is already over the fence. I wish, but I would not discuss it here. Maybe a subsequent paper?

It's a well written and interesting article from the devils advocate. Sometimes "against" surgeons. Facts are well described with a small negative interpretation due to the author viewpoint. The angel viewpoint need to be write. Because actual surgeons study concerns patients quality of life, surgical impacts on patient, hospital costs and organization and also ecological impact, young surgeon education also concerning article reading, and non-technical skills because being surgeon is being a caregiver first, with everything supposed to.
I deeply hope, that I am not against surgery and surgeons. It is my life, bread and butter -so my only aim is to open the eyes and teach asking proper questions. Where it seems to be negative, it wants to be objective, wishes to offer a 3D picture of reality. Where I see warning signs, I am ringing a bell: Stuart W.Grant,

SimonKendall, Andrew T.Goodwin et al Trends and outcomes for cardiac surgery in the United Kingdom from 2002 to 2016 JTCVS Open 2021;7:259-269
Angel viewpoint: actually it is dominating the professional publication domain; sometimes uncritical and one sided,
The paper I submitted tries to contribute to the non-technical skills of the young generation of TS.

Reviewer C

Title. Does the title reflect the main subject/hypothesis of the manuscript?
The title reflects the purpose of the authors to investigate the merits and defects of thoracoscopy

Abstract. Does the abstract summarize and reflect the work described in the manuscript?
Quite confused and not clearly describe which is the purpose of the authors. It seems just an historical overview of the development through the last 40 years of the minimally invasive techniques.
This is a paper of one author, it is me. I am deeply sorry, that I confused the reviewer.
The purpose /aim is : Challenge of the undiscerning canon characteristic of minimally invasive thoracic surgery from a subjective viewpoint of a practizing thoracic surgeon with extensive literature output. Less than 30 % of the whole text is concerned with historical aspects in a structured manner. (2355 words out of the 9792 – references included)

Comment´s
First,
What are the original findings of this manuscript?
We think that the article is just an historical overview oft he last 40 years without nothing new to know. Just a personal interpretation oft he past by the authors that tried to analyze the delepments process of the videothoracoscopic technique. It´s an interesting overview but nothing nore and in our opinion in some key point could be debatable. However it´s not a scientific article with objective datas and the conclusions are based on personal opinions of the authors. I connot be agree or disagree about the conclusions because there are no objective data.
Historical part is less than one third of the manuscript submitted. It is not a (descriptive) overview, but a systemic analysis of the development of VATS/RATS (with many contextual references to intensive therapy, medtech etc…- never observed before by other authors) followed by the discussion of despotism of technology an approach has not been published so far. The same refers to the periodization, which is absolutely original and unique to my best knowledge, as a part time medical historian full job thoracic surgeon

The accusasion, that the paper is debatable, is not a negative remark at all in my view, quite the contrary. Impact factors are generated by opinions agreeing and disagreeing. Dispute is the motor of scientific progress.

I strongly oppose the opinion of the reviewer, telling me that this is not a scientific paper. The reference list consists of the hard data – there is no need for rumination here. Being the board member of the Journal of Thoracic Oncology, having an independent citation index well above 1000, having more than 80 English publications I like to think about myself as somebody who has a hazy idea what science means and what does not. (Details: https://pubmed.ncbi.nlm.nih.gov/ > Molnar TF 66 items, - absolute majority first or last author. Further 24 does not appear in the US catalogue)

I am very well aware, that nowadays the trendy paper is written by a computer scientist with a fresh degree in medicine, no clinical practice at all but excellent in metaanalysis. Sorry, its not me – but this does not mean, that my submission is out of science. Science means systemic doubt and critical approach- not necesserily a datamass with fancy statistics. I have my share in that portion – this time I walk a different path.

Second,

What are the new methods that this study proposed?

The methods of the review aren´t reports.

Yes, you are right, this is not a report, this is a sort of systemic and hopefully coherent rethinking of our dogmas. I did not use key words or search motors or other fancy tools – I used my experience in the wards, OPs from TS centers in Hungary (I founded two), to Heidelberg, Bristol (twice) East Kilbride, Newcastle, Barcelona -and many congresse in the past 40 years.

How the collected the articles in literature?

Sorry, I do not understand the question completely. If the question refers to the method of collecting the references, it was prioritized by me, a private collection of relevant papers > 600 – starting from 1990 onwards. As the subjective standpoint is an important factor in this paper, my relevant papers published in English were applied as well.

Which are the criteria for the literatures revision?

I do not think, that a revision would improve the quality of the paper; I added papers to the reference list on topics, other reviewerrs (1&2) suggested.

Thank you all for your time and help in formulating my paper

sincerely yours

Tamas F Molnar