

Letter to the Editor

Non-intubated thoracic surgery programs: “just another brick in the wall”

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Dear Editor,

The history of surgery is studded by innovations; but great improvements have often been initially opposed due to consolidated experiences and traditions. On the other hand, history is plenty of meteors and technical speculations fueled by exasperating personalisms miserably shipwrecked on the rock of unequivocal evidences.

However, innovations represent undoubtful milestones in surgery with the aim to achieve applicability, reproducibility and, at least, a real benefit for patients. In this scenario, non-intubated thoracic surgery (NITS) techniques stand as new strategies in the wide portfolio of patients’ tailored approaches and pathways, such as minimally invasive surgery (video-assisted and robotic) and perioperative optimization programs [1].

Although one-lung ventilation (OLV) surgery still guarantees an unavoidable safety profile (stable operating field, airways control, titration of proper ventilation volumes), it is associated with detrimental related complications, such as iatrogenic airway injuries, laryngeal spasms, ventilator-induced lung injury, high risk of mechanical ventilation dependence or weaning issues in high-risk patients (COPD, reduced pulmonary functional reserves, neuropathies), as well as intraoperative ventilation-perfusion mismatches [2].

Furthermore, the need to resort to intraoperative rescue maneuvers, such as the adoption of positive pressures on the non-dependent lung or the need for intraoperative forced lung re-expansions could predispose to

an early parenchymal staple-line oozing and the onset of air-leaks in the immediate postoperative period. Finally, ventilation exclusion represents a predisposing factor for atelectasis, sublobar air-trapping and cardiovascular events as the results of transient intraoperative pulmonary hypoxic vasoconstriction. In this context, the benefits of a spontaneous breathing would appear rather obvious by guaranteeing a physiological approach and preserving intact muscle tone, functional residual capacity and mucociliary clearance [3]. But what are the limits of a NITS approach? But above all, is it an innovation for the surgeon or for the patient?

Unfortunately, we still have to come to terms with the past. Since the ancillary works by Pompeo et al [4], thoracic surgery scientific communities have rather limited its adoption only to mere diagnostic or minor parenchymal resections [5]. Nowadays, the first limit to the implementation of NITS programs still appears to be the lack of cultural transition from historical eligibility criteria, as in high-risk patients. This inexorably follows a discrepancy between theoretical advantages and daily clinical practice.

The multicenter INFINITY study [6] clearly offered an objective picture of an alarming and emblematic “leitmotiv” cyclically reappearing in the history of surgery. About one-fifth of the enrolled Centers reported lack of confidence with regional anesthesiological techniques for such approach and, in 42% of cases, the non-implementation of NITS was attributed to a putative surgical unsafety. This resulted into NITS indications’ restriction only to minor diagnostic procedures and for the treatment

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of pneumothorax in patients with high comorbidity or poor respiratory performance; while, only a small number of Departments intentionally resorted to NITS for fit for surgery patients. Although postoperative advantages were undeniable, main doubts were raised upon the management of the airways in emergency, the onset of intraoperative hemodynamic instability, the failure to resolve cough reflex, patients' cooperation and increased operating times. Moreover, additional issues raised from lack of standardization in analgo-sedation procedures and high incidences of ineffective intraoperative analgesia (up to 42% of cases). However, the need for a stable operating field requires technical compromises, such as the control of the cough reflex by airways anesthetic aerosolization and intraoperative vagal infiltration [7].

Facing with such ambiguous scenario and discordant literature evidences, an adjunctive element for general reticence arises from intraoperative management of life-threatening complications requiring conversion to one-lung ventilation, the need to deepen anaesthesia and the introduction of a double-lumen tracheal tube or bronchial blocker in such precarious setting, promoting a new concept of spontaneous ventilation with double-lumen intubation and short relaxation techniques [8]. But, is it only a mere compromise strategy? Probably a pre-announced failure to set aside peculiar aspects and rationale of NITS itself.

Moreover, in the context of a heterogeneous literature, geographical disparities are undeniable, as most evidences come from Eastern countries, while a generalized skepticism still claims debate in the Western ones.

In a large retrospective study, Hung et al [9] reported NITS in a cohort of 1.205 lung cancer patients. 426 were anatomical resections (lobectomies and segmentectomies). Post-operative complication rates were modest (2% air leak, 0.2% arrhythmias, 0.3% haemothorax) and intubation conversion was required in 2% of cases due to mediastinal movement or instability of the operative field. At the multivariate analysis, the Authors reported a BMI of 25 kg/m² or more and anatomical resections as risk factor for OLV conversion.

Guo et al [10], comparing 48 non-intubated video-assisted thoracic surgery (NiVATS) with 92 OLV-segmentectomies, reported no significant differences in intra- and perioperative complications. Similarly, Liu et al [11] have clearly demonstrated an undeniable safety profile of NITS procedures for anatomical parenchymal surgery

with an overall conversion rate of 7%, mainly due to unexpected pleural adhesions, mediastinal movements and the onset of hypercapnia or refractory hypoxemia.

However, taking into account technical and anaesthesiological issues, why to start a NITS program? Are there more risks or benefits? The answers seem quite far from an exhaustive definition, although the "NITS theory" would not significantly differ from "NITS practice". But, it would be a mistake to consider NITS as the latest evolution of minimally invasive thoracic surgery.

Regarding patients' outcome, surgery translates into a transient state of immunosuppression [12]. NITS would seem to reduced post-operative IL-6, TNF-alpha and C-reactive protein serum titers and these peculiar aspects should be priorities when facing oncological surgery. Recent studies have demonstrated both overall survival and disease-free survival were significantly better after NITS than OLV-surgery [8,13].

In conclusions, NITS is a modern approach claiming dignity into clinical practice. A complementary and non-exclusive opportunity among several innovations in the modern thoracic surgery.

NITS is "just another brick in the wall".

Keywords: non-intubated thoracic surgery, pulmonary resections, lobectomy

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