

Post-operative lung ultrasonography in daily routine thoracic surgery: can we trust its results?

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Management of chest tubes and monitoring pleural space after thoracic procedures continue to influence several authors to design protocols, to describe chest drain care and its removal affecting variable hospital length of stay for the same procedure. There are different studies with very limited data on the follow-up of patients after surgical operation. The necessity of obtaining an imaging study is to confirm lung expansion (LE) and to reveal any radiological abnormality before discharging patient (1-3). Daily chest radiographs are the common way to reach this goal at most institutions. Starting with Reeb and colleagues, about this use of daily routine chest radiographs as compared to on-demand strategy after pulmonary surgery (4), lots of authors have suggested using alternative ways. The authors concluded that daily radiographs could be foregone, because the on-demand strategy has a better impact on management and has not proven to negatively affect outcomes, even if prospective and randomized trials are necessary to improve the current level of evidence.

In the same way, French *et al.* (5) about reducing length of hospital stay and improving patients' satisfaction suggest reducing the numbers of CXRs, as previously reported by Reeb *et al.* (4).

Cerfolio and Bryant (6), in their deep analysis on 1,037 patients who underwent to thoracic procedure, concluded that “*there are no data to suggest that a daily chest X-radiograph (CXR) of asymptomatic patients who are doing well after elective pulmonary resection adds any clinically relevant or important*

aspect to the patients' care”; also “*...daily CXRs are of little benefit for patients who do not have a pneumothorax on their recovery room CXR and for patients who do not become hypoxic during their hospital stay*”. CXRs may be associated with pain or discomfort as a result of patient stay during performing imaging. Lanuti (7), about the analysis of Cerfolio and colleagues observed that lobar collapse, retained blood, alveolar infiltrates, small to moderate pneumothorax (PNX) could be occult findings on post-operative CXRs and underestimated by clinical examination and advocate a simple prospective randomised controlled trial to understand and indicate when it is necessary chest radiography in routine pulmonary resections. In this scenario, an increasing interest in using chest ultrasonography (CU), after general thoracic surgery procedure, has found a fertile ground to grow up. The pivotal role of CU has started to emerge from its spreading use in trauma center as a rapid scan detector. Rapid, low-cost, no radiation, sensibility, specificity, portable device and bed side patient-performing are its major and strong characteristics (8).

Before continuing in the analysis we have to describe what a thoracic surgeon is interested to see in CXR as well as a good clinical evaluation on the patient's bed: (I) PNX; (II) pleural effusion (PE); (III) LE; (IV) lung consolidation (LC)/atelectasis; (V) subcutaneous emphysema (SE); (VI) diaphragm (D); (VII) mediastinum (M).

Considering the present literature there are no reports about mediastinum evaluation with CU.

PNX, PE, LC, SE, LE, D can be evaluate both with CU and CXR. Alrajab *et al.*, analyzed 13 studies comparing CU and CXR in detecting PNX underling the superiority of CU over CXR even if more of these studies derived from trauma center data (9).

Goudie and colleagues (10) evaluated the use of CU in post-operative care and concluded it will be an alternative way to monitor thoracic patients, being effective, convenient, inexpensive and easy to learn for the most of physicians (thoracic surgeons, radiologists and pneumologists in primis). On the same way Patella *et al.* (11) propose to introduce CU as an alternative to exclude significant PNX after chest-drainage removal. Starting from these studies, Chiappetta and co-authors (12) put the attention also on the other lung abnormalities that could be discovered and monitored.

In their most recent pilot study, which inspired this editorial (13), patients after thoracic procedures were evaluated with CU blinded to CXR, deciding if it was useful or CU was exhaustive. Only 24 patients were enrolled prospectively, but even if this small number, CU allowed a further discrimination of the lung abnormalities, such as atelectasis, infections, hematoma, PEs. It is also interesting that CU was exhaustive in 67% of cases after open surgery and in 85% of cases after video-assisted thoracic surgery. Its limit was the presence of massive SE or the absence of lung point which determined CXR in only 5 cases. As we already previously assumed (14) the use of chest sonography can be an alternative way to promote a reduction of postoperative chest radiographs, and the present study of Chiappetta and colleagues confirmed this role, without the risk of delaying a change in management, without sacrificing quality or reducing safety, thus according to the IDEAL recommendations (15).

Our final comment is about a legal concern, when a malpractice could be under investigation: a CXR would give objective findings, which can be easily reviewed and evaluated by different operators, while a CU is a dynamic operator-related exam, and many information would get lost when reviewed in future times.

So, are you really confident that CU findings will be trusted?

We would rather suggest considering a pre-dimission CXR, when you have already gained the reduction of postoperative CXRs performing CUs.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Sepehrpour AH, Farid S, Shah R. Is routine chest radiography indicated following chest drain removal after cardiothoracic surgery? *Interact Cardiovasc Thorac Surg* 2012;14:834-8.
2. Brunelli A, Beretta E, Cassivi SD, et al. Consensus definitions to promote an evidence-based approach to management of the pleural space. A collaborative proposal by ESTS, AATS, STS, and GTSC. *Eur J Cardiothorac Surg* 2011;40:291-7.
3. Whitehouse MR, Patel A, Morgan JA. The necessity of routine post-thoracostomy tube chest radiographs in post-operative thoracic surgery patients. *Surgeon* 2009;7:79-81.
4. Reeb J, Falcoz PE, Olland A, et al. Are daily routine chest radiographs necessary after pulmonary surgery in adult patients? *Interact Cardiovasc Thorac Surg* 2013;17:995-8.
5. French DG, Dilella M, LaPlante S, et al. Optimizing postoperative care protocols in thoracic surgery: best evidence and new technology. *J Thorac Dis* 2016;8:S3-11.
6. Cerfolio RJ, Bryant AS. Daily chest roentgenograms are unnecessary in nonhypoxic patients who have undergone pulmonary resection by thoracotomy. *Ann Thorac Surg* 2011;92:440-3.
7. Lanuti M. Invited commentary. *Ann Thorac Surg* 2011;92:443-4.
8. Lobo V, Weingrow D, Perera P, et al. Thoracic ultrasonography. *Crit Care Clin* 2014;30:93-117, v-vi.
9. Alrajab S, Youssef AM, Akkus NI, et al. Pleural ultrasonography versus chest radiography for the diagnosis of pneumothorax: review of the literature and meta-analysis. *Crit Care* 2013;17:R208.
10. Goudie E, Bah I, Khoreba M, et al. Prospective trial evaluating sonography after thoracic surgery in postoperative care and decision making. *Eur J Cardiothorac Surg* 2012;41:1025-30.
11. Patella M, Saporito A, Puligheddu C, et al. Lung Ultrasound to Detect Residual Pneumothorax After Chest Drain Removal in Lung Resections. *Ann Thorac Surg* 2018;105:1537-42.
12. Chiappetta M, Meacci E, Congedo MT, et al. Is Post-Operative Lung Ultrasonography Effective in Lung Abnormalities Analysis? *Ann Thorac Surg* 2018;106:937.

13. Chiappetta M, Meacci E, Cesario A, et al. Postoperative chest ultrasound findings and effectiveness after thoracic surgery: A pilot study. *Ultrasound Med Biol* 2018;44:1960-7.
14. Scanagatta P, Girelli L. eComment. Chest sonography could reduce routine chest radiographs after pulmonary surgery. *Interact Cardiovasc Thorac Surg* 2013;17:999.
15. McCulloch P, Altman DG, Campbell WB, et al. No surgical innovation without evaluation: the IDEAL recommendations. *Lancet* 2009;374:1105-12.

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