Editorial

Digital chest drainage *vs.* water seal chest drainage in the robotic era

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Jacobsen and coworkers present the results of a retrospective study analyzing the possible benefits of using digital chest drainages compared to water seal drainages after robotic lung resection [robotic-assisted thoracic surgery (RATS)] (1). Although this is an innovative study and a well written paper, I would like to suggest points for consideration to readers of the article.

Authors conclusions remark, once more, the uncertainty of using the water seal drainages due to the subjectivity of its reading. This point has been largely highlighted (2,3) and it is considered the main reason to use digital systems (2-4). However, in this series, despite being three people making decisions about the chest tube, differences between groups were not so large although significant: water-seal drainage patients had 30% more time the chest tube in compared with the other group. This data, statistically significant, ended up being also clinically relevant because this group showed one day longer length of stay (LOS). Nevertheless, digging in the detail, in the multiple regression analysis, type of digital chest drainage did not influence chest tube duration but surprisingly, it was key for the LOS along with the BMI of the patient. This is a confusing result. Probably, it is closely related to the retrospective nature of the study and the population included in each group. Information about chronic obstructive pulmonary disease (COPD) and pulmonary function tests of the patients, not provided here, would have helped better understanding what was really happening in the series. Reviewing the literature, there is a lack of consensus when comparing outcomes (duration of chest drainage and LOS) depending on the type of chest drainage used (5-8). The last systematic review published about the issue (9) found that duration of chest tube was significantly shorter using digital drainages in 8 out 18 studies with complete data (time ranging from 1.7–5.5 days in the digital system versus 1.9 to 6.1 in the traditional group) and LOS was shorter only in 6 out of 14 included studies. Therefore, the current data is not clearly in favor of using a more expensive device as the digital drainage. However, there is an issue in which all authors agree: there is no need to perform provocative clamping when using digital systems (6,10). The continuous reading of changes in the pleural pressure and air flows easies taking sound decisions at bedside which is an objective benefit (2).

We have enjoyed the precision used by the authors defining the clinical course of the patients and the criteria for chest tube removal in either group. But, apparently, conditions are not the same because in the digital group patients are asked to and evaluated after exercise something implicit in the other group but not clearly stated. For us this is a very important issue as we have demonstrated that intensive perioperative chest physiotherapy is key for decreasing postoperative complications, reducing LOS and producing a reduction in overall costs after lung resection (11-14). Costs, another relevant issue when implementing new technology (15). Though, what really impressed us was the detailed and intensive follow-up protocol performed by the nurses evaluating and charting the air-leak evolution during the postoperative period. This fact can create

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significant differences finding real variations between groups and specially reducing the timing to chest tube removal. In most units, doctors oversee postoperative chest tube management. Transferring this decision to the attending nurses, that are 24 hours at bedside, can effectively decrease timings no matter what type of chest drainage being used.

Other debatable issue is the need for continuous suction as a rule in the postoperative period after a lung resection. Jacobsen and coworkers (1) applied suction for the initial 8 hours and then switch to physiological intrapleural pressure in the digital group versus not suction in the traditional drainage group of patients. Authors do not clarify the reasons for applying this specific protocol although some ideas might support it such as helping the patient to fully expand the lung while initially recovering or speeding up the time to eliminate the natural residual pneumothorax. Again, for us, intensive chest physiotherapy started as soon as the patient arrives at the recovery room will show the same results (14). Multiple studies have addressed the use of suction mainly using water seal drainages after lung resection not finding clear advantages except when subcutaneous emphysema was developing. Therefore, in the guideline, Gao *et al.* (3) made only a weak recommendation (Grade 2A) to apply suction specifically when subcutaneous emphysema is present recognizing the need for extensive studies using digital systems. In 2019, Wang and coworkers (16) performed a complete systematic review concluding that digital drainages significantly reduced the rate of prolonged air-leak (PAL), shortened the duration of chest tube drainage and the LOS compared to traditional water sealed drainages even when this conclusion may have been influenced by the lack of information in items relative to PAL score (such as FEV1 or pleural adhesions). Authors discussed that benefits are related to the capacity of the system to regulate its pressure depending on the pleural conditions to avoid great variations of intrapleural pressure that seem to increase the rate of PAL.

When dealing with chest drainages in the postoperative period of a lung resection, information about the rate of PAL of the series is interesting although in this case it was not provided because it was not the aim of the study. This fearful complication is closely related to the quality of the lung of the patients, being older and COPD-emphysema patients the worst ones. Accordingly, in this series, age of the patient was key for predicting the duration of chest tube. But, as a technical complication, PAL is also related to the surgical technique itself. Robotic procedures allow performing great precision surgery. Nevertheless, it has drawbacks, such as opening the fissures using the monopolar cautery more often or the possibility of parenchymal injury due to the lack of haptic feedback increasing the risk of air leaks (17). In this paper, as only one surgeon has performed all the cases, technical issues might be controlled in both groups. A recent comprehensive systematic review (15) found that PAL was reported in 5% to 10% after RATS being significantly lower compared to open resections but not different to video-assisted resections. According to the European Society of Thoracic Surgery 2019 Annual Database Report, the rate of PAL after lobectomy is 9.1%, 6.5% after anatomical segmentectomy and 3.7% after wedge resections independently of the employed technique (18).

After a general review of the literature, data about the final benefits of using one or other type of drainage systems are inconclusive (9,15) probably because the measured outcome does not only depend on the type of drainage. Multiple confounding factors are out of sight specially when analyzing retrospective studies. We definitively agree with French *et al.* (10) thoughts of focusing on careful designed clinical pathways to achieve major benefits for the patients (4).

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Footnote

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