



Digital pleural drainages—what is the real value for patients?

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In a recently published randomised trial (1), the authors conclude that the use of a digital thoracic drainage system did not shorten the duration of chest tube placement in comparison to a traditional thoracic drainage after anatomic lung resection. This conclusion conflicts with the meta-analysis by Zhou *et al.* (2). According to them, using digital drainages reduce duration of air leaks and hospital stay. Other reported advantages of digital drainages are: improving agreement in clinical decisions (3), being useful to predict the occurrence of prolonged air leak (4,5) and improving patients' satisfaction scores (6). No other surgical outcomes but time with chest tubes have been improved with the use of digital systems, including reoperation and readmission rates, prevalence of relapsing pneumothorax or pleural spaces, amount of postoperative pleural fluid, pleural empyema, chest pain or rate of patients discharged with chest tubes (2). A reduction of non-specified pulmonary complications was reported by Miller *et al.* (7) in patients with digital pleural devices included in a retrospective analysis of matched 20 cases and 40 controls. The association between pulmonary complications and digital drainages is not discussed in the paper and it is difficult to understand.

Regarding the advantage of decreasing hospital stay, in most published trials and cohort analyses, the differences of length of staying using digital or conventional pleural systems is around 1 day. As we have highlighted in a previous editorial comment (8) the median reduction of hospital staying using digital devices can be estimated in 0.7 days

(less than 17 hours). In other words, patients can be discharged in the evening instead of staying overnight. This can be statistically significant, but its clinical relevance is difficult to accept. In the trial conducted by Takamochi *et al.* (1) the actual hospital stay for patients with digital devices was 6 (range, 6–8) days while in the case of patients with conventional systems it was 7 (range, 6–8) days; again 1 day or less but in this case P value was over 0.05. Depending on the number of cases in the study—which is not easily calculated for non-parametric tests as those to be used for duration of hospital stay (9)—and the type of statistical analysis, hospital staying differences result statistically significant or not.

Hospital staying is a surrogate of multiple clinical, administrative and social variables, some being easily measured and reported and some not. In lung resection, duration of air leaks—easy to measure—is the main variable influencing postoperative hospital stay (10). Other circumstances, such the availability of administrative resources to generate discharge reports—which are mandatory in all developed countries—patients' transportation and other social and family support, and the type of reimbursement or health care coverage have influence on the time of discharging patients from hospitals but are not reported or measurable. Specially in multi-institutional trials, it must be assured that the process of discharging patients from hospitals follows the same steps and it is free from unveiled influences.

In 2009, we reported by the first time that using digital devices increases the inter-observer agreement on when

to pull out chest tubes (3). In our paper it was concluded that digitally recording the occurrence or not of air leaks in the last hours before morning rounds facilitated the decision of withdrawing the tubes. Curiously enough, a few years after (11), we were able to observe a comparable high agreement rate using conventional drainage systems. That was probably the effect of the same team working together under the same guidelines for years. This finding is not reproducible in other teams where fellows are being replaced every few months by new coming doctors under training. Thus, we could hypothesise that the influence of digital pleural drainage systems on duration of chest tubes and hospital stay is just a matter of doctors being more comfortable—thanks to digital recordings—ordering chest tubes to be pulled out. To our knowledge, that is the main reason why the use of digital drainage devices has been included in lung resection clinical pathways in many teams around the world (12).

Other advantages of the use of digital devices have been related to digital monitoring and storing of pleural pressure records. As mentioned above, pleural pressure readings are useful to predict the occurrence of prolonged air leak (4,5) but the same can be done using conventional systems at a lower price (11). Also, pleural pressure records may help to differentiate active air leak from a pleural space effect (13). Other advantages of recording pleural pressures are still awaiting demonstration. In a previous investigation, we tried to evaluate the physiologic effects of pleural suction on different types of pulmonary lobectomy (14). Our results were inconclusive and clinically non-relevant; in fact, although frequently commented in the literature (15), the usefulness of massive recording of postoperative pleural pressures for further analysis is still unknown, but for predicting prolonged air leaking (4,5).

Subjective advantages related to the use of digital systems are mentioned in some randomised trials. According to Pompili *et al.* (6), patients wearing digital devices were more comfortable than patients with conventional ones. In their study, the questionnaire was administered in the evening of postoperative day 1 and in the morning of postoperative day 2. It is to note that patients under conventional systems were on wall suction on day 1; obviously, their mobility was impaired by that reason; on the other hand, the usefulness of wall suction after lung resection is far from being demonstrated (16).

In conclusion, we still believe that digital pleural drainage systems have a role in the armamentarium of thoracic surgeons, but its real value is facilitating clinical decisions

on pulling out chest tubes; other clinical advantages are still lacking evidence. We applaud Takamochi *et al.* (1) for showing their negative results against the current trending in postoperative pleural drainage.

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Footnote

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

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