The fanfolding modification for removing chest tube clogging after cardiac surgery

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Received 10 May 2013; accepted 28 May 2013

Keywords: Chest • Haemothorax • Pleural space • Postoperative care • Surgery • Complications

Karimov et al. [1] emphasize an interesting subject ignored by surgeons in many aspects compared with surgical procedures. However, when not followed seriously, chest tube (CT) clogging can result in catastrophic complications [2, 3]. We congratulate the authors to draw attention to CT drainage, which is as important as ‘operative planning’. Duncan and Erickson [4] state that ‘When the full length of CTs was stripped (135 cm), intrathoracic pressure increased to ~400 cmH2O (=294 mmHg) (whereas 5 cm of tubing resulted in a mean pressure of ~87 cmH2O (=63.9 mmHg)). However, it may not be clinically applicable. Because when the internal volume of 135-cm-long CTs with inner diameter of 0.952 cm (3/8 inch) is measured, its volume is determined to be no more than 130 ml. According to Pascal’s Law, if a U-tube is filled with water and subsequently, the air at the top of the one arm is evacuated by a piston, the height difference between two arms represents suction pressure. The same principle can be applied to chest drainage system (CDS). Namely, if the reservoir of the CDS is completely filled with water and 130 ml of air is evacuated from the connector end of CT, the height of water column within the CT is measured about 120 cmH2O, which is much less than 400 cmH2O. Likewise, if a 5-cm-long tube is stripped, the evacuated volume is ~4.4 ml, creating a suction pressure of 4.06 cmH2O (=2.9 mmHg) in the thoracic cavity. Briefly, it can be said that such high suction pressures cannot be created by stripping/milking (S/M). Otherwise, the clinical implications of high negative suction pressure created by S/M would have been observed, since the pressure change in the thoracic cavity may not transient as the authors declared in the study [1]. The supporting point is that the CDS uses an under water seal which cannot allow flow through the thoracic cavity after S/M.

It was suggested in the systematic Cochrane review that techniques, including stripping, milking and fanfolding, used for removing clots from tubes are not superior to each other [5]. The fanfolding technique involves folding sections of the tube over each other and squeezing [5]. According to our clinical experience, we would like to talk about the ‘Fanfolding modification’. In this technique, the tube is clamped distally before fanfolding, subsequently the fanfolded segment is released suddenly after squeezing and the clamp is removed. The manoeuvre is continued until oscillation is approved, especially in pericardial CT. Cardiac tamponade has never been observed with the manoeuvre at the intensive care duty during our residency course (~1640 cases in a 6-years period). While avoiding volume changes in the chest, the main effect is the removal of clot and maintaining the oscillation for intact flow to the reservoir. Although the modification is clearly beneficial, the more sophisticated systems described by the co-authors [6] are quite good, and would gain wide acceptance by many surgeons.

REFERENCES