



Clinical Update

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Chest Drain Management: Tradition or Evidence-Based?

Nursing and medical practice both have a long legacy of traditions that are handed down from generation to generation, from mentor to student. The past decade has seen even more emphasis on practice based on research rather than practices based on “the way we have always done it.” However, when it comes to managing patients on chest drainage, bedside practice does not necessarily reflect research findings, particularly regarding use of suction or gravity drainage.

Clinical Update last reviewed the literature on suction or gravity drainage in the [September 2002](#) issue. At that time, three studies showed that air leaks resolved more quickly and chest tubes were removed sooner postoperatively when the drain was left to gravity drainage rather than connected to suction. Researchers noted that suction increases the flow rate of air coming out of the chest which was associated with delayed healing. As long as air is being pulled through an opening in the lung parenchyma, the thinking goes, the edges cannot approximate and healing will not occur. In these studies, the benefits of reducing airflow outweighed any advantage provided by suction in pulling the visceral pleura up against the parietal pleura.

Identifying the Outcome

A new meta-analysis of randomized, controlled trials comparing suction with gravity drainage is currently in press and available online (Epub ahead of print).¹ A challenge in evaluating the literature in this area is determining the outcome desired: presence of a postoperative pneumothorax, duration of a prolonged air leak, length of time with chest tube, length of stay, or something altogether different? Methods also vary. In some studies, gravity drainage was implemented *after* initial suction in the OR or PACU. Those are difficult to compare with studies in which patients' tubes were *never* connected to a vacuum source.

A “best evidence topic” asked a very specific question: In patients undergoing pulmonary procedures, is the use of suction of benefit in reducing the incidence of prolonged air leak?² Length of stay or presence of pneumothorax were not considered. The review concludes that of the six studies presented, no studies favored suction to reduce air leak, two found no difference between suction and gravity drainage, and four found gravity drainage more likely to reduce prolonged air leak.

Another study compared suction and gravity by presenting the hypothesis that suction applied to the pleural space could decrease work of breathing after lung resection by altering pleural pressures.³ Of note, patients with a postoperative air leak or COPD were excluded from the study group.

Pleural pressure differentials were compared between patients with suction and those with gravity drainage. Even though the study question included work of breathing, the only study result was a reported decrease in differential pressures in patients after upper lobectomy when pleural suction was applied. The authors acknowledged that the study cannot speak to the work of breathing issue because of the multiple parameters involved.

Neither of these studies examined patient symptoms, duration of drainage or length of stay – factors commonly associated with “successful” surgery.

A third study compared 91 lobectomy patients⁴. Those in the gravity group were never connected to suction. Researchers determined that routine suction is not needed postoperatively and that it should only be applied for patients with residual pneumothorax and patent airways. They believe suction is “probably contraindicated” in postthoracotomy patients with air leaks if the lung is expanded because the suction will prolong the leak.

Application to Practice

The new meta-analysis¹ shows that if the goal is to avoid postoperative pneumothorax, suction should be applied. It is less clear when it comes to determining the effect of suction or gravity on prolonged air leaks with a slight tilt in favor of gravity reducing prolonged air leaks. Statistical analysis also leaned in favor of gravity drainage over suction to reduce duration of air leak, decrease time to removal of chest tubes and shorten hospital stay.¹ The analysis was further challenged by the wide variety of patients within the trials: some had complex lung cancer with pulmonary comorbidities such as COPD, while others had relatively simple recurrent pneumothorax. Some had extensive surgery via thoracotomy while others had a minimally invasive approach to wedge resection via video-assisted thoracoscopic surgery (VATS).

The researchers conclude “there is no necessity to use suction in most cases...however, meta-analysis indicated that suction can reduce the occurrence of postoperative pneumothorax resulting from early air leak.¹ p5-6.”

Challenges for Clinicians

Researchers agree that suction is not required routinely for patients undergoing pulmonary resection.¹⁻⁴ Of course, there will be individual cases in which it can be beneficial, such as in patients with a large air leak or a large pneumothorax on a chest radiograph^{3,4} – identifying these patients is art of medical and nursing practice. These findings are important because eliminating suction enhances patient mobility by removing the tether to wall vacuum, and we are well aware of the benefits of getting patients off bedrest and walking as soon as possible.

In The Literature

A Curtain of Protection: Dealing with Death

The current issue of the *Journal of Nursing Scholarship* features an article about how nurses cope with patient deaths. A key aspect of nurses' ability to manage grief is their initial experience with a patient death. If the nurse was isolated, felt helpless and unsupported, he or she could have more trouble dealing with their grief at a later time, being more susceptible to self-blame and emotional upset. On the other hand, a supportive environment allows nurses to process the event of a patient death and cope effectively for the rest of their careers. Role modeling by mentors is important to develop nurses' emotional skills as well as traditional technical or psychomotor skills.

Source: Gerow L et al: Creating a curtain of protection: Nurses' experiences of grief following patient death. *Journal of Nursing Scholarship* 2010;42(2):122-129.

Airway Suction Clinical Practice Guidelines

The American Association for Respiratory Care has published updated clinical practice guidelines for suctioning endotracheal tubes in mechanically ventilated patients in this month's *Respiratory Care*. Key recommendations include: suction only when secretions are present, not routinely; do not disconnect the ventilator if possible; use shallow suction instead of deep suction, particularly in infants and children; do not routinely instill normal saline prior to suctioning; use a suction catheter that occludes less than 50% of the artificial airway lumen; and limit suctioning to 15 seconds.

Source: AARC: Endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. *Respiratory Care* 2010;55(6):758-764. [PubMed Citation](#)

Note: All AARC clinical practice guidelines are available at: <http://www.rcjournal.com/cpgs>

Lights at Night

If you have ever had trouble sleeping during the day after working nights – because of light in your bedroom – you will understand the important contribution of a descriptive study in the current issue of *Critical Care Nurse* about nighttime lighting in ICUs. This observational study could be quite easily replicated; the researchers suggest looking at whether different nurses have different patterns of lighting use to reveal opportunities for education. Sadly, much of the potentially disruptive lighting use occurred for activities that were scheduled overnight for convenience of others, not the patients, such as the greatest number of x-rays being performed between 4am and 5am.

Source: Dunn H, et al.: Nighttime lighting in intensive care units. *Critical Care Nurse* 2010;30(3):31-37. [PubMed Citation](#)

On the World Wide Web



Best Evidence Glossary

The Clinical Evidence site, from the British Medical Journal, offers a handy glossary of research and statistical terms that are common in the literature. If it's been a while since you have reviewed odds ratios or relative risk ratios, or if you teach others, bookmark this site for ready reference.

<http://clinicalevidence.bmj.com/cweb/resources/glossary.jsp>

How Cochrane Does It

You're probably familiar with the Cochrane reviews of the literature on a wide variety of subjects. The handbook describing how those reviews are compiled is available online. This comprehensive resource can be your guide to developing your own evidence-based reviews.

<http://www.cochrane-handbook.org/>

Your Stat Questions Answered

A retired professor of biostatistics at Georgetown put together this site, which provides an amazing array of everything you might possibly need to know about statistics, including online calculators, free statistical programs, and tips on choosing the most appropriate statistical analysis here:

<http://statpages.org/>

And if that's not quite enough, check here:

http://www.martindalecenter.com/Calculators2A_1_Cou.html

Sources from page 1:

1. Deng B, et al: Suction or non-suction to the underwater seal drains following pulmonary operation: meta-analysis of randomized controlled trials. *European Journal of Cardio-thoracic Surgery* in press 2010, doi:10.1016/j.ejcts.2010.01.050 [PubMed Citation](#)
2. Sanni A, et al: Should chest drains be put on suction or not following pulmonary lobectomy? *Interactive CardioVascular and Thoracic Surgery* 2006;5:275-278. doi:10.1510/icvts.2006.130559. [PubMed Citation](#)
3. Varela G et al: Chest drainage suction decreases differential pleural pressure after upper lobectomy and has no effect after lower lobectomy. *European Journal of Cardio-thoracic Surgery* 2010;37(3):531-534. [PubMed Citation](#)
4. Prokakis C et al.: Routine suction of intercostal drains is not necessary after lobectomy: a prospective randomized trial. *World Journal of Surgery* 2008;32:2336-2342. [PubMed Citation](#)

Be sure to visit Atrium University, a free, online resource filled with educational materials about chest drainage. From basic to advanced, the University provides learning opportunities in written, Web-based training and video formats.

