



Clinical Update

Atrium Medical Corporation

5 Wentworth Drive, Hudson, New Hampshire 03051

Phone (603)880-1433 Fax (603)880-6718

www.atriummed.com

Suction or Gravity Drainage?

Traditionally, we have set up disposable chest drainage systems by filling the water seal chamber, adjusting the level of suction by adding water to or adjusting a dial on the suction control chamber, and connecting the drain to a wall-mounted vacuum regulator. Using wall vacuum to generate suction, it was believed, pulled air and drainage out of the chest more efficiently, hastening recovery.

Suction, Immobility, and Air Leaks

In recent years, however, this practice has been examined to see if, indeed, postoperative patients need to be tethered to the wall during the postop recovery period. Research has shown that the quicker patients get up out of bed and walk around, the fewer their complications, and the shorter their length of stay. Having a chest drain attached to the wall limits patient mobility, and there is no research that says suction must be used continuously until chest tubes are removed from postoperative patients.

Surgeons performing lung volume reduction surgery (LVRS) have questioned if suction applied to the suture line of the diseased, fragile lung actually prolongs air leak rather than enhancing healing. Many now do not connect chest drains to wall vacuum postoperatively. In this issue of *Clinical Update*, we'll review research on this aspect of caring for patients with chest tubes after pulmonary surgery.

Comparing Suction to Gravity Drainage

Researchers at the University of Alabama at Birmingham⁽¹⁾ prospectively randomized pulmonary resection patients into two groups. In group one, chest drains were disconnected from wall vacuum on postop day 2 and left to gravity water seal drainage; in group two, wall vacuum was maintained. In the gravity water seal group, 67% of air leaks resolved one day after wall vacuum was discontinued. In patients who remained connected to wall vacuum, only 7% of air leaks resolved by postop day 3. The randomization of the trial ended once data showed that gravity water seal drainage was superior in resolving air leaks. These researchers did note that pneumothorax may recur if wall vacuum is discontinued when air leaks are large.

Going to Gravity Drainage in the PACU

In a later study, University of Pennsylvania researchers reported their experience of similarly randomizing postoperative pulmonary resection patients (not including LVRS) into two groups. One group's chest drains remained connected to the vacuum regulator with the suction control chamber set for a level of -20 cmH₂O; the others were disconnected from the wall vacuum and remained on gravity drainage with the water seal of the chest drain⁽²⁾.

Sixty-eight patients who underwent pulmonary wedge resection were included in the study, with 34 in each arm of the study. The two groups were evenly matched; 15 patients in each group had an air leak at the end of the operation. All patients were connected to wall vacuum in the operating room to re-expand the lung at the end of the case. Vacuum was disconnected for transport to the PACU. There, patients were randomized to resume vacuum or to stay on gravity water seal drainage — two days earlier than in the previous study. If a pneumothorax >25% was present on a chest radiograph in the gravity drainage group, the chest drain was reconnected to wall vacuum with a suction level of -10 cmH₂O until the pneumothorax was <10%. (Note that none of the patients was symptomatic.) Then, gravity drainage was reestablished. Patients on the wall vacuum protocol had suction control chambers set to -20 cmH₂O.

Patients with air leaks in the gravity water seal drainage group had a mean leak duration of 1.50 days. In the wall vacuum group, mean leak duration was 3.27 days. Chest tubes in the gravity water seal patients remained in place a mean of 3.33 days; in the wall vacuum group, the mean duration was 5.47 days. Even when taking the length of staple lines into account, the differences between the two groups remained.

The researchers found that the duration of air leaks in the gravity water seal group was about one-half the time of the wall vacuum group. Since many argue that suction is critical to apposition of the pleurae postoperatively, these researchers initially used suction on all patients in the operating room. To date, this study is the first to discontinue suction so quickly after surgery (in the PACU). These researchers note that visually, the bubbling is more vigorous in the water seal chamber when the chest drain is connected to wall vacuum, indicating a greater flow of air out of the lung. They suggest that the benefit of reducing airflow, thereby allowing the suture line to be more closely approximated, aids healing and outweighs any benefit of pleural apposition.

The researchers conclude that placing patients on gravity water seal drainage helps resolve air leaks after pulmonary surgery more quickly than when suction is used. They state that routinely using wall vacuum postoperatively is counterproductive.

Applying Research to Practice

The Alabama researchers also reported on their pulmonary resection fast-tracking program⁽³⁾. They noted that using gravity water seal drainage instead of wall vacuum was one of the factors that contributed to shorter lengths of stay.

These studies, taken together, support the practice of stepping patients down to mobile chest drains as soon as the first day after surgery if there is no severe air leak immediately postoperatively. This approach will increase patient mobility, reduce complications associated with immobility, and has great potential to reduce length of stay. If you're still routinely keeping lung resection patients attached to wall vacuum for days, or until chest tube removal, you might want to take a look at these studies to see if an adjustment in your postoperative practice is appropriate in your patient population.

Check Your Knowledge...

Q. If you were caring for a postoperative patient whose chest drain was maintained with gravity water seal drainage, how would you know if a pneumothorax was re-accumulating?

Answer on other side

In The Literature

You Got Your Degree How?

In the most recent issue of *Orthopaedic Nursing*, Dawn Kozlowski provides an excellent overview of non-traditional nursing education. There are basically two types of non-traditional nursing education: external degree programs and distance learning programs. In external degree programs, there are no classes; knowledge is assessed by written and practical examination. This article reviews distance learning by breaking it into two categories. In synchronous learning environments, students and teacher are linked in "real time" by an audio and/or video communication system. Students must all meet at the same time. In asynchronous learning environments, the focus is more on independent study and self-directed learning with individualized feedback from instructors. Course discussions are held, but students may post messages or assignments at different times and read other students' comments at any time, whether or not their colleagues are online. The article provides Web sites for reference, essential benchmarks, and questions a prospective student should ask.

As a proud graduate of the first accredited external nursing degree program at Regents College in Albany, NY (now called Excelsior College), I highly recommend investigating these alternatives to traditional classroom learning to see if they're right for you.

Kozlowski, D: Returning to school: an alternative to 'traditional' education. *Orthopaedic Nursing* 2002;21(4):41-47.

Who Supports Employee Perception?

An article in the most recent issue of *Nursing Economic\$* examines how workplace redesign affected employees' perceptions in the workplace. Interestingly, in this study, researchers discovered that the nurses surveyed emphasized a local frame of reference to help establish their satisfaction with change. This is contrary to conventional wisdom that it takes a visionary senior nursing executive to drive organizational change effectively. In reality, a visionary executive needs to build a strong network of mid-level managers to translate that vision to the bedside staff. For more interesting insights into the effects of organizational change, don't miss this interesting piece.

Ingersoll GL, Wagner L., Merck SE et al: Patient-focused redesign and employee perception of work environment. *Nursing Economic\$* 2002;20(4):163-170.

What is your Responsibility for Error Reporting?

Medical errors have been discovered by the mainstream press, and it seems as if there is now an epidemic. Nurses know better, and they struggle mightily with the legal and ethical issues surrounding the public disclosures of medical errors. A thought-provoking article in the most recent issue of *MEDSURG Nursing* explores the pros and cons of public reporting of medical errors. Most important, the author points out that nurses should not be placed in a situation where they feel they must choose between their organization and their patients. This article is particularly useful if you are in a role of shaping organizational policy for handling a variety of patient care errors.

Stewart DW: Conflict in fiduciary duty involving health care error reporting. *MEDSURG Nursing* 2002;11(4):187-191.

On the World Wide Web...



Thinking about going back to school, but can't meet a rigid class schedule? Check out these sites for non-traditional nursing degree programs.

Excelsior College School of Nursing (formerly Regents College)
http://www.excelsior.edu/nur_home.htm

This fully accredited college awards nursing degrees from Associate's through Master's. Just because you don't attend class, don't think it's a piece of cake. It is the largest nursing degree program in the US because it is rigorous and challenging, yet convenient. They do a superb job of assessing students' knowledge through written and clinical exams.

Online Nursing Programs

<http://www.worldwidelearn.com/nursing-degrees.htm>

This site provides a list of a number of online nursing programs, ranging from certificate programs to Master's degree. Links to the schools allow you to explore the approaches of different schools and see if any looks like a good fit for you.

All Nurses

http://allnurses.com/Nursing_Continuing_Education/Distance_Education/

This site provides another list of distance learning opportunities for nurses, from continuing education courses to certificate and degree programs.

Check Your Knowledge...

A. In most cases, pneumothorax is diagnosed on chest radiograph since the patient remains asymptomatic. With a large pneumothorax, the patient may complain of increased pleural chest pain, respiratory rate may increase with more shallow breaths, there may be hyperresonance to percussion in the apex (when the patient is upright) and potentially diminished breath sounds.

References:

1. Cerfolio RJ, Bass C, Katholi CR: Prospective randomized trial compared suction versus water seal for air leaks. *Annals of Thoracic Surgery* 2001;71(5):1613-1617.
2. Marshall MB, Deeb ME, Bleier JIS, et al: Suction vs water seal after pulmonary resection: a randomized prospective study. *Chest* 2002;121(3):831-835.
3. Cerfolio RJ, Pickens A, Bass C, Katholi C: Fast-tracking pulmonary resections. *Journal of Thoracic and Cardiovascular Surgery* 2001; 122(2):318-324.

To learn more about mobile chest drainage:

Carroll P: A guide to mobile chest drains. *RN* 2002;65(5):56-60,65.

Carroll P: Mobile chest drainage: coming soon to a home near you. *Home Healthcare Nurse* 2002;20(7):434-441.