

## Journal Club Synopsis

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### **Clinical Scenario:**

It's a typical day in the emergency department, with codes, traumas, neonatal resuscitations, and sprained ankles filling every bed. Your next patient walks in – a tall, skinny 19 year old male complaining of sudden-onset shortness of breath a few hours ago. You think his lung sounds are a little diminished on the right, so you quickly order a CXR before running off to tube and line the fourth patient in the last hour. Just as you finish, you get an urgent phone call from the radiologist – “Patient X has a 30% pneumothorax on the right.” Time to go do a conscious sedation and chest tube, more numbers for your procedure log, but also a lot more time out of your busy shift.

In a patient with primary spontaneous pneumothorax is a chest tube always required, or are there other treatment options?

**Introduction:** I had a number of patients with various types of pneumothorax during my rotation a few months ago. As we took the time necessary to get everyone together, perform a conscious sedation, and place the chest tube, I wondered if all of this was really necessary, especially for some of the smaller, more stable cases. Does every pneumothorax, no matter what the etiology or status of the patient, get a chest tube, regardless? Or are there other options? I searched PubMed for articles relating to pneumothorax, Heimlich valve, and simple aspiration. I also came across some EM blogs discussing the question, and combed through their list of articles for further literature. It turns out there's not a lot of high quality data on this topic. There are lots of papers on the topic, but most have very small patient populations, are retrospective chart reviews, or were poorly conducted studies. Even the three best papers that I ended up choosing still suffered from some of these defects.

**Article 1:** Aspiration versus tube drainage in primary spontaneous pneumothorax: a randomized study. Ayed AK, Chandrasekaran C, Sukumar M. Eur Respir J. 2006 Mar;27(3):477-82.

A randomized study comparing clinical outcomes for simple aspiration vs tube thoracostomy in 147 patients with primary spontaneous pneumothorax. They found that 40/65 (62%) simple aspiration patients had immediately successful results, compared to 49/72 (68%) chest tube patients, a non-significant difference. The 1-week success rates in both groups were essentially the same, but the aspiration groups had an insignificantly higher number of PTX recurrence at 3 months. Complications were higher in the chest tube group, as was analgesia requirement. Of the patients who failed simple aspiration, half of them actually went on to require VATS – so even a chest tube wasn't sufficient for those patients. This was a well-designed study apart from the fact that it was underpowered. The patient population was Kuwaiti, but the journal club group agreed that the population characteristics were similar enough that the conclusions could be applied to American patients as well.

**Article 2:** Two-year experience of using pigtail catheters to treat traumatic pneumothorax: a changing trend. Kulvatunyou N, Vijayasekaran A, Hansen A, Wynne JL, O'Keeffe T, Friese RS, Joseph B, Tang A, Rhee P. *J Trauma*. 2011 Nov;71(5):1104-7; discussion 1107.

This was a retrospective chart review of patients at a trauma center that got either chest tube (CT) or pigtail catheter (PC). 96 patients got PC (only 89% of these were for PTX though). 286 got CT. Hospital length of stay was shorter for PC, but they were unable to attribute this solely to the use of a PC (ie, those patients could have simply been less sick in the first place). The success rate was 89% for PC vs 96% with CT – but 83% of the CT failures were from unresolved PTX, compared with only 50% of the PC failures. The paper essentially found a trend towards increased PC use over time – but the numbers supporting the benefit of PC vs CT were not very strong, as other variables were not well controlled. They found a slightly higher complication rate with PC, but assumed this was due to being unfamiliar with the procedure. As the paper was written by surgeons, they recommended “more practice!”. The paper ends with a few interesting conclusions – they feel that, although inconclusive, the topic does not need to be studied any further, and they suggest that the rapidity of PC insertion may be helpful in a mascal situation. Interesting. There were several problems with this study. It was a retrospective review; a small portion of the patients got one of the procedures for something other than a traumatic PTX (eg, empyema); variables were poorly controlled for, and the final numbers were inconclusive.

**Article 3:** Management of traumatic occult pneumothorax. Yadav K, Jalili M, Zehtabchi S. *Resuscitation*. 2010 Sep;81(9):1063-8.

Unlike the other papers looking at non-traumatic PTX, this article was looking at the management of traumatic PTX, specifically occult ones (too small to pick up on supine CXR). This was a mini-review of papers found by searching MEDLINE, EMBASE, and the Cochrane Library. They included all studies of adult or pediatric trauma patients, blunt or penetrating trauma, and randomized to either observation or chest tube. From 411 articles identified, they ended up with 3 RCTs enrolling a total of 101 patients. They included patients on positive pressure ventilation in their analysis. Ultimately, it was concluded that observation is probably just as safe and effective as chest tube in traumatic occult PTX patients. Interestingly, they also found that patients on PPV do OK without a chest tube – possibly because of the lower pressure and tidal volumes that we tend to use nowadays. The review was well done, but the numbers are still quite small, showing trends and suggestions, rather than any definite answer.

**Bottom line:** There is a paucity of evidence to firmly answer the questions; as Dr Olson pointed out, it's much harder to prove that two treatments are equal than it is to prove that they are different.

Ultimately, we concluded that simple aspiration is a good first line option for primary spontaneous PTX, pigtail catheter is a reasonable 2<sup>nd</sup> attempt, and occult traumatic PTX can be simply observed. Even if simple aspiration fails, it's a relatively benign procedure and not a big deal to escalate care – but if it works, then the patient is spared a significant amount of pain, hospital time, and complication risk. The argument is somewhat similar for pigtail catheter use. More than any definite answer though; these articles make it possible for us to have a much more informed discussion with our patients about the treatment options.