Thoracentesis is a common procedure performed in the hospital. It can be performed at bedside or in the radiology suite. It has been shown that by using ultrasound guidance in CT guidance the risk of complications decreases, especially pneumothorax. Several studies have shown pneumothorax is associated with several variables, such as operator experience with equipment, lack of ultrasound imaging, or aspiration of large volume of fluid in one setting. A study done at Mayo clinic showed that without intervention pneumothorax was 6%, but decreased to 1.1% following intervention using ultrasound guidance.

Purpose of the study was to assess if there is a difference between pneumothorax caused by CT guided thoracentesis versus ultrasound guided thoracentesis. Latrogenic pneumothorax is a common complication of thoracentesis. Thoracentesis can be performed without any guidance or can be performed under ultrasound or CT guidance. Ultrasound is a safe and effective way of detecting pleural effusions. Ultrasound guided thoracentesis can be performed at bedside or in a radiology suite. Majority of the thoracentesis performed at our institution in the radiology department are performed under CT guidance; which is a significant source of ionization radiation. It has been shown that ultrasound guided thoracentesis is effective with very low rate of complication with proper training. This is a retrospective study looking at one year data from 9/1/2011 to 9/1/2012. 75 cases were reviewed, this included 22 ultrasound guided thoracentesis and 53 CT guided thoracentesis. For the purpose of this study, pneumothorax caused by CT or ultrasound guided thoracentesis per patient was visually seen on radiographic studies within 24 hour post procedure. We did not expect to find any significant difference between the two groups.

MATERIALS & METHODS

Over the course of 1 year, retrospective data was collected from 75 patients from 9/1/2011 to 9/1/2012. Out of this patient group underwent CT guided thoracentesis and 22 patients had thoracentesis performed under ultrasound guidance. All CT guided thoracentesis were performed on 16 slice CT scanner. Previous imaging studies and laboratory values were reviewed. All risks benefits and risk of doing nothing were explained to patients. Patients were placed on CT table and initial 10 mm sections were obtained of the chest. Of the 53 patients, 49 patients were placed in supine position, 2 in left lateral decubitus and 2 in right lateral decubitus. After the initial CT scan, grid was placed at appropriate point and patient was scanned again at 5 mm as the area of the grid.

After proper marking the grid was removed, using sterile technique area was thoroughly cleaned with either Betadine or Chloraprep, depending on individual attending’s choice. At that time 2% Lidocaine was infused into the subcutaneous tissue as local anesthetic. The needle position was confirmed by CT imaging. Small dermatomy was made and an appropriate catheter was inserted and pleural fluid was drained. Of the 53 patients, 49 had 8 French catheters placed, 3 had 10 French catheters, 4 had 12 French catheters, 2 had 14 French catheters, 2 had 16 gauge needle and 2 had 20 gauge needle to drain the fluid. After removal of the catheter/needle, an appropriate dressing was applied and follow up x-rays were ordered to evaluate for pneumothorax.

For ultrasound guided thoracentesis, bedside ultrasound of the lungs was performed. After choosing the appropriate site, a proper identification site was selected and the area was prepped and cleaned in a sterile fashion using either Betadine or Chloraprep as described earlier. Of the 22 cases, 17 were placed in sitting position, 2 in supine, 2 in right lateral decubitus and 1 in left lateral decubitus. Either 2% or 1% Lidocaine was used as local anesthetic. Small dermatomy was made at selected site and an appropriate catheter was inserted to drain the pleural effusion. Of the 22 patients, 10 had 11 French catheters, 8 had 5 French catheters, 1 had 14 French catheter, 2 had 20 gauge needle and 1 had 22 gauge needle placed to drain the pleural effusions. After removal of the catheter/needle appropriate dressing was applied and follow up x-rays were ordered to evaluate for pneumothorax.

RESULTS

75 patients were evaluated for pneumothorax after having CT or ultrasound guided thoracentesis. For the purpose of this study, pneumothorax caused by CT or ultrasound guided thoracentesis per patient was visually seen on radiographic studies within 24 hour post procedure. Overall rate for pneumothorax was 6.6%. Pneumothorax occurred in total of 5 patients out of 75 (figure 1). Pneumothorax rate for CT guided thoracentesis was 7.5% (4 patients out of 53) (figure 2). Pneumothorax rate for ultrasound guided thoracentesis was 4.5% (1 patient out of 22) (figure 3). We did not expect to find any significant difference between the two groups.

CONCLUSION

In conclusion, ultrasound guided thoracentesis is a safe, inexpensive and effective tool. As our study showed, there is no significant difference between developing iatrogenic pneumothorax after thoracentesis performed under ultrasound guidance or CT guidance. With proper training, ultrasound guided thoracentesis is a powerful tool which gives real time imaging which is not possible with CT guidance. Most importantly, patients are not exposed to ionizing radiation. We are encouraging radiologists and pulmonologists to use ultrasound guidance when performing thoracentesis because multiple studies have shown that there is statistically a significant difference when ultrasound is not used and when it is used. Limitations of this study include other comorbidities and other underlying lung diseases, experience of operator, age of patient and small sample size especially in the case of ultrasound guided thoracentesis.

Pneumothorax following CT Guided Thoracentesis. Is it Safer than Ultrasound Guided Thoracentesis?

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REFERENCES