

Altered Thoracostomy Tube Insertion Site in Primary Spontaneous Pneumothorax Management

Zainab Alibrahim¹, Farouk Alreshaid², Zainab Alhashim³, Eman Alabbad⁴, Yasser Aljahn⁵

Thoracic Surgery Division, Department of Surgery, King Fahad Hospital of the University, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Abstract: Primary spontaneous pneumothorax (PSP) is a known condition that mainly affects seemingly healthy young individuals. One of the arms of management is surgical, through thoracoscopy utilizing three incisions; two as working ports and one as a camera port. We applied a new technique in managing primary spontaneous pneumothorax. The standard site of inserting a thoracostomy tube is altered to facilitate a single incision VATS through the same incision. Both patients made a remarkable recovery.

Keywords: Single incision, Primary spontaneous pneumothorax, Uniportal, VATS

1. Introduction

Primary spontaneous pneumothorax management is becoming mainly surgical. The standard chest tube site is the 5th intercostal space anterior to mid-axillary line. We deviated to accommodate the staplers and graspers within angle possible during single incision thoracoscopic surgery to the 7th intercostal space posterior to mid-axillary line in such elective cases.

Case 1

A 20 years old Saudi male, who is a smoker and not known to have medical illness before, presented with a sudden severe left sided chest pain. It was sharp and not associated with shortness of breath, cough, vomiting or fever. He has no history of trauma before. Upon examination, he was hemodynamically stable. Chest examination revealed decreased chest movement, reduced air entry, and hyperresonant note over the left side of the chest. Chest x-ray showed moderate left sided pneumothorax with pleural apical separation of 5 cm with no significant mediastinal shift. A thoracostomy tube was inserted in the left 7th intercostal space posterior to the mid axillary line. Follow up chest x-ray and CT scan of the chest were done and showed re-expansion of the left lung with atelectatic changes and bullae seen in the left upper.

Case 2

An 18 years old Saudi male, who is a smoker and not known to have medical illness before, presented with one day duration of left compressing chest pain radiating to the left shoulder. It was associated with dyspnea at rest. There was no history of trauma, cough or fever. On physical examination, he was hemodynamically stable. Chest examination showed decreased chest movement, diminished air entry, and hyperresonant note on the left side. Chest X-ray showed a left side mild pneumothorax. A thoracostomy tube was inserted in the left 7th intercostal space posterior to the mid axillary line. Follow up chest x-ray and CT scan of the chest were done and showed re-expanded left lung and multiple apical blebs bilaterally.

Management of both cases

Both patients underwent Uniportal VATS bullectomy through the same thoracostomy tube insertion site which was

1 cm in length. Cutting was done in layers till the pleura. After isolating the targeted lung, the pleura was opened. A 30 degrees thoracoscope was introduced through the edge of the incision. Exploration was done. The visceral blebs and bullae were identified and caught with laparoscopic Endo-Clinch. The Endo-GIA universal stapler was introduced through the other edge of the incision. Endo GIA™ 60 mm purple Articulating Reloads were used. The operative time was 18 minutes from skin to skin in both cases. Postoperative recovery was smooth. Both patients were discharged first postoperative day. Follow up clinical assessment and chest x-ray at one, three and six months showed fully expanded lungs with no recurrence.

2. Discussion

Primary Spontaneous Pneumothorax (PSP) is an accumulation of air within the pleural space due to rupture of a subpleural bleb or bulla. (1) It occurs without a precipitating event in seemingly healthy individual. Most of the patients are in their teens and early twenties. (2) Smoking, positive family history, Marfan syndrome and homocystinuria all are well established risk factors for PSP. A diagnosis is made by detection of the visceral pleural line on the chest radiograph. Computed Tomography scan is then made to confirm the diagnosis. (1)

The initial management options of PSP include either high flow oxygen, thoracentesis or a thoracostomy tube insertion. High flow oxygen therapy (15L/min) and observation is recommended in those who have small pneumothorax (less than 2 cm from apex to copula) and remain stable in the emergency department for 4-6 hours. (3) In case of large pneumothorax (more than 2cm) and stable hemodynamics, percutaneous aspiration using a 16-18 G cannula could be used. (1) If aspiration fails or the patient was hemodynamically unstable, then chest tube thoracostomy should be applied connected to water seal device with or without section.

Surgery is one of the modalities of management. There are several ways in which it can be carried out. The most acceptable method and the procedure of choice is the VATS with pleurectomy or pleural abrasion. Several techniques have been recommended to induce pleurodesis, but the most

simple and effective way is the mechanical one. Open thoracotomy is only indicated when thoracoscopy fails either due to extensive adhesions or uncontrollable bleeding. Recently, a single incision thoracoscopic surgery (SITS) became an alternative approach in managing several thoracic conditions especially primary spontaneous pneumothorax. Both resection of apical bullae and pleurodesis are feasible through SITS.(4) It has been found to be safe and effective through several case reports. Less post-operative pain, less thoracotomy neuralgia and faster recovery time were associated with single incision VATS in addition for being safe and feasible. (5)(6)Koji et al have found that Uniportal VATS is doable for the management of PSP. Any patient, in whom blebs or bullae were in difficult or dangerous locations such as mediastinal or close to great vessels, was converted to the conventional three-port VATS.(2)The standard site for thoracostomy tube insertion is the 5th intercostal space anterior to mid-axillary line. We believe if this was changed to the 7th intercostal space posterior to mid-axillary line in such elective cases, it would facilitate the planned Uniportal VATS as it would give more space.



Figure1

3. Conclusion

In conclusion, SITS is a safe and feasible approach. It has a shorter operative time, shorter hospital stay and less postoperative pain in comparison with three port thoracoscopic surgery. However, it requires well equipped operation theater and an experienced surgeon. This technique needs more further investigations by proper randomized clinical trials.

References

- [1] Noppen, M. and Baumann, M. (2003). Pathogenesis and Treatment of Primary Spontaneous Pneumothorax: An Overview. *Respiration*, 70(4), pp.431-438.
- [2] Yamazaki, K., Haratake, N., Shikada, Y., Mori, R., Kouso, H., Shoji, F. and Takeo, S. (2015). Initial Experience of Single-Incision Thoracoscopic Surgery for 100 Patients with Primary Spontaneous Pneumothorax. *Annals of Thoracic and Cardiovascular Surgery*, 21(6), pp.513-516.
- [3] O'Driscoll B, Howard L, Earis J, Mak V. British Thoracic Society Guideline for oxygen use in adults in healthcare and emergency settings. *BMJ Open Respiratory Research*.2017;4(1):e000170.
- [4] Sahn S, Heffner J. Spontaneous Pneumothorax. *New England Journal of Medicine*. 2000;342(12):868-874.
- [5] Jutley R, Khalil M, Rocco G. Uniportal vs standard three-port VATS technique for spontaneous pneumothorax: comparison of post-operative pain and residual paraesthesia. *European Journal of Cardio-Thoracic Surgery*. 2005;28(1):43-46.
- [6] Son, B., Kim, D., Lee, S. and Kim, C. (2015). Small Single-Incision Thoracoscopic Surgery Using an Anchoring Suture in Patients With Primary Spontaneous Pneumothorax: A Safe and Feasible Procedure. *The Annals of Thoracic Surgery*, 100(4), pp.1224-1229.