



E-ISSN: 2616-3470
P-ISSN: 2616-3462
© Surgery Science
www.surgeryscience.com
2020; 4(2): 211-213
Received: 04-02-2020
Accepted: 06-03-2020

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Pitfalls and safety measures for difficult thoracotomy in a patient of severe kyphoscoliosis associated with chest wall deformity: A case report

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DOI: <https://doi.org/10.33545/surgery.2020.v4.i2d.418>

Abstract

Studies have been done extensively, about the difficulties of giving anaesthesia and endo-tracheal intubation, in patients with severe kyphoscoliosis, due to distortion of the airway anatomy. However, there is a little or no information about difficulties in doing thoracotomy, in such patients with distorted chest wall. We would like to report a case of severe kyphoscoliosis with deformed chest wall, who underwent thoracotomy for recurrent pneumothorax due to ruptured multiple bullae. The pitfalls and safety measures to be taken, have been explained.

Keywords: Kyphosis, scoliosis, chest wall, thoracotomy, bulla, lobectomy

Introduction

Severe kyphoscoliosis patient's have difficulties in inducing anaesthesia and endo-tracheal intubation, due to distortion of the airway anatomy [1, 2]. However, there is a little or no information about the difficulties in doing thoracotomy to do various lung procedures, in such patients with distorted chest wall. Post poliomyelitis, leads to spine and chest wall deformities, as a consequence of prolonged stresses on skeletal structure in previously weakened muscles [3]. We would like to report a case of meticulously planned thoracotomy, in a severe kyphoscoliosis with deformed chest wall. Patient underwent bullectomy for recurrent pneumothorax due to rupture multiple bullae.

Case report

A 40-year-old woman came to us with history of acute breathlessness and left chest pain, month ago for which, left intercostal drainage (ICD) tube inserted, on emergency basis for left tension pneumothorax elsewhere. Post ICD tube insertion patient continues to have air leak and non expansion of lung. Case referred to us for further management. Preoperative examination showed (Figure-1), patient was poorly built, short statured lady. She had severe thoracic kyphoscoliosis with deformed chest wall, predominantly on left side. Patient was normal in her early age. The polio infections lead to chest wall deformity and severe kyphoscoliosis, when patient was 10 year old. Patient had similar episode of left pneumothorax, 2 years ago, for the same ICD tube was inserted and removed once lung expanded without further evaluation.



Fig 1: Patient

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Patient came with left ICD tube in situ, lung was not expanded and showed significant air leak on normal inspiration and expiration. Chest x-ray PA view (Figure-2) showed collapsed lung and in-situ ICD. Chest computed tomography (Figure-3&4) showed severe kyphoscoliosis with vertebral body fusion in the thoracic spine. It also confirmed non expansion of lung, ICD tube in situ and multiple bullae in left posterior segment of upper lobe. Other blood investigations were un-remarkable.

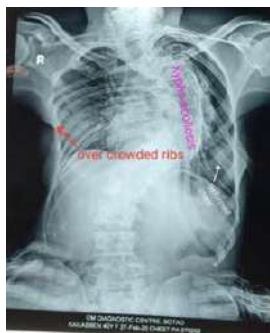


Fig 2: Chest x-ray

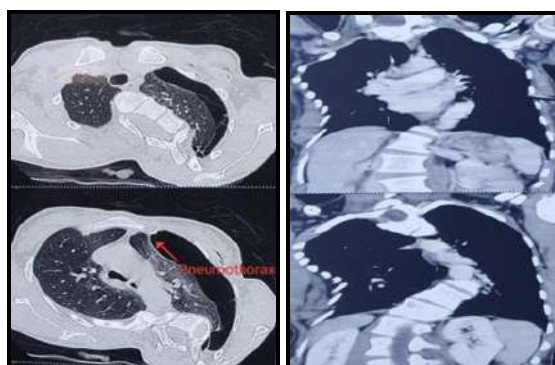


Fig 3&4: CT Chest

Preanaesthetic checkup revealed that, patient was not suitable for double lumen ET tube insertion due to short neck and deformed chest. Single lung ventilation ruled out. In view of significant air leak and chronic collapsed lung, decide to go ahead with left thoracotomy and bullectomy with closure of broncho-pleural fistula on single lumen ET-Tube insertion.

Procedure

In the operating room, the routine monitoring systems, including electrocardiogram, pulse oximetry, and non-invasive blood pressure were started.

Patient was given general anesthesia with single lumen ET-tube insertion. Patient was given left lateral position. The chest ribs were overcrowded, severely deformed and angulated at posterior axillary line. Left postero-lateral thoracotomy done. Latissimus dorsi and serratus anterior muscles were thin. Thorax entered through 5th intercostal space with lots of difficulty, as ribs were kissing each other and severely calcified. The lung adhesions were released. The exposure and dissection was difficult in spite of adequate length of incision. Deformed thoracic vertebrae found just below the incision pushing aorta medial to the vertebrae. Air leak from ruptured bullae identified under water, along with unruptured multiple bullae varied in size from, largest being, 4x4x2 cm to smallest of 2 mm along the lower edge of posterior segment of upper lobe (Figure-5&6). Vascular Clamp placed at the base of bullae and suture obliteration done, using 4-0 and 5-0 polypropylene material in two layers (Figure-7). Checked for air leak and found minimal from suture holes.

There were lots of bleeders from the area of adhesion. Bleeders were troublesome and inaccessible due to deformed and distorted vertebral anatomy particularly, the bleeders in the grooves, on either side of vertebrae, to cauterize. Extra efforts were needed to complete hemostasis by changing position of surgeon, on either side of patient with focused light and long instruments. The lung expanded well on table. Two ICD tube were inserted, tips being placed in apical and basal area of thorax. Ribs approximated using #2 vicryle. Muscle approximated using #1 vicryle. Skin approximated using #2-0 ethilone. Patient was extubated in operating room.

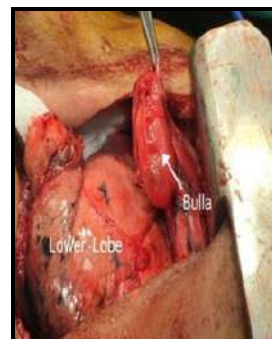


Fig 5: Bulla

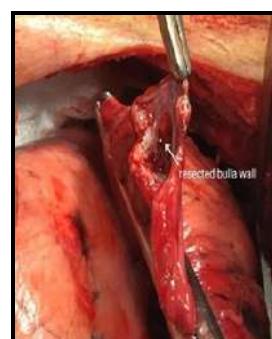


Fig 6: Bullae excised



Fig 7: Edges sutured

After the operation, the patient was transferred to the intensive care unit. Postoperatively patient had tachycardia, in spite adequate pain control. Injection digoxin loading dose followed by oral tab digoxin 0.25 mg once a day and tab lasilactone 50 mg, a diuretic helped to stabilize the patient.

She was treated with mucolytic agents, bronchodilators, and oxygen. Intensive chest physiotherapy such as coughing, deep-breathing exercise, and ambulation was also performed. Her pulmonary condition gradually improved and air leak stopped on post-surgery day three with complete lung expansion. Both ICD tubes removed on post-surgery day six. She was discharged on postoperative day seven without sequelae (Figure-8 &9).



Fig 8: Post op x-ray



Fig 9: Day of discharge

Discussion

Severe kyphoscoliosis presents not only a challenge to anesthetist but also to the thoracic surgeon. Numbers of articles have been published to reveal difficulties of airway management and its solutions [1, 2]. There are no articles about doing thoracotomy, for whatsoever reason in patient with severe kyphoscoliosis and chest wall deformity. Reports of thoracic or spinal deformities were observed, following various lung resection in childhood [4]. The thoracic scoliosis also is an acquired possible complication after lateral thoracotomy in childhood [5]. Developing severe kyphoscoliosis with chest deformity in post polio infection is unusual and rare to see. In any of such deformed chest with or without spine deformity, doing thoracic surgery is a challenge, because of difficult in accessing organs, in turn increased risk of organ injury and bleeding [6].

Due to angulated and overcrowding of ribs, irrespective of incision length, entry to thorax is very restrictive. The thoracic anatomy is distorted due to abnormal shape of vertebrae. Major organs, in thoracic cavity are inaccessible without appropriate VATS instruments. The lung appeared to be normal size and compliant but distorted due to contracted chest wall. This could be the reason for restrictive lung function. The hemostasis, most important as bleeders is likely to be missed, due to formation of deep grooves by abnormal curvature of vertebrae's and deformed chest. Severe kyphoscoliosis and chest wall deformities are often associated with a high rate of perioperative morbidity due to various respiratory problems [7]. The abnormal thoracic cage geometry limits the vital capacity and chest wall compliance, generally resulting in restrictive respiratory disease [8, 9]. Pulmonary atelectasis and infection is also frequent, so intensive monitoring, physiotherapy and cardiac supportive treatment reduces post-operative morbidity [10].

Conclusion

Severe kyphoscoliosis is associated with difficult airway

management. It is also associated with difficulties, while doing thoracotomy. Adequate extra-long incision and longer surgical instruments, not only helps to complete the procedure safely but also makes life easier for the surgeon. Hemostasis is quite tricky and annoying due to inaccessible grooves in deformed vertebrae and chest. Intensive monitoring, physiotherapy and cardiac supportive treatment reduces post-operative morbidity.

Declarations

Funding: none

Conflict of interest: None

Ethical approval: Taken

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