


CASE REPORT

Emergency Clamshell Thoracotomy and Pneumonectomy in a Resource-Limited Setting: A Case Report on Penetrating Thoracic Trauma

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Clamshell thoracotomy provides rapid access to the thorax in an emergency with better outcomes after penetrating injury. Aggressive resuscitation and adherence to damage control surgery principles can improve outcomes. Survival depends on multiple factors, including the quality of the intensive care services. We present a case of a young woman with a gunshot injury to the chest managed with Clamshell thoracotomy and pneumonectomy with successful outcomes under limited facilities.

Keywords: clamshell thoracotomy, pneumonectomy, damage control surgery**Introduction**

Clamshell thoracotomy (bilateral anterolateral thoracotomy) (CST) provides rapid access to the thoracic cavity in an emergency setting.^{1,2} Although long-term outcomes are generally poor, penetrating injuries have better survival than blunt trauma (9-12% vs 1-2%).^{3,4} This procedure involves a transverse incision between the two mid-axillary lines anteriorly at the 5th intercostal space and can be performed at the trauma scene, emergency room, or operating theater.⁵

Aggressive resuscitation and damage control surgery are key to success in the acute trauma setting, focusing more on physiological stabilization than anatomical reconstruction.⁶ Recovery of these patients can be influenced by multiple factors. Timely intervention and availability of modern intensive care facilities are essential for improved outcomes. Here we report a young woman who presented in shock following a gunshot injury to the chest and was successfully managed with a CST and pneumonectomy, achieving an excellent outcome.

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Case presentation

A 25-year-old lady was brought to the emergency department of a base hospital approximately 10min after sustaining a gunshot injury to the left side of the chest. She was hemodynamically unstable, presenting with hypotension (80/50 mmHg), tachycardia (~120 bpm), and reduced level of consciousness (GCS 14/15). During the resuscitation, bilateral intercostal tubes were inserted, and a gush of blood was observed from the left-sided tube, accompanied by rapid clinical deterioration (Blood pressure dropped to ~50/30 mmHg and bradycardia ~70 bpm). She was intubated, placed on mechanical ventilation, and immediately transferred to the operating theater where an emergency CST was performed.

Intraoperatively, a penetrating injury was identified just distal to the left lung hilum with active bleeding. Exploration and repair of the bleeding vessels were not feasible due to her hemodynamic instability, and left pneumonectomy was performed. Separate identification of the vascular and bronchial structures was not possible due to the destructive nature. Repair over clamps using 1-0 silk sutures was performed to prevent air leakage and to minimize time on the operating table. The thoracotomy was closed, and she was transferred to the ICU for postoperative care.

She remained on mechanical ventilation for ten days, requiring a tracheostomy for weaning. Her recovery was complicated by ventilator-associated pneumonia, but she did not require a revision surgery. After weaning from ventilation and sedation, she had no neurological deficits and was discharged from the hospital 28 days later.

At her follow-up appointment 14 days post-discharge, she reported moderate exertional dyspnea and was subsequently referred to a local respiratory clinic for pulmonary rehabilitation.

Discussion

Several surgical approaches have been described in the literature for accessing the thoracic cavity.⁷ In an emergency, open surgery is recommended to achieve faster access. While median sternotomy and CST both provide adequate access to all intrathoracic structures, CST is quicker.⁸ Additionally, CST has comparable outcomes with anterolateral thoracotomy while providing better access to both sides of the thorax.⁹

Our institution, being a base hospital, is staffed with only two general surgeons who perform most elective and emergency general surgical procedures. However, apart from unstable patients who cannot be transferred, routine or urgent thoracic surgical cases are referred to the nearest thoracic surgical care facility.

In our case, the entry wound was about 2 cm lateral to the left border of the sternum at the 3rd intercostal space. There was no exit wound visible, and the bullet trajectory was unknown. Given the injury's location and the clinical presentation, we initially suspected cardiac or major vascular involvement. However, since the patient had a cardiac rhythm and a detectable blood pressure, an emergency department thoracotomy was not indicated.¹ CST was preferred over anterolateral thoracotomy to ensure adequate access to the heart and major vessels, especially given our limited familiarity with the unilateral anterolateral thoracotomy. During the surgery, repair of the damaged lung was not attempted in accordance with the principles of damage control surgery. This decision was supported by the healthy-looking contralateral lung and the patient's ability to maintain adequate oxygenation while the left lung was clamped.

Postoperatively, she developed a ventilator-associated pneumonia, which was managed with multiple courses of antibiotics. She was gradually weaned off the ventilator with the aid of a tracheostomy. Throughout her recovery, we maintained close communication with the nearest thoracic surgical facility. Even though she experienced severe hypotension at presentation and during the early minutes of surgery, it was promptly corrected, and she didn't suffer from prolonged hypotension. As a result, she recovered without any neurological deficit.

Since she experienced a moderate exertional dyspnea without any identifiable cause other than the pneumonectomy and possible lung injuries that occurred during the hospital stay, she was referred to the nearest respiratory clinic for pulmonary rehabilitation and follow-up.

Conclusion

This case highlights a successful management of a penetrating chest trauma with CST and pneumonectomy in a resource-limited setting. Timely intervention, the avoidance of prolonged hypotension, adherence to damage control surgery principles, and multidisciplinary input all contributed to the patient's recovery without neurological deficit despite experiencing postoperative complications. Long-term follow-up with pulmonary rehabilitation is crucial for achieving better functional outcomes.

Authors' contributions

Concept and design: AL, DL

Literature review: AL, DL

Compilation of manuscript: AL, DL

Manuscript reviewing and proofreading: AL, DL

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