Lateral Extracavitary Approach (LECA) For Thoracic Vertebral Lession

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Abstract

Introduction. The Lateral Extracavitary Surgical Approach (LECA) to the thoracic is challenging since anterior interventions to this region are quite complicated with the presence of major vascular elements or important visceral and soft-tissue structures.

Method. Operative technique was performed initially on three consecutive patients. Costotransversectomy was performed on the right side and pediculectomy were added in two patient to achieve wide visual angle during corpectomy and the stabilization procedure was completed with posterior instrumentation with the exception of one patient who had a hardening of bone due to receiving

Results. The initial clinical presenting symptom was paraparesis in three patients Total excision was achieved in 3 patients (1 schwanommas, 2 tuberculosis). No significant postoperative complications occurred and discharge was achieved in all patients with an average hospital stay of 5 days.

Conclusion. A one-step approach through a posterior midline incision is feasible, safe and efficient for complete excision of thoracic lesion. This approach facilitates laminectomy, costotransversectomy, pediculectomy and instrumentation under flouroscopy guidance but excessive blood loss, operative time and postoperative pain. Despite that early mobilization with a reduced hospital stay were achieved.

Keyword: Costotransversectomy, Lateral Extracavitary Approach, Ventrolateral
Introduction

Lateral Extracavitary Approach (LECA) is a technique that is useful in spinal surgery to remove lesions located in the ventral and ventrolateral portion of the spinal cord or spine such as burst fracture, neoplasm, infection, or herniated disc. LECA is mostly effective for spine surgery vertebrae level T3 to L1 but generally there are several surgical approaches for lesions located in ventral and ventrolateral namely, costotransversectomy, Leca, or transpedicular. (3-5)

Case 1

45-year-old woman complained of weakness of both lower extremities with motor strength 1/5 since 4 months ago. Magnetic Resonance Imaging (MRI) examination shows tumor located ventrolateral spinal canal and cause spinal cord compression and without bone destruction (Figure 1).
Figure 1. MRI A) Isointens on T1WI MRI picture on thorakal V Th 2-5 B) T2WI MRI hyperintense signal pressing spinal cord to the posterior C, D) MRI axial T1WI mass fills the spinal canal in the right ventrolateral (2).

Case 2

Male 31 years complained of weakness both lower extremities with motor strength 0/5 since 6 months ago. He denied smoking history and family history of similar disease. History of pulmonary Tb (+). Magnetic Resonance Imaging (MRI) examination show vertebrae thorakal destruction > 50% accompanied with an epidural mass and paravertebrae (Fig 2).

Figure 2. A) On T2WI MRI reveal hipointens on extradura which compress the spinal cord and bone destruction > 50%. B, C) Coronal and axial view shows paravertebral abscess. D) Myelography shows LCS blocks at thoracic level (1).
**Case 3**

Male 36 years complained of weakness both lower extremities with motor strength 0/5 since 9 months ago. He denied smoking history and family history of similar disease. History of pulmonary Tb (+). Preoperative MRI show thoracic vertebrae destruction > 50% accompanied with an epidural mass and paravertebral.

**Operation Procedure**

Preoperative preparation is similar with preparation for other major spinal surgery. Vein and artery access and folley catheter are used. Operator (RD, FY, SV) used Wilson frame to reduce intra-abdominal venous pressure to reduce bleeding during surgery. Once induced, intubated, infused and ETT is confirmed safe, four or five assistants are needed to transfer the patient into a prone position to reduce the manipulation of the spinal cord that may cause injury. Intraoperative C-arm is used to confirm the anatomical level (3, 6-8).

Upper arm and knee placed above a soft pad. Operating table can be tilted from side to side so that the operating field can be seen clearly by neurosurgeons and assistants. With semilunar incision, a skin flap was then made (Figure 3A). Blunt dissection is conducted right on thoracodorsal fascia. Retractors are used to maintain a good exposure of the operating field. Muscle dissection is performed laterally until the edge of the transverse process (Figure 3B). A T-shape incision was made on thoracodorsal fascia. Erector spinae muscle can be observed after retraction of the fascia. A dissection is performed from medial to bottom lateral of the erector spinae muscles, separated from quadratus lumborum muscle on the waist area, ribs and intercostal muscles in the back of the chest (Figure 3C). Trapezius, rhomboid, and latissimus dorsi muscles can be incised to maximize visual field (Figure 3D).

Osteotomy can be performed on one to three medial ribs 6 to 10 cm which allows access to a desired pathological level then released subperiosteally using *Doyne rib dissector*
of the surrounding soft tissues (including the neurovascular bundle (Figure 3E). Cutter rib is used for cutting lateral ribs. Further dissection is needed to release the parietal pleura from the rib and vertebral corpus. The procedure is done carefully to avoid injury to the intercostal nerves and pleura. This dissection, including ribs removal, allows access to the lateral aspect of the vertebral bone. In thorakal area, intercostal nerves may be sacrificed to maximize exposure, but not in lumbar region. Pathological pedicle of vertebral are partially removed with a rongeur then dissection of the nerve roots to the medial aspect of the pedicle is performed. Removing the pedicle expose the lateral aspect of the dura. (3, 4, 7-10). For extradura lesions will appear pathological masses, for intradura lesions after opening the dura mater using bysturi No. 11 tumor mass can be observed (Figure 3F). Tumor mass is removed peacemeal to decompress the spinal canal.

Then, unilateral posterior stabilization is performed. After the installation of posterior stabilization, the wound was closed layer by layer with special attention during fascia closure. Thoracostomy tube is used only if there is pleural fluid or bronchopleural fistula that may occur during the operation. Intraoperative and/or postoperative x-ray examination is conducted to assess postoperative anatomical arrangement.

Discussion

Surgical access of anterior part of thoracic vertebrae is achieved by anterior approach through thoracotomy. It allows decompression, anterior column reconstruction, restoration, and improvement of kyphosis. However, there are some complications caused by thoracotomy such as pneumothorax, hemothorax, and vascular injury. Chest tube is required after surgery. (3, 11)
Figure 4. A). Picture of the tumor after removal B). Histopathology result show schwannoma antoni mix A & B (H & E 40 x) Figure 9 C). Abscess paravertebral D). Histopathology result reveal Datia Langhans cells which indicate spondylitis tuberculosis (H & E 40 x)

Posterior approach consisting of transpedicular, costotransversectomy, extracavitary lateral approach, and modifications are used to access the ventral and ventrolateral thoracic vertebrae through the posterior approach, however there are some weaknesses of extracavitary lateral approach on thoracic and thoracolumbar which is associated with the manipulation of the visceral pleura in the chest wall (8,12,13). Selection of the operating technique requires experience and skill. Blood loss, patient positioning and exposure area is also a problem. Blood loss from the epidural venous plexus can be reduced by releasing the compression of the stomach using a Wilson frame.

Macroscopic and histopathological analysis showed a verocay bodies; mixed type schwannoma in case 1 (Figure 4A, B) and presence of Datia Langhans cells indicating tuberculosis spondylitis infection in cases 2 and 3 (Figure 4C, D).

Conclusion

LECA is a surgical technique of posterior approach is a safe procedure to remove lesions in the ventral or ventrolateral thoracic vertebrae such as infections, neoplasms and bone fractures. This method provides adequate operating field of important structures.
Removal of the tumor/infection and installation of posterior stabilization can be done immediately after the removal. Leca also allows early mobilization and shorten hospital stay.
Daftar Pustaka


