Thoracic surgeons are frequently being asked to provide surgical exposure from C7 to L2 vertebrae. The anterior transthoracic approach affords the spine surgeon excellent visualization and access to different parts of the thoracic and upper lumbar regions. We reported thirty eight patients underwent operations through a thoracic or thoracolumbar approach for orthopedic or neurosurgical procedures. The initial selection and the indications for operations were performed by the spine surgeon. A few works explaining this techniques published in the worldwide journals. This work provides explanations for Certain surgical principles and techniques that would help the spine or general thoracic surgeons to improve the quality of surgical exposure and minimize the morbidity and mortality.
Anterior Transthoracic Approaches to Dorsal Spine, Surgical Techniques

Abstract

The anterior transthoracic approach affords the spine surgeon excellent visualization and access to the anterior thoracic spine. Between May 2009 and January 2012, thirty eight patients aged 12 to 55 years with mean age, 29 years, underwent operations through a thoracic or thoracolumbar approach for spinal procedures. There were 9 women and 27 men. The initial selection and the indications for operation were performed by the spine surgeon. We reported the deferent approaches for proper exposure of different segments of thoracic vertebra to achieve good exposure without intrathoracic visceral injuries. The choice of approach is dictated by the level and length of spinal involvement. In the absence of lateralizing pathology, surgical approaches can be described in terms of the lesion at four anatomic levels of the spinal column; (1) from C7 to T2 through longitudinal cervicothoracic approach (2) from T2 to T6 through right posterolateral thoracotomy because of the location of the heart, aortic arch and great vessels; (3) from T6 to T12 through left posterolateral thoracotomy to avoid liver retraction; and (4) from T12 to L3 through left posterolateral thoracotomy with detachment of the lumber origin of the diaphragm(C; cervical vertebra, T;thoracic vertebra).

Key words: dorsal spine; vertebral levels; rib removal; intercostal vessel;

Introduction

The first reported series of thoracotomies for transthoracic access to the spine were performed by Hodgson and Stock in 1956 for the treatment of Pott's disease [1]. Thoracic surgeons had become increasingly involved with anterior transthoracic approaches to the thoracic and upper lumbar spine. Thoracic surgeons are frequently being asked to provide surgical exposure from C7 to L2. These Approaches must provide maximum exposure to spine pathology without intrathoracic visceral injuries [2,3,4]. Few small literatures were published describing these techniques.

Patients and Methods:

Between May 2009 and January 2012, thirty eight patients aged 12 to 55 years with mean age, 29 years, underwent operations through a thoracic or thoracolumbar approach for spinal procedures. There were 9 women and 27 men. There were deferent pathologies of the vertebral column disorders required anterior transthoracic exposure of the Dorsal Spine and adjacent cervical or lumber vertebrae. The initial selection and the indications for operation were performed by the spine surgeons.

Surgical exposure techniques
In the absence of lateralizing pathology, surgical approaches can be described in terms of the lesion at four anatomic levels of the spinal column:

1. **Exposure of C7 to T2 vertebrae performed** in 2 patients through longitudinal cervicothoracic incision made along the anterior border of the sternocleidomastoid muscle with an upper ministernotomy down to sternal angle followed by blunt dissection of the subcutaneous tissue with division of the platesma muscle. Carotid sheath and innominate artery were encircled and retracted laterally, innominate vein was encircled and retracted inferiorly, and pharynx, thyroid, and esophagus are retracted medially with gentle pressure (figure 1a & b).

2. **Exposure of T2 to T6 vertebrae performed** in 9 patients through right posterolateral thoracotomy with entering the chest through bed of the rib of involvement corresponding to the appropriate level of spinal pathology after subperiosteal resection of that rib to give space for retraction. The right side is preferred to be away from location of the heart, aortic arch, and great vessels. Skin incision must be directed parallel to the direction of the rib of involvement (figure 1c). Subcutaneous tissue dissection with division of the latismus dorsi muscle, thoracodorsal fascia, and serrates anterior digits were performed to expose the anterior aspect of the rib. **Towel compression of the lung with medial retraction is mandatory followed by meticulous longitudinal division of the mediastinal pleura covering the spine longitudinally with ligature suspension and traction.** Ligation and division of the posterior intercostal vessels crossing over the body of the vertebra was needed in some cases but this step may be crossed if the pathology were limited to intervertebral discs as in cases for correction of the scoliosis (figure 1d).

3. **Exposure of T7 to T12 performed** in 18 patients through left posterolateral thoracotomy with entering the chest through bed of the rib of involvement corresponding to the appropriate level of spinal pathology after sub-periosteal resection of that rib except for T10, T11, and T12 entrance of the chest through bed of 9th rib. The left-sided is preferred to avoid liver retraction. Again, skin incision must be directed parallel to the direction of the rib of involvement. Subcutaneous tissue dissection with division of the latissimus dorsi muscle, thoracodorsal fascia, and external oblique muscle digits were performed to expose the anterior aspect of the rib. Exposure of the spine is obtained by towel compression of the lung with medial retraction as well as ligature retraction and elevation of the diaphragmatic copula downward. Meticulous longitudinal division of the mediastinal pleura covering the spine longitudinally with ligature suspension and traction were mandatory (figure 2a). Intercostal arteries should only be divided if necessary because of the potential resultant morbidity. If the thoracic pathology involves a substantial number of spinal segments below T6, a spinal angiogram should be performed to visualize the artery of Adamkiewicz. If mobilization of the aorta is required this can be easily done (figure 2b).

4. **Exposure of T12 to L2 performed** in 9 patients through left lower posterolateral thoracotomy incision through the bed of the 9th rib as described in the previous approach with detachment of the lumber and costal origin of the diaphragm by blunt
pushing after incision of the parietal pleura reflection over the T12 to avoid entering the peritoneum (figure 2c). Subcostal vessel ligation and division with longitudinal division of the uppermost fibers of psoas major to expose the spine. Once exposure is obtained, additional segmental arteries may be divided and excellent exposure provided (figure 2d). After completion of the procedure lumber and costal origin of the diaphragm were reattached to the lower ribs by pericostal non-absorbable sutures.

Comment

All patients survived operation with no postoperative mortality. Choice of laterality and type of surgical approach depends on the level and length of vertebral column involvement. The above mentioned surgical principles and techniques will help the general thoracic surgeon to improve the quality of surgical exposure to the associated spine surgeon without intrathoracic visceral injuries. Outlining and understanding of the primary spinal pathology with adequate preoperative assessment of the respiratory function and cardiovascular system will help in minimizing morbidity and mortality.

References

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FIGURE 1
FIGURE 2