

Anterior Cervical Incision and Thoracotomy for Cervicothoracic, Thoracic, and Thoracolumbar Spine Surgery: A Clinical Series

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ABSTRACT

Introduction: Surgical treatment of diseases in cervicothoracic, thoracic and thoracolumbar regions can be a challenging issue. Cooperation of the thoracic surgeons and spine surgeons can improve the outcomes and decrease the complications of patients who underwent these approaches.

Materials and Methods: The participants of this study consisted of seventeen patients suffering from different types of vertebral lesions such as spinal tuberculosis (TB), primary tumor, metastasis, and scoliosis. These patients were operated through anterior lower cervical incision (without sternotomy), standard thoracotomy, and lower thoracotomy during 2001-2016. For five patients, exposure of cervicothoracic region was achieved through anterior cervical incision with extension to anterior chest wall (without sternotomy). Through performing posterolateral thoracotomy (left or right) on nine patients, spine surgeons had a better access to the vertebral pathologies. In three cases, a perfect access to the thoracoabdominal spine was obtained by performing lower thoracotomy with removal of the twelfth rib and release of diaphragm from the chest wall.

Results: In total, seventeen patients [eleven males (65%) and 6 (35%) females] with the mean age of 33.6 ± 19.4 were operated. six (35%) patients suffered from cervicothoracic lesions, 8 (47%) cases had lesions in middle and lower thoracic spine, and 3 (18%) patients had lesion in the thoracolumbar vertebra. Postoperatively, no mortality was observed in the patients and complications were reported to be minimal.

Conclusion: According to the findings, the joint corporation of thoracic and spine surgeons can improve exposure of cervicothoracic, thoracic, and thoracolumbar regions. Furthermore, this approach can decrease the complications of these complex surgeries.

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Introduction

Thoracic spine is composed of 12 vertebrae. Cervicothoracic junction and thoracolumbar junctions are defined as C7-T4 vertebrae and T11-L1 levels, respectively (1-3). Surgical treatment of disease in these regions can be a challenging issue (4, 5). Access to cervicothoracic junction can be done with anterior cervical

approach with extension to anterior chest wall. Open thoracotomy is standard route to mid-thoracic and lower thoracic (T3-T10) and thoracolumbar junction is acceptable by thoracoabdominal approach (6, 7).

Cooperation of the thoracic surgeons and spine surgeons can improve the outcomes and decrease

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the complications of patients who underwent these approaches.

Materials and Methods

The study population consisted of a group of 17 patients who underwent spinal surgery, owing to different pathologies of the spine. Surgery was performed by the joint cooperation of thoracic and spine surgeons at Ghaem Hospital, Mashhad, Iran during March 2001-March 2016 (Table 1). The demographic characteristics of these patients are illustrated in Table 2.

Six (35%) patients suffered from cervicothoracic lesions, 8 (47%) patients had lesions in the middle and lower parts of the thoracic vertebra (T6, T7, T8, and T9), and 3 (18%) patients had lesions in the thoracolumbar region (Table 3). Tables 4 and 5 display the surgical approach and the involved levels.

Table 1. Pathology of the spinal column

Scoliosis	4(23%)
The primary tumor of the vertebrae	3(18%)
Vertebral tuberculosis	3(18%)
Vertebral metastasis	6(35%)
Vertebral fracture (traumatic)	1(6%)
All	17(100%)

Table 2. Demographic characteristics of patients

Female/Male	6(35%) /11(65%)
Age (Average)	3-68(33.6±19.4)

Table 3. The location of the lesion

Cervicothoracic spine	6(35%)
Middle and lower thoracic spine	8 (47%)
Thoracolumbar spine	3 (18%)

Results

In total, 11(65%) males and 6 (35%) females with pathological C7 through L1 vertebrae underwent surgery.

In five (29%) patients with pathological lesion of C7, T1, and T2 anterior cervical approach with extension to the anterior chest wall (without sternotomy) was done. After releasing the superior mediastinum, the vertebrae were exposed for the surgery. In case of primary or metastatic malignancies, partial or complete vertebral body resection, disc removal, and anterior vertebral reconstruction were performed.

Overall, 12 (71%) out of 17 patients underwent thoracotomy. In one (6%) patient with T2-T4 pathology, upper thoracotomy was performed. Nine (53%) patients went through posterolateral thoracotomy (left or right) with a double-lumen endotracheal tube and total collapse of one lung. This approach provided the spine surgeons with a better access to the thoracic vertebrae from T5 through T10. As a result, the surgeons were enabled to perform deformity correction or surgery for other pathologies in thoracic regions.

In three (18%) cases, total access to the thoracoabdominal region was achieved by lower thoracotomy with the removal of the twelfth rib and release of diaphragm from the chest wall (Table 4). Eleven (65%) patients had two or more lesions, whereas six (35%) had single lesion (Table 5).

Postoperatively, no mortality, infection, or dehiscence of incision was observed in the patients, and complications were reported to be minimal. Based on the findings, only one patient had transient cerebrospinal fluid leakage, while seven patients had pre-operative neurological deficits; however, all the patients, except for one case, either remained stable or improved postoperatively.

Table 4. Distribution of the surgical incisions

Anterior lower neck	5 (29%)
Thoracotomy (right or left)	12 (71%)

Table 5. Level affected

Single level	6((35%)
Multiple levels	11(65%)
Total levels	34
Involved levels	1-4 (mean:1.9)

Discussion

Although abnormalities of the cervicothoracic spine are not infrequent, access to this region and the associated surgical operations can be challenging. Surgical procedures reported in medical journals are often insufficient and cervicothoracic incisions are unnecessarily expanded (8, 9). Some authors have reported that exposure to T3 can be achieved with an incision in the lower part of the neck with an extension to the anterior chest wall; however, anterior fixation is not possible in this incision (10, 11).

By extending the lower anterior neck incision to the anterior chest wall in five patients, the second thoracic vertebra was accessible and sternotomy was not necessary for exposure to T2. Mc Donald et al. (12) and Dorling et al. (9) reported that the anterior incision of the neck and limited sternotomy could create a narrow corridor (4-cm diameter) with limited exposure to the third thoracic vertebrae.

In this regard, Luk et al. (13) used a modified version of Hodgson's technique by unilateral or bilateral manubriectomy (reserved T) for five patients with cervicothoracic lesions in order to gain adequate access to the fifth vertebra. Four patients had no complications in the two-year follow-up. This study highlighted the importance of protecting the recurrent laryngeal nerve, gullet, and thoracic duct against lesions. Moreover, the results demonstrated that cooperation of thoracic surgeons and neuro-surgeons can not only prevent the probable complications in spine surgery, but also can be regarded as an efficient and effective

approach.

Likewise, the present study suggested the effectiveness of the joint corporation of thoracic and spine surgeons in complex surgeries of the cervicothoracic region, which can lead to exposure improvement and elimination of complications. In a previous report, 29 patients with T3, T6, T7, T10, T11, and T12 lesions underwent left-sided thoracotomy (14). In addition, Hott et al. performed surgery on 20 patients with disc herniation through thoracotomy and thoracoscopy (15).

Gokaslan et al. (16) performed thoracic vertebrectomy on 72 patients with vertebral metastasis. All the patients underwent vertebrectomy, decompression, reconstruction with methyl methacrylate, and anterior fixation. In the current study, one patient suffered from lymphoma metastasis to T6 region, and one patient had osteosarcoma in T8 and T9. Both patients underwent spinal cord decompression with anterior reconstruction of the spine and anterior fixation.

Krasna et al. (17) treated 24 patients with severe idiopathic scoliosis through thoracoscopic anterior spine surgery. Thoracic spine pathology can be operated through thoracoscopy. Minimally invasive surgery of the spine reduces the injury resulting from thoracotomy, bleeding, and length of hospital stay; furthermore, it minimizes postoperative pain and complications (18, 19, 20, and 21). Despite the small population of the current case series, this study revealed that the joint corporation of thoracic and spine surgeons can lead to better patient outcomes.

Conclusion

As the study findings showed, corporation of thoracic and spine surgeons improved the exposure of cervicothoracic, thoracic, and thoracolumbar regions and decreased the complications of these complex surgeries.

Acknowledgment

None

Conflict of Interest

The authors declare no conflict of interest.

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