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Solitary involvement of multiple myeloma in the upper thoracic spine, and anterior approach to thoracic region without full sternotomy: A case report

Üst torasik omurgada multipl miyelomun soliter tutulumu ve tam sternotomi olmaksızın torasik bölgeye anterior yaklaşım: Olgu sunumu

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Abstract

Multiple myeloma is cancer that starts in the plasma cells in bone marrow. Bone x- rays may show fractures or hollowed out areas of bone. The most common skeletal sites are pelvis, skull, spine, ribs and femoral and humeral shafts. The unique anatomy of thoracic spine creates challenging surgery approaches. Treatment choices of hematological malignancies of the spine are surgery, chemotherapy and radiotherapy. Unilateral L-shaped manubriotomy does not require full sternotomy for upper thoracic segment pathologies. We present a case of multiple myeloma patient in the upper thoracic area and the surgical management. We present an approach to anterior pathology of the upper thoracic spine that obviates the need for sternotomy.

Keywords: Multiple myeloma, Unilateral L-shaped manubriotomy, Anterior approach, Cervicothoracic junction

Öz

Multipl miyelom kemik iliğindeki plasma hücrelerinden başlayan bir kanser türüdür. Kemik grafileri kemikteki kırıkları ve oyukları gösterebilir. En sık tutulan iskelet alanları pelvis, kafatası, kaburgalar ve femur- humerus kemikleridir. Torasik omurganin özellikli anatomisi, bu bölgenin cerrahi yaklaşımlarını oldukça zorlaştırır. Omurgadaki hematolojik hastalıkların tedavi seçenekleri arasında cerrahi, kemoterapi ve radyoterapi seçenekleri yeralmaktadır. Tek taraflı L- şekilli manubriyotomi sayesinde üst torasik bölge patolojilerine yaklaşımlarda tam sternotomi gerekmemektedir. Üst torasik omur multiple myeloma hastasının cerrahi yönetimini sunmayı amaçladık. Sunulan cerrahi yöntem üst torasik bölgeye yaklaşımda sternotomi ihtiyacını ortadan kaldırmaktadır.

Anahtar kelimeler: Multipl Miyelom, Tek taraflı L-şekilli manubriyotomi, Anterior yaklaşım, Servikotorasik bileşke

Introduction

Multiple myeloma is the prototype of malignant monoclonal gammopathies. Radiographic presentation is lytic skeletal lesions classically. Also can present sclerotic and porotic changes. The most common skeletal sites are pelvis, skull, spine, ribs and femoral and humeral shafts. The unique anatomy of thoracic spine creates challenging surgery approaches. Exposure of the upper two thoracic vertebrae is most compelling of all [1]. Created rigidity of this area by rib cage provides tightness so the spondylotic changes do not occur as in the cervical or lumbar spine [2].

Traumatic injuries, infections, spondilopathies or malignancies can require anterior corpectomy of the thoracic spine. These approaches permit the surgeon a wide decompression of the corpus but can be critical to uncover complications associated with entering the thorax and working around aorta [3].

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Case presentation

A 44-year-old woman with localized back pain went under x- ray to thoracic spine and T3 region localized compression fracture was found at another hospital. Magnetic resonance imaging was performed. Pre- diagnosis of the MRI was spinal tumor so she went under PET scan, but no primary tumor was found. She underwent posterior T3- 4 laminectomy and T3 corpus biopsy procedure but the pathology did not give any result of a tumor so she was discharged from hospital with analgesic treatment (figure 1). She admitted to our emergency service with continued severe back pain. Recent MRI of the thoracic spine revealed severe impression of T3 to the spinal cord (figure 2). So she underwent anterior T2-3 corpectomy followed by anterior spinal stabilization by corpectomy cage and anterior plate (figure 3). Manubro-sternotomy for anterior approach was performed. Pathological diagnosis was kappa monoclonal plasmacytoma. Bone marrow biopsy performed by oncology department showed none plasma cell increase. FISH study results showed 13q, 17p, t84:14 negativity. She was given radiotherapy treatment to the thoracic spine. She remains neurologically intact at 1 year postoperatively without evidence of disease recurrence. Patient has given consent for this report.

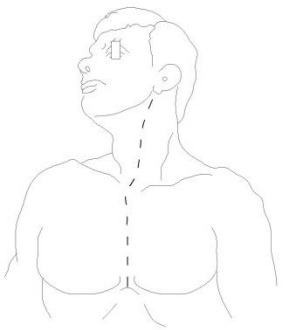
Figure 1: Thoracic spine sagittal tomography image after outer clinic operation

Figure 2: Spinal cord impression of T3 vertebrae on the MRI two months after first operation

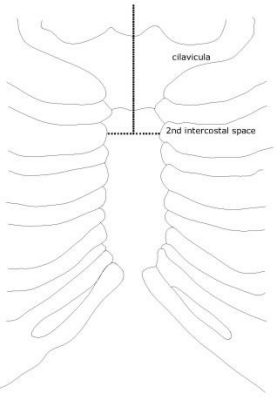
Figure 3: Early postoperative sagittal 3- dimension tomography image showing placement of corpectomy cage with T1-2 anterior plating after T2-3 anterior corpectomy

Technique

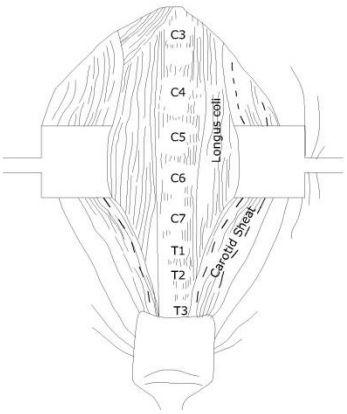
The patient is positioned supine, the trunk 10° flexed and the head slightly rotated to the right (picture 1). We used an incision cranially from the medial side of the sternocleidomastoid muscle to the manubrium notch, which extended 5 cm downwards on the midline. A L-shaped osteotomy is made over the manubrium sterni (picture 2) and a retractor was placed (picture 3). With blunt dissection, eusophagus and trachea retracted to the left (medial) side and the common carotid artery to the right side laterally (picture 4, 5). T3 vertebrae was exposed, but because of the thoracic kyphosis and the deep angled vision, T2 corpectomy is also required together with T3 corpectomy. Stabilization with expandable corpectomy cage [medicon r] and anterior plating is done (figure 2).



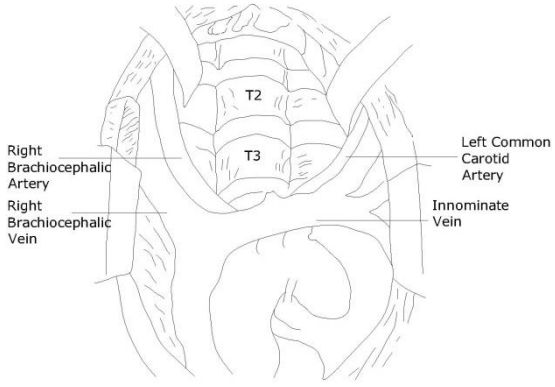
Picture 1: Patient positioning and incision area decision before surgery. First half of the incision (cranial half) is used for this case. Whole incision is necessary for sternotomy



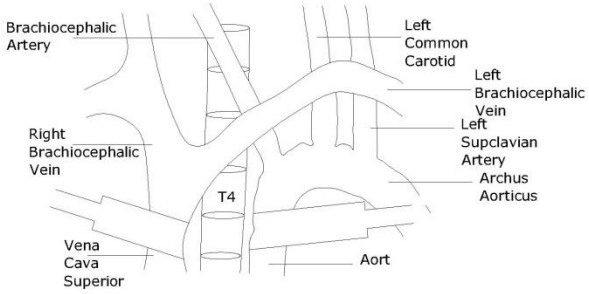
Picture 2: L-shaped skin incision is showed in the drawing



Picture 3: Surgical area is shown after bilaterally m. longus coli dissection



Picture 4: The relationship with T2-3 is shown in the drawing.



Picture 5: The drawing shows the surgical area anatomy

Discussion

Multiple myeloma is characterized by the accumulation of malignant plasma cells in the bone marrow followed by impaired hematopoiesis and bone disease, which includes mainly lytic lesions, pathological fractures, hypercalcemia and osteoporosis [4].

Thoracotomy to access the anterior thoracic spine was first described in 1950s [2]. Hematological malignancies such as myeloma and lymphoma incidence in spinal localizations varies from 6 to 20%. Treatment choices are surgery, chemotherapy and radiotherapy. Place of surgery in spinal hematological malignancies treatment takes up less space. According to Lachaniette et al. [5], surgical treatment must be considered in case of acute vertebral collapse, or if the diagnosis is uncertain and a biopsy is needed, or if the neurological symptoms increase under medical treatment of the hematological malignancy.

The cervicothoracic junction is defined as an area between C7 to T4 mostly and varied approaches to this area have been described, including low anterior cervical approach alone or combined with sternotomy, unilateral or bilateral manubriotomy or with clavicular dissection and lateral parascapular thoracotomy. Anterior approach is defined as the best surgical strategy for this region, because it allows better decompression of neural structures [6,7].

Surgical approaches from the seventh cervical to the fourth thoracic vertebrae is always challenging because of the regular kyphosis of the higher thoracic segments requires deep surgical area [8,9]. Traditional approaches to this region includes thoracotomy or at least limited sternotomy [10]. Huang et al [11] described the region in their cadaveric study recently. As they reported that, when an access to T2 and above is required, the traditional low cervical approach is usually enough, but the manubrium sterni and clavicles often hinder access to T3, T4 and below, so trans-sternal, trans-clavicular and trans-manubrial approaches are defined.

Sundaresan et al [1] first described a T-shaped incision on 1984, with the vertical limb extending over the body of sternum for the anterior approach to upper thoracic region. Accordingly to his method, medial third of the clavicula is resected and disconnected from the sternum which improves exposure and also used as a strut graft for the fusion after corpectomy. Height of the manubrium, shape of the thoracic aperture and the degree of cervicothoracic kyphosis may limit this approach. The most caudal lesion level was T2 in their study.

Subsequent to Sundaresan [1], Darling et al [12] used a modified trans- manubrial approach [unilateral manubriotomy] to access T4- T5 level, however it provided a narrow operation field. Luk et al [9] used bilateral manubriotomy for more extensive exposure of this area. The transverse limb of the osteotomy of the manubrium sterni should exit at the second intercostal space and can be unilateral (L-shaped) or bilateral [inverted T-shaped] [5].

Conclusion

We used the unilateral L-shaped manubriotomy. This approach is useful to expose upper thoracic spine until fifth thoracic vertebrae so there is no need for full sternotomy for these segment pathologies. It also provides the patient from postoperative pain and potential morbidity of full sternotomy. It provides an 8-cm interval between the split manubrium and allows access to both sides of the vertebrae. The deep localization of the vertebral bodies due to kyphosis of the upper thoracic spine and the presence of neurovascular and osseous obstacles over the operation area are out limitation factors for this approach.

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