1. Introduction:

After the adventure endoscopic surgery and usage for the management of lung based pathologies, it is carried to the endoscopic approaches of thoracic spine pathologies (1,2). The major advantages of endoscopic surgery is the elimination of thoracotomy. For this reason, the patient does not cause to the thoracotomy pain which is one of the main source of the pain after surgery. The surgical approach is maintained with two trocars on the thorax.

Generally, there are two kinds of traumatic processes. The first is the new fractures at the vertebrae or dislocation. The second is the osteoporotic fractures.

Because of the easy separation of mosaic like bone pieces at the vertebrae fractures of new trauma, they can be excised easily with endoscopic approach. The spinal canal can be decompressed easily with this method. The alignment of vertebrae at the dislocation can be maintained via posterior approach instrumentation. If the fracture line accross the disc level, the bone graft is inserted after discectomy.

The first choice is vertebroplasty or kyphoplasty at the osteoporotic fractures. However, surgical approach can be necessary for the total collapsed or stucked upper and lower endplate cases.

The contrindications of thoracoscopic trauma surgery is similar with general thoracoscopic approach contrindications and mentioned in chapter 4b.

3. Surgical Procedures:

3.a. Surgical equipment:
The instruments of thoracoscopic trauma surgery are similar with routine thoracoscopic surgery instruments and defined in chapter 4b.

3.b. Operating room set up:
The surgeon is positioned at the ventral side of the patient while the assistant is located opposite to the surgeon. While the anesthesia team is located at the head of the table, the nurse is at the right side of the surgeon. The monitors of endoscopy and scopy must be positioned at the opposite side of the surgeon. If the monitor is single it can be located at the foot of the operating table behind the scopy. Also, the operating room set up is similar with chapter 4b (Figure 1).

3.c. Patient Positioning:
The patient is positioned in right lateral decubitus position to maintain the aorta at the upper side. The 15º posterior angulation of the thoracic body will increase the visualisation of spinal canal. The patient is covered after staining and marking of the thoracar entrance localizations.
3.d. Surgical Technique:
The localization of working channels are arranged according to the surgical plan. One of the port is located anterior to the midaxillary line just opposite to the fractured vertebra and the light and aspiration ports are located to the upper and lower of the first port. If the surgical plan includes the insertion of spinal implant, it will be better to maintain an additional port just above the fractured vertebra. The endoscopic approach is proper between the Th4 and Th11 vertebrae.

After the fixation of vertebra, the upper and lower disc levels are marked. The pleura is elevated at the lateral sides of the vertebral column to control anterior part of the fractured vertebrae. The arterial and venous structures lying above the fractured vertebrae are coagulated proximally or near the vertebral foramina and removed from the operational area. Discectomy is performed to the upper and lower disc levels of the fractured vertebrae. After discectomy, the fractured and mosaic shaped bone pieces are excised via pulling to the abdominal space. It will be better to avoid compressing the spinal canal while excising the fractured bone pieces. We must be careful while working on the posterior longitudinal ligament (PLL). The big sized bone pieces can be excised via high speed drilling. If the PLL is teared, duramater and also the spinal cord can be damaged. The excessive bleeding can occur via epidural venous plexus or arterial structures which are feeding the vertebrae. The bipolar coagulator, bone wax and surgicel can be used to control the bleeding. The cartilage endplates of the upper and lower vertebrae corpus can be excised with courteous osteotomes and/or high speed drill.

The suitable bone graft or cage can be inserted to the excised area of the fractured vertebra. If it is decided to insert a cage, the autolog bone grafts can be used which are excised during vertebrectomy. One of the advantage of the cage is to avoid the surgeon for an extra autolog bone graft excision. The sizes of the cage and position and adaptation with the vertebrectomy area is controlled under scopy. The minimal bleeding of the bone structures can be controlled via placing spongostan behind and above the cage or bone graft.

The vertebra corpus disappears and the upper and lower disc levels kiss for the cases of advanced osteoporotic vertebra fractures. After the excision of degenerated and sequestre disc pieces between two vertebrae, the osseous endplates of upper and lower vertebrae is planed and bone graft is inserted into the vertebrectomy area. Because of the hard shape, cage insertion is not suitable for advanced osteoporotic cases. The upper and lower vertebrae corpses can be damaged.

Dislocations of the thoracic vertebrae occurred after trauma is straightened via posterior instrumentation before thoracoscopic approach. Because of the dislocation point is at the disc level, traumatic disc tissue is excised and osseous endplates are smoothened. Using long shafted multidirection kerrison ron-
4. Postoperative Care:

Postoperative care unit is suggested after surgery for one day. Daily routine chest graphy may alert the possible atelectasis problem after operation. Controlling the arterial gas levels and urine output of the patient is important after operation. Prophylactic antibiotics should be taken to avoid form a possible infection.

5. Complications and Avoidance:

Complications of this procedure are: gross hemorrhage, great vessels injury, pulmonary injury, atelectasis, spinal cord injury, tension pneumothorax. The multidicipliner approach can be necessitate under this circumstances. The vena cava inferior damage is one of the biggest problem during the thoracoscopy procedure. A special operation instrument which is opening as goose foot is located be-

between the thorax cavity and operatin area. Excessive bleeding may occur via vertebrectomy area or epidural space. The bleeding must be controlled in every stage of the surgical approach. The preparing of upper and lower vertebral surfaces before decompressing the spinal canal may avoid the surgeon from the excessive epidural bleeding. The suddenly graft insertion and spongostanes may contribute to control the bleeding.

6. Case Illustrations:

A 35 year-old female admitted to our emergency clinic with complaints of unable to walk and move her legs. Her history revealed that she had a traffic accident 5 days ago. Her physical examination revealed a decubitus ulcer at mid-low back. Neurological examination showed a complete paraplegia. The radiological studies (X-ray graphies, spinal MRI, chest CT) showed Th5-6 fracture dislocation and bilateral hemothorax. Bilateral thorax tubes were put and hematoma drainage was achieved.

Posterior Th6 laminectomy was performed, duramater was opened and the spinal cord was transected. After the closure of duramater, bilateral Th3-4-5-7-8 pedicle screw fixation was performed.

Figure 2: Preoperative a) sagittal reconstruction and b,c) axial CT scans and d) T2 weighted MRI scan of the traumatic vertebra is seen.
Following posterior approach, thoracic endoscopic approach was performed to the Th6 vertebra via left thorax cavity and Th6 vertebra corpus was resected and bone graft was inserted to the Th6 corpectomy area (figure 3a,b) (figure 4a,b). The patient was transferred to the ICU after the operation and discharged at 2 weeks after the operation.

7. References:

