16 Microsurgical Anterior Approach to the Thoracolumbar Junction

H. M. Mayer

16.1 Terminology

A microsurgical modification of the transthoracic-retroperitoneal approach to pathologies of the thoracolumbar junction (T11–L2) is described.

16.2 Surgical Principle

The surgical principles follow the principles described in the previous chapter. The anterolateral aspect of the thoracolumbar junction is approached through a 4- to 6-cm skin incision from the left side. A mini-thoracotomy is used to approach the spine at the base of the diaphragmatic insertion on the left side. The approach is then extended into the retroperitoneal cavity through dissection of the diaphragm on the vertebral bodies of T12/L1 without detaching the diaphragmatic insertion in a circumferential way. The soft tissue spreader described in Chapter 15 is used to retract the ribs as well as the ipsilateral lung. It is completed by a diaphragm blade which holds the retroperitoneal contents downward and retracts the incised diaphragm. Since a high retraction force has to be applied because of the intra-abdominal contents, the diaphragm blade can be fixed on the vertebral body L1 or L2 with a U-shaped integrated K-wire. As described in the previous chapter a surgical microscope or an endoscope is used to illuminate and magnify the target area (see Chapter 15). This approach is mainly used for anterior decompression of the spinal canal and anterior interbody bone grafting in fractures.

16.3 History

The technique was developed from the microsurgical approach described above. The first patient was operated on by the author on 4 April 1997.

16.4 Advantages

- Small skin incision
- Small less traumatic thoracotomy
- Less trauma to the rib cage with window, sliding, or intercostal technique
- No cosmetic alterations
- Short ICU stay
- Better illumination and magnification of surgical field
- Safe dissection of tissues anterior and in the spinal canal
- No laboratory training necessary

16.5 Disadvantages

- Exposure limited to one or two segments with surgical microscope
- Individual learning curve
- Long instruments
- Limited manipulation of the motion segment (e.g., reduction)
- Limited options for anterior instrumentation

16.6 Indications

The approach has been used in patients with the following indications:

- Disc herniations at the thoracolumbar junction (T10/11/12)
- Fractures (T10–L1)

It can also be used for the treatment of:

- Spondylodiscitis/spondylitis
- Palliative treatment of monolocular malignant tumors
- Enucleation or marginal excision of benign tumors or tumor-like lesions
• Anterior biopsies of lesions providing no indication of their malignant or benign nature

16.7 Contraindications

There are no absolute contraindications for this approach (see also Chapter 15). However, decisions should be made on an individual basis in the following patients:

• Patients with previous thoracotomy or thoracoscopic surgery
• Patients with pleural empyema
• Patients in whom single-lung ventilation is not possible
• Patients with severe or acute respiratory insufficiency
• Patients with vascular diseases or malformations of the thoracic cavity
• Patients with previous operations of or around the diaphragm
• Patients with previous retroperitoneal approaches from the left side (e.g., kidney, spleen)

16.8 Surgical Technique

16.8.1 Preoperative planning

Preoperative planning and preparation includes AP and lateral X-rays of the thorax and the thoracolumbar junction. Magnetic resonance imaging (MRI) is mandatory. Identification of T12 or L1 follows the same criteria as described in the previous chapter. Selective intubation and unilateral ventilation is helpful but not necessary for the approach to the thoracolumbar junction.

16.8.2 Positioning

The patient is placed on the operating table in a right lateral position (see Figs. 15.2 and 15.3). The approach is from the left side. The operating table is tilted in the coronal plane in order to achieve a left convex bending of the thoracolumbar junction. Care must be taken that the level of pathology (e.g., intervertebral space, vertebral body) shows an orthograde projection onto the skin level in a lateral fluoroscopic view. Both legs are bent about 80° at the knee joints, supported with soft cushions, and fixed with a tape. The lower (right) arm is stretched out and a small soft towel roll is placed under the axilla in order to prevent lesions to the brachial plexus. The upper (left) arm is placed in 90° elevation, the elbow is slightly bent, and the forearm is placed on an armrest. The ulnar sulcus must be free, and both arms should be placed without pressure or tension.

The position of the body of the patient is held by two soft pads from behind: one supports the buttocks and the other the neck. The table is then tilted about 20° backward. The head of the patient is supported by a gel cushion and placed in a neutral position.

The operating table should be radiolucent from the lumbosacral junction to the level of the pathology to be treated to avoid exploration of the wrong level.

16.8.3 Localization

The skin incision is determined by fluoroscopy. The C-arm is placed in the AP position over the target level and the projection of the vertebral body or disc space onto the skin is marked. If a vertebral body is the surgical target (e.g., tumors or fractures) then the superior/inferior as well as the anterior/posterior borders are drawn onto the skin under fluoroscopic control. The skin incision is marked parallel to the orientation of the rib or the intercostal space underneath the drawing of the target area and should be centered onto the pathologic level.

16.8.4 Surgical Steps

16.8.4.1 Exposure of the Rib or Intercostal Space

The approach is primarily transthoracic. Exposure of the “target rib” or intercostal space to enter the thoracic cavity is easy at the thoracolumbar junction. A 4- to 6-cm skin incision is placed over the target area and the inferior lower parts of the anterior serratus muscle as well as the superior aspects of the oblique external abdominal muscle are exposed and split parallel to their fiber orientation. Thus the underlying rib or intercostal space is exposed.

16.8.4.2 Mini-thoracotomy: Intercostal Approach

If no bone graft is needed, an intercostal approach is preferred at the thoracolumbar junction (Fig. 16.1). Usually the rib cage is more elastic at this level even in older patients. The intercostal muscles are split close to the superior rim of the caudal rib and the thoracic cavity is entered after splitting of the visceral pleura. The intercostal space can be opened with the rib spreader in order to give sufficient exposure.

The other types of thoracotomy techniques are described in the previous chapter.