Thoracic spine approaches

Since the end of the nineteenth century, the wide dissemination of Pott's disease has ignited debates about which should be the ideal route to perform ventrolateral decompression of the dorsal rachis in case of paraplegia due to spinal cord compression in tuberculosis spondylitis. It was immediately clear that the optimal approach should be the one minimizing the surgical manipulation on both neural and extra-neural structures, while optimizing the exposure and surgical maneuverability on the target area. The first attempt was reported by Victor Auguste Menard in 1894, who described, for the first time, a completely different route from traditional laminectomy, called costotransversectomy. The technique was conceived to drain tubercular paravertebral abscesses causing paraplegia without manipulating the spinal cord [1].

The procedure defined by Capener in 1954 [2] resulted in better results for the treatment of spinal tuberculosis, due to the effect of antibiotics [3]

Over the following decades many other routes have been described all over the world, thus demonstrating the wide interest on the topic. Surgical development has been marked by the new technical achievements and by instrumental/technological advancements, until the advent of portal surgery and endoscopy-assisted techniques. Gagliardi et al. retraced the milestones of this history up to 2022, through a systematic review on the topic [4].

Thoracic disc herniation surgery is challenging because of: the difficulty of anterior approaches, the proportionately tighter space between cord and canal compared to the cervical and lumbar regions, and the watershed blood supply which creates a significant risk of spinal cord injury with attempts to manipulate the cord when trying to work anteriorly to it from a posterior approach. Thoracic disc herniations are calcified in 65% of patients considered for surgery [5] (more difficult to remove from a posterior or lateral approach than non-calcified discs).

For centrally located anterior access: a transthoracic or lateral approach gives the best acess. Some prefer a left-sided approach to avoid the vena cava, others prefer a right-sided approach because the heart does not impede access.

Various different approaches have been tried for the surgical removal of TDH, but most of them are cumbersome surgeries such as thoracotomy or thoracoscopic or anterior approaches with or without instrumentation. The requirement for a simplified, familiar, and less morbid surgery has motivated some new approaches. A pedicle sparing transfacet approach (PSTA) was first described in 1995, but to date no sufficient clinical series has been presented in the literature to report on its feasibility and applicability along with complication and morbidity rates.

Surgery for thoracic disc herniation is comparatively rare and often demanding. The goal is to achieve sufficient decompression without manipulating the spinal cord. Individual planning and various surgical techniques and approaches are required.

Surgical treatment can be divided into anterior, lateral and posterior approaches and is an area of contention in the literature. Available evidence consists mostly of single-arm, single-institutional studies with limited sample sizes.

Anterior approaches had longer LOS and higher, although not statistically significant, complication rates. No difference was found with regard to discharge disposition. In light of these findings, surgeons should weigh the risks and benefits of each surgical technique during tailoring of decision making [6].

The approach is dependent on the location, the magnitude, and the consistency of the herniated thoracic disc.

Medially located large calcified discs should be operated through an anterolateral transthoracic approach, whereas noncalcified or lateral herniated discs can be treated from a posterior approach as well. For optimal treatment of this rare entity, the treatment should be performed in selected centers [7].

Anterolateral retroperitoneal, anterior transthoracic, posterolateral, and lateral approaches are performed in discectomy with or without fusion and internal fixation. However, patients who have undergone any operation at these levels are predisposed to postoperative recurrence, neurological aggravation, and adjacent segment degeneration, and the outcomes are inferior than those in lower lumbar spine [8] [9].

Posterior

posterior (midline laminectomy): primary indication is for decompression of posteriorly situated intracanalicular pathology (e.g. metastatic tumor) especially over multiple levels. There is a high failure and complication rate when used for single-level anterior pathology (e.g. midline disc herniation)

Posterolateral

a) lateral gutter: laminectomy plus removal of pedicle

b) transpedicular approach [10]

c) costotransversectomy

d) Pedicle sparing transfacet approach

Anterolateral

Anterolateral transthoracic endoscopic approach (transthoracic approach): usually through the pleural space

Lateral extracavitary

(retrocoelomic) [11] : an approach posterior (external) to the pleural space

Thoracoscopic surgery

Video-assisted thoracoscopic surgery is an alternative to open surgical approaches [12] [13].

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