En bloc spondylectomy Surgical Technique

Appropriate application of an oncologic staging system is required to evaluate the relationship among histologic types, management, and outcome of primary bone tumors. A commonly accepted terminology for surgical procedures and for the definition of tumor extent is needed for surgical planning and clinical reviews. The principles of the Enneking system for classifying stages of tumors are emphasized and applied to the spine using a practical approach for surgical staging [1)]

While Tomita's technique involves cutting through both pedicles to release the dural tube and thus potential tumor spread in case of tumor involvement of one or both pedicles (two-piece spondylectomy), the techniques described by other authors enable a true extra-lesional resection without violating the tumor margins (one-piece spondylectomy) [2) 3) 4) 5) 6) 7)].

Latter is in correspondance with Enneking's principles of musculoskeletal tumor resection [8)].

From https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2295282/#CR6

With the patient in a prone position the posterior aspect of the spine is exposed paying meticulous attention not to violate any potential soft tissue masses of the tumor. In one-level spondylectomies, harvesting of both cancellous and cortical iliac crest bone is performed prior to the posterior exposure, in order not to risk any tumor spread. This bone graft is mainly used for posterior fusion at the end of the procedure. In multilevel spondylectomies a fibula allograft is used for posterior fusion, thus iliac bone harvesting is not necessary. Pedicle screws are placed and controlled fluoroscopically. Typically, two levels above and below the resected vertebra(e) were instrumented, except for one case with a four-level spondylectomy which was instrumented three levels above and below. In adolescents with lumbar lesions only one level above and below was instrumented in order to safe motion segments.

Prerequisite for an extralesional resection is tumor involvement of no more than one side of the posterior structures, so that a corridor can be created through which the spinal cord is released during the spondylectomy. The posterior elements without tumor infiltration (lamina, spinous, articular and transverse processes, pedicle) are resected and the dura and nerve roots mobilised. In case of multilevel involvement the nerve roots passing through the tumor need to be sacrificed. In thoracic lesions the ribs attached to the tumor vertebra(e) are cut and anterolateral soft-tissue attachments (i.e. parietal pleura, aorta) at the non-affected side of the vertebrae are released. In thoracolumbar lesions attachment of the diaphragm needs to be released and in lumbar lesions the psoas muscle. The discs including the posterior longitudinal ligament and the lateral parts of the annulus are incised and a temporary rod is inserted on the non-affected side.

Videos

<html><iframe width="560" height="315" src="https://www.youtube.com/embed/-K638cH9RkQ" frameborder="0" allow="accelerometer; autoplay; encrypted-media; gyroscope; picture-in-picture" allowfullscreen></iframe></html>

References

[1] [2]
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Boriani S, Weinstein JN, Biagini R. Primary bone tumors of the spine. Terminology and surgical staging. Spine (Phila Pa 1976). 1997 May 1;22(9):1036-44. doi: 10.1097/00007632-199705010-00020. PMID: 9152458.

[3]
Fidler MW. Radical resection of vertebral body tumours. J Bone Joint Surg. 1994;76-B:765–772.

[4]
Fisher C, Keynan O, Boyd M, et al. The surgical management of primary tumors of the spine. Spine. 2005;30:1899–1908. doi: 10.1097/01.brs.0000174114.90657.74.

[5]
Krepler P, Windhager R, Bretschneider W, et al. Total vertebrectomy for primary malignant tumours of the spine. J Bone Joint Surg. 2002;84-B:712–715. doi: 10.1302/0301-620X.84B5.12684.

[6]
Mazel Ch, Grunenwald D, Laudrin P, Marmorat J. Radical excision in the management of thoracic and cervicothoracic tumors involving the spine: results in a series of 36 cases. Spine. 2003;28:782–792. doi: 10.1097/00007632-200304150-00010.

[7]
Roy-Camille R, Saillant G, Mazel Ch, Monpierre H. Total vertebrectomy as treatment of malignant tumors of the spine. Chir Organi Mov. 1990;75:94–96.

[8]
Enneking WF. A system of staging musculoskeletal neoplasms. Clin Orthop. 1980;204:9–24.