

Preoperative Predictive Factors of Survival, Neurological, Functional, and Health Related Quality of Life Outcomes in Surgically Treated Patients With Metastatic Epidural Spinal Cord Compression: A Systematic Literature Review

Nater A (1), Martin AR (1), Choi D (2), Fehlings MG (1)

(1) Toronto Western Hospital, Toronto, ON, CA; (2) The National Hospital for Neurology and Neurosurgery, and Institute of Neurology, London, UK

Introduction

This systematic literature review aimed to ascertain the preoperative clinical factors in patients with metastatic epidural spinal cord compression (MESCC) treated with surgery to inform the development of clinical prediction rules (CPRs) for survival and HRQoL. This systematic review seeks to answer 4 key questions (KQs) :

- KQ1: What are the preoperative clinical factors associated with survival after surgery?
- KQ2: What are the preoperative clinical factors associated with neurological status after surgery, in terms of neurologic examination feature, i.e. improved muscle power or neurological outcome measure, i.e. ASIA or Frankle grade, and / or autonomic functions (bladder and/or bowel control, and sexual dysfunction)?
- KQ3: What are the preoperative clinical factors associated with functional status, in terms of ambulatory status and / or Karnofsky or Eastern Cooperative Oncology Group (ECOG) performance status?
- KQ4: What are the preoperative clinical factors associated with health related quality of life (HRQoL), in terms of scores on any given metrics used to assess QoL in patients with MESCC?

Methods

Several electronic databases were systematically searched for original surgical series published between January 1st, 1990 to December 31st, 2015 that identified preoperative clinical factors of survival, neurological, functional, and QoL in symptomatic MESCC patients who were surgically treated. Studies were selected based on criteria set a priori, including using multivariate analysis. Two reviewers independently assessed the risk of bias of individual articles, then the strength of the overall body of evidence with respect to each predictor was allocated using the method described by Skelly et al (1). The final strength of the overall body of evidence was classified as High, Moderate, Low, or Very Low and expresses our confidence that the evidence reflects the true effect and the likelihood of further research to change our confidence in the latter estimate of effect.

Identific

Screet

R high lity

Included

Results

The 17 studies addressed KQ1 and were Class III. While all 46 predictors identified had a Low baseline strength of evidence, the overall body of evidence remained Low for 7 predictors and was ultimately judged Very low for the other 39 predictors.

Negative preoperative factors

| | 3 | deligni of eviden | 6.C |
|--|----------------|-------------------|------------|
| Negative preoperative predictors | Baseline | Up./ Downgrade | Final |
| All types of primary tumors, including multiple myeloma | | | |
| (Arrigo Neurosurgery 2011: Bollen Fur Spine J 2013: Finkelstein J Bone Joint Surg Br 2003: | | | |
| Hosono Clin Orthop Relat Res 2005: Leithner Eur Spine . | 2008: Molla | hoseini J Res Me | d Sci 2011 |
| Nemelc, Eur Spine J. 2014) | | | |
| Radioresistant primary tumor | Low | | Low |
| Neurologic deficit or Palsy or Frankel/ASIA other than E | Low | | Low |
| KPS 10-40% | Low | | Low |
| Modified primary tumor Tomita Grade III (rapid growth) | Low | -1: risk of bias | Very low |
| Primary tumor Tomita Grade III (rapid growth) | Low | -1: risk of bias | Very low |
| Poor prognosis primary tumor | Low | -1: risk of bias | Very low |
| Lung primary | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Breast primary | Low | -1: risk of bias | Very low |
| Stomach primary | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Colon primary | Low | -1: risk of bias | Very low |
| Prostate primary | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Kidney primary | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Non-ambulatory | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Charlson comorbidity index score ≥ 2 | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Presence visceral metastases | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Number of spinal metastasis | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Older age | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Male sex | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| Presence of pain | Low | -1: risk of bias | Very low |
| | | -1: consistency | |
| All types of primary tumors, includ | ing multipl | e myeloma | |
| (Leithner, Eur Spine J, 2008; Tor | nita, Spine, 2 | 2001) | |
| Primary Tomita Grade II and III (moderate and rapid | Low | -1: risk of bias | Very low |
| growth) | 1 | A | |
| Presence of visceral metastases both opinal and ostraopinal | LOW | -1: risk of blas | Very low |
| riesence or bone merasiases, both spinal and extraspinal | LOW | 1: consistent: | very low |
| | | - 1. consistency | |
| | | | |
| | | | |
| l adie 1 | | | |

CIHRIRSC CHRIRSC Caractan Institutes Institutes de recherche of Health Research en santé du Canada

Negative preoperative factors Negative preoperative predictors Breast cancer (Cahill, N Longer time interval from cancer diagnosis to surgery (year) Admission to hospital via emergency room Poor/undifferentiated histologic grade Negative progesterone receptors Henatonellitilar carcinoma (Che Low Low Serum albumin <37 g/L Lactate dehydrogenase ≥ 200 U/L Lung cancer: NSCLC and SCLC (Lei, Eur Sp Presence of visceral me astasi ≤14 days interval motor deficits due to MESCC to surgery Low -1: risk of bias Very I on-ambulatory status ≥60 years old patients (Liang, Clin Orthop Relat Res, 2013) Original Tokuhashi score < 9 points -1: risk of bias Very low Low Rapid- or moderate-growing primary tumour Tomita grade Unknown site of primary tumor (Aizenbe erg, J Neurosurg Spine, 2012) Cervical spinal location Presence of extraspinal disease at presentation risk of bias Very lov Low -1: precision Frankel A B C lic, Spine 2012; Williams J Neurosurg Spine, 2 Prostate ca 50-70% KPS 50-70% KPS Gleason score > 8 Total number metastases > 5 Presence of metastases to lymph node at time of surgery > 25% spinal canal compression NSCLC (Chen, J Orthop Surg Res, 2015; Lei BIMC Cancer, 2015) Low -1: risk of bias Low -1: risk of bias Very low

NSCLC (Chen, J Orthop Surg Res, 2015; Lei BMC Cancer, 2015) Low performance status ≥ 3vertebrae involved Low -1: risk of bias Very Iov Table 1

Conclusions

Prior to developing CPRs, it is important to evaluate the strength of the overall body of evidence for predictors reported in the literature. Although the site of primary tumor, performance status, presence of visceral and extraspinal metastasis, ambulatory status and Frankel/ASIA grade were most commonly examined, none of the 46 predictors identified in this study had a final strength of evidence greater than Low. Further rigorously conducted research is thus needed to be able to estimate the effect of key predictors of survival, neurological, functional and HRQoL in MESCC patients and have confidence in these estimates.

References: (1) Skelly AC, et al. 2013. Cervical spondylotic myelopathy: methodological approaches to evaluate the literature and establish best evidence. Spine 38, S9-18

