

Background: The perioperative complication rate of surgery targeting spinal metastases is rather high with surgical site infections being one of the most frequent complications. Especially patients with spinal metastases are at risk of developing postoperative surgical site infections. Systems to perform posterior stabilization via a minimally invasive approach have been established in the recent years in order to reduce traumatization of the tissue. In this study we analyzed the incidence of surgical site infections using a minimally invasive approach compared to an open approach for posterior stabilization of patients with spinal metastases

Methods: We conducted a retrospective cohort study on patients operated using posterior stabilization due to thoracic or lumbar metastases. Study period was between January 1st 2007 and December 31th 2019. Patients were either operated on using a standard open approach via a midline skin incision or using a minimally invasive approach.

Results: 545 patients were analyzed. 406 patients were operated by standard open approach while 139 by a minimally invasive approach, with this group being further subdivided into a strict percutaneous approach (93) and a transmuscular approach (46). Intraoperative red blood cell transfusion was more often necessary when using the open approach. The type of approach had a significant effect on developing a surgical site infection with the percutaneous approach showing the lowest rate of surgical site infections (5.4%) compared to the transmuscular ($p=0.046$) and open approach ($p=0.037$) (15.2 % and 15.0 %, respectively).

Conclusion: A minimally invasive percutaneous approach for posterior stabilization for spinal metastases seems to be beneficial with regard to blood loss and rate of surgical site infections compared to a conventional open approach and is therefore a valid alternative.

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3-D PATIENT-SPECIFIC MONITORED GUIDEWIRE PLACEMENT-GUIDES: A SAFE(R) TECHNIQUE

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Background and Aim: Fixation of the subaxial cervical spine is usually performed with lateral mass screws. Cervical pedicle screws are viewed as a salvage option due to their higher risk of neurovascular injury.

3-D printed patient-specific screw placement-guides have shown promise in decreasing implant mispositioning, but data on their use in the subaxial cervical spine is scarce. We report the successful use of this technique and propose a technical nuance to improve its safety.

Case description: A 53-year-old male presented with weight loss and bilateral lower-limb weakness. CT scan showed a tumor involving the apex of the right lung, pleura and rib cage with invasion of T1, T2 and T3. The T2 vertebral body had collapsed causing a kyphotic deformity and sagittal and coronal plane translation. The patient had undergone a laminectomy of the affected levels and thus suffered from a complete cervico-thoracic dissociation and high risk of further neurologic injury.

After multidisciplinary discussion, a decision for palliative treatment was made. In a case of cervico-thoracic dissociation and complex deformity, lateral mass screws would not provide the needed biomechanical strength.

A posterior fixation was performed using pedicle screws from C4 to T6. After planning of each pedicle trajectory using AutoCad®, patient-specific guidewire placement-guides printed in polyactic acid were used. The guidewires were coupled to an electrical conductivity sensor to ensure an intra-osseous trajectory and increase procedure safety. Correct positioning of all 14 guidewires was confirmed with intra-operative imaging and pedicle-screws were placed.

Results: Postoperative imaging revealed no cortical breaches. No neurovascular injuries occurred.

Conclusion: The use of 3-D patient-specific guidewire placement-guides in the subaxial cervical and thoracic spine is safe. Guidewire conductivity monitoring during placement is a valuable tool to prevent neurovascular injury.

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UTILITY OF THE SPINAL INSTABILITY SCORE IN PATIENTS WITH SPINAL METASTASES: A SINGLE CENTER STUDY WITH 332 PATIENTS

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Objective: Spinal metastases may cause spinal instability. The Spinal Instability Neoplastic Score (SINS) was developed to assess spinal neoplastic-related instability. Aim of this study was to determine the utility of SINS in predicting progression of a pathologic fracture due to spinal metastases.

Methods: A retrospective analysis of patients with a pathologic fracture due to a spinal metastases between January 2018 and December 2018 was performed. We selected patients with a minimum follow-up of 12 months and analysed them according to the SINS criteria. The primary endpoint was the progression of vertebral body fracture following radiotherapy.

Results: 332 Patients were identified. Median age was 68 SD +/- 10.3. 38% were Female. Median follow-up was 26 months (range 12-29). 30, 283 and 19 Patients presented with low (0-6), moderate (7-12) and high (13-18) SINS, respectively. Fracture progression following radiotherapy was seen in 9 (30%), 84 (30%) and 8 (42%) in cases with low, moderate, or high SINS ($P = 0.522$), respectively. During follow-up, 44% of patients with low SINS showed a progression to moderate SINS without neurological deficits. In the originally moderate group, 17% had progression with neurological deficits needing surgery. None had functional recovery postoperatively. 83% of the progression cases in the moderate group did not develop neurological deficits and 4 underwent surgery for pain management. 63% of all progressions in the high group developed neurological deficits, however none of them recover postoperatively ($P < 0.001$).

Conclusion: SINS is a very useful tool for assess stability of a pathologic fracture due to spinal metastases after radiotherapy for spinal metastases. Moderate or high SINS are associated with a high risk of fracture progression as well as risk for neurological deterioration, therefore surgical instrumentation in these groups may be advised prior to radiotherapy.

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THE PROGNOSIS OF SURGERY IN SINGLE VS MULTIPLE SPINAL METASTASES PATIENTS

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Background: Metastatic Spinal tumor is the most common tumor of the spine. The incidence of spinal metastasis in cancer patients with confirmed primary disease has been reported as high as 70-90%. Surgical resection and reconstruction is usually necessary in more advanced disease due to the risk of spinal instability. The aim of this study is to evaluate whether single vs multiple metastases affect the prognosis of surgical treatment.

Method: This is a retrospective analysis of the surgical outcome of seventy-four patients with metastatic spinal tumor resection and reconstruction from July 2017 to January 2021 at the Department of Neurosurgery at Westpfalz Klinikum in Kaiserslautern, Germany. There were 43 men and 31 women, and mean age of the patients was 68.4 years. The most common primary tumors were breast and lung cancer both at 23% of all cases. Thirty-eight patients had a single metastatic tumor. The treatment was resection and fusion without reconstruction in 68% of the patients, and the remaining had reconstruction as well.

Results: At the end of the study period, the prognosis was 6.1 +/- 5.4 (0-18) months among the expired patients (44 patients, 59.5% of all patients), and 43% of those patients had multiple metastases. The remaining 30 patients are still under follow-up (average 18 months) and 53% of them had multiple metastases.

Conclusion: In this study, the severity of the disease (single vs multiple metastases) was not a prognostic factor for the outcome of surgical resection/fusion and reconstruction. Unfortunately, too often multiple metastases patients only receive palliative treatment and are not considered surgical candidates.