

Clinical Study

Reconstruction with expandable cages after single- and multilevel corpectomies for spinal metastases: a prospective case series of 60 patients

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Abstract

BACKGROUND CONTEXT: Expandable cages are widely used to reconstruct the spine after the removal of vertebral metastases. Long-term results, however, are lacking, and there is little information on reconstruction after multilevel corpectomies.

PURPOSE: To determine long-term outcome for reconstruction of the spine with expandable cages after single and multilevel corpectomies for spinal metastases.

STUDY DESIGN: A prospective cohort study of 60 consecutive patients with spinal metastases treated with expandable cages.

METHODS: All patients were prospectively followed with regular clinical and radiographic evaluation. Outcome measures were the Frankel score, patients' self-reported recovery, radiological alignment of the spine, and neurologic plus biomechanical complications.

RESULTS: Sixty patients were treated with expandable cages in our hospital in a 5-year period with a maximum follow-up of 6 years. Single-level reconstruction was performed in 48 cases, 2-level in 8, and 3-level in 4. Postoperatively, the Frankel score had improved significantly ($p=.03$), the segment height had increased ($p=.02$), and, in severe cases of kyphosis ($>20^\circ$), the regional angulation had been corrected compared with preoperatively ($p<.001$). Complication rate, however, was high (36.7%), in particular after multilevel reconstruction, in which three cases had to be reoperated years after the initial surgery; reasons for this were hardware failure, progressive kyphosis, and bronchial perforation. Good recovery was reported in 70% of all patients.

CONCLUSIONS: Expandable cages can be used successfully in reconstruction of the spine after single and multilevel corpectomies for spinal metastases. However, long-term complication rate is high. Promotion of bony fusion, prevention of soft-tissue damage, adequate posterior stabilization, and careful patient selection may reduce these complications. © 2014 Elsevier Inc. All rights reserved.

Keywords:

Spinal tumors; Spinal instrumentation; Decompression; Stabilization; Surgery; Surgical procedure

Introduction

Different surgical strategies can be applied in patients with spinal metastasis, varying from decompression alone to radical removal of the spinal metastases through a

corpectomy procedure. The choice of treatment depends on several factors, including the life expectancy and condition of the patient. Different prognostic models have been developed that may aid in the choice of treatment [1–6].

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GCWdR and DJL contributed equally to this study.

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EVIDENCE & METHODS

Context

Over the last two decades, enthusiasm for surgical intervention in the setting of spinal metastases has grown. Surgical treatment maintains the twin aims of increasing longevity as well as improving quality of life. Information is limited, however, regarding perioperative morbidity and long-term results following these interventions.

Contribution

The authors retrospectively evaluated 60 patients treated with expandable cages following single- and multilevel corpectomies for spinal metastasis. Mean survival following surgery was 20 months, with nearly onethird of the cohort expiring within the first postoperative year. Complications occurred in nearly 40% of cases with the rate approximating 60% in individuals who received multilevel corpectomy.

Implications

The current series adds to the growing literature describing outcomes following surgical intervention for the treatment of spinal metastases. While long-term prognosis remains grim and complication rates are high, there are clearly some patients who benefit substantially from these types of surgery. The information presented here can be used to frame preoperative discussions with patients and families, as well as to manage expectations in the perioperative period. The study's design, along with the fact that cases were performed by an experienced surgical team at a tertiary center, may limit the capacity for translation beyond similar surgical environments.

—The Editors

In case the patient has a relatively good prognosis, the surgical strategy that is generally preferred is complete removal of the metastasis through a corpectomy procedure. A graft or implant device is subsequently needed to reconstruct the anterior column of the spine with respect to spinal stabilization. Autogenous bone grafts obtained from the iliac crest or fibula can be used, although donor site morbidity, graft dislodgement, or pseudoarthrosis may occur. Alternatives are titanium mesh and stackable cages, but optimal placement of these cages can be challenging, especially through a posterior approach. Expandable cages, however, have the advantage to be implanted relatively easily. In addition, the angle and height of the affected segment can be corrected in case of collapse of the vertebral body.

Expandable cages seem to have added value in the reconstruction of the anterior column after trauma (burst injuries), spinal degeneration, infectious diseases, and

primary bone tumors for which en bloc removal of a vertebral body is warranted [7–10]. Several studies have reported the use of expandable cages in reconstruction of the spine after the removal of spinal tumors, including metastases [11–16]. Long-term results of spinal reconstructive surgery, however, are lacking. In addition, there are little data on the use of expandable cages in reconstructive surgery after multilevel corpectomies [17]. The added value of this extensive and expensive surgery should be weighed against the complication rate in patients with a dismal life expectancy. In this study, we present the long-term results of a prospectively followed case series of 60 patients, in whom expandable cages were used after single or multilevel corpectomies for the removal of spinal metastases.

Methods

Patient population

Between December 2005 and May 2011, a total of 95 patients with spinal metastases were surgically treated at our institution (Medical Center Haaglanden, The Hague, The Netherlands). Different types of surgery were performed. In 35 patients, the spine was stabilized and the cord, cauda equina, or nerve roots were decompressed with (partial) tumor reduction. Sixty patients underwent a single- or multilevel corpectomy with implantation of an expandable cage. The choice of surgical treatment was based on several factors, including life expectancy (at least 6 months for the corpectomy procedure), condition of the patient, degree of involvement of the vertebral body, sagittal alignment, and preference of the patient. Patient characteristics are presented in Table 1. Mean age was 62 (range 40–77) years. Most frequent spinal metastases from breast (23%), lung (13%), kidney (17%), multiple myeloma (13%), and gastrointestinal (8%) carcinomas were treated, which were localized in the cervical (32%), thoracic (43%), and lumbar (25%) spine. Mean duration of symptoms was 16 weeks. Symptoms consisted of neck or back pain (27%), radiculopathy (32%), or myelopathy (37%). Three asymptomatic cases (5%) were treated because of kyphosis with radiological spinal cord compression.

Radiographic evaluation

Magnetic resonance imaging and computed tomography (CT) scan were obtained in all patients preoperatively. Postoperatively, a conventional X-ray was made followed by a CT scan after 3 months to evaluate bony fusion. Multilevel cases were followed up with a CT scan once a year. Regional angulation, segment height, and subsidence were determined on the latest CT scan or conventional X-ray in case the patient died before the scheduled 3-month evaluation. The regional angulation was determined (as described previously [7]) by measuring the angle between the caudal end plate above and the cranial end plate below the affected

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