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Original Article

Reoperation rates in the surgical treatment of spinal metastases

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Abstract

BACKGROUND CONTEXT: The surgical treatment in spinal metastases has been shown to improve function and neurologic outcome. Unplanned hospital readmissions can be costly and cause unnecessary harm.

PURPOSE: Our aim was to first analyze the reoperation rate and indications for this revision surgery in spinal metastases from an academic tertiary spinal institute and, second, to make comparisons on outcome (neurology and survival) against patients who underwent single surgery only.

STUDY DESIGN/SETTING: This was an ambispective review of all patients treated surgically over an 8-year period considering their neurologic and survival outcome data. Statistical analysis was performed using IBM SPSS 20. Because all scale values did not follow the normal distribution and significant outlier values existed, all descriptive statistics and comparisons were made using median values and the median test. Crosstabs and Pearson correlation were used to calculate differences between percentages and ordinal/nominal values. For two population proportions, the z test was used to calculate differences. The log-rank Mantel-Cox analysis was used to compare survival.

PATIENT SAMPLE: During the 8 years' study period, there were 384 patients who underwent urgent surgery for spinal metastasis. Of these, 289 patients were included who had sufficient information available. There were 31 reoperations performed (10.7%; mean age, 60 years; 13 male, 18 female). Exclusion criteria included patients treated solely by radiotherapy, patients who had undergone surgery for spinal metastasis before the study period, and those who had other causes for neurologic dysfunction such as stroke.

OUTCOME MEASURES: The outcomes considered in this study were revised Tokuhashi score, preoperative/postoperative Frankel scores, and survival.

METHODS: We performed an ambispective review of all patients treated surgically from our comprehensive database during the study period (October 2004 to October 2012). We reviewed all patient records on the database, including patient demographics and reoperation rates.

RESULTS: Reoperations were performed in the same admission in the majority of patients (n=20), whereas 11 patients had their second procedure in subsequent hospitalization. The reasons for their revision surgery were as follows: surgical site infection (SSI; 13 of 31 [42%]), failure of instrumentation (9 of 31 [29%]), local recurrence (5 of 31 [16%]), hematoma evacuation (2 of 31 [6%]), and others (2 of 31 [6%]).When comparing the ''single surgery'' and ''revision surgery'' groups, we found that the median preoperative and postoperative Frankel scores were similar at Grade 4 (range, 1–5) for both groups (preoperative, p=.92; postoperative, p=.87). However, 20 patients (8%) from the single surgery group and 7 (23%) from the revision group had a worse

FDA device/drug status: Approved (Spinal Instrumentation, widely used).

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postoperative score, and this was significantly different (p=.01). No significant difference was found (p=.66) in the revised Tokuhashi score. The median number of survival days was similar (p=.719)—single surgery group: 250 days (range, 5–2,597 days) and revision group: 215 days (range, 9–1,352 days).

CONCLUSION: There was a modest reoperation rate (10.7%) in our patients treated surgically for spinal metastases over an 8-year period. Most of these were for SSI (42%), failure of instrumentation (26%), and local recurrence (16%). Patients with metastatic disease could benefit from revision surgery with comparable median survival rates but relatively poorer neurologic outcomes. This study may help to assist with informed decision making for this vulnerable patient group.

Keywords: Surgical treatment of spinal metastases; MSCC; Spinal instrumentation and revision surgery; Spinal reoperation; Spinal oncology; Spinal surgical site infection; Spinal instrument failure

Introduction

Skeletal system metastases are the third most common metastases, behind those of the pulmonary and hepatic systems [1]. Within the skeletal system, the spinal column is the most common site of metastases [1]. Postmortem studies have shown that, depending on the histopathology of the primary site, 30% to 90% of patients with terminal cancer have metastatic spinal disease [2,3]. It is expected that symptomatic metastatic spinal disease will become more prevalent as survival rates for many common cancers improve [4].

Surgical indications in spinal metastases include the need to establish a diagnosis, spinal instability, epidural cord compression with cord dysfunction from bone/tumor, radioresistant tumors, tumors that recur despite radiotherapy, and neurologic deterioration during radiotherapy. Technical advances in surgery that enable circumferential spinal cord decompression combined with spinal stabilization have allowed more aggressive and more effective surgical therapies for patients with metastatic spinal cord compression.

Indications for radiotherapy in patients with metastatic spinal cord compression include highly radiosensitive tumors (lymphoma, myeloma, small cell lung carcinoma) without neurologic impairment, no spinal instability or mechanical pain, no significant bony compromise of the spinal canal, and patients whose life expectancy is less than 3 months [5]. Conventional radiotherapy is typically administered in 8 to 10 fractions with a total radiation dose of 25 to 40 Gy [5]. The development of stereotactic radiosurgery (SRS) for the spine has improved local control rates compared with conventional radiotherapy. However, despite the promise shown with SRS [5–7], the availability of this modality is currently limited in the United Kingdom.

In a large study from Sloan-Kettering, the incidence of hardware failure in patients with metastatic spinal cord compression undergoing posterolateral decompression and posterior screw-rod instrumentation was low at 2.8% [8]. Although reoperations for recurrent epidural spinal cord compression have been reported in the literature, no consensus exists regarding the indications or efficacy of such surgery [9,10]. We present our experience with reoperations for metastatic spine tumors to assess indications and outcome with particular attention to neurologic parameters and survival. Furthermore, we make direct comparisons to patients with spinal metastasis undergoing a single procedure only.

Methods

We performed an ambispective review of all patients undergoing surgery for spinal metastases at a tertiary referral spinal unit between October 2004 and October 2012 (retrospective October 2004 to October 2009; then prospective to October 2012). Surgical indications included spinal cord/cauda equina compression by solid-tumor metastases or spinal instability. Spinal instability was based on the combination of radiographic findings (burst fracture with posterior element extension) and movement-related pain patterns [8]. Mechanical instability along the Spine Instability Neoplastic Score criteria evaluation [11,12] was a later inclusion.

Exclusion criteria included patients treated solely by radiotherapy, patients who had undergone their primary surgery before the study period, or those who had other causes for neurologic dysfunction such as stroke. The surgical approach was dictated by the location of the pathology and surgical preference of the operating surgeon. Patients received adjuvant radiotherapy postoperatively as required. Research approval was not required as this study was conducted for ''service evaluation'' as per our hospitals' guidelines.

Statistics

All data were collected in a spread sheet (MS Excel 2010, Microsoft, Chicago, IL, USA), and statistical analysis was performed using IBM SPSS 20. Because all scale values did not follow the normal distribution and significant outlier values existed, all descriptive statistics and