Current Surgical Management of Metastatic Spinal Disease

The authors have provided an excellent review of contemporary approaches to the treatment of spinal metastatic disease. With improved diagnostics, advances in spinal fixation techniques, and a more rational approach to achieving decompression, better outcomes can be expected in patients with spinal metastases.

It is important to realize that the primary goals of surgery in patients with vertebral metastases are to reduce pain, preserve or restore neurologic function, and maintain spinal column structural integrity. The immediate proximity of vital structures, particularly the neural elements, to the metastatic tumor precludes wide surgical excision, and spinal metastases are invariably treated with intralesional surgery. Patients and treating physicians must realize that such surgeries are seldom curative, and are usually performed in an attempt to improve the quality of the patient’s life.

**Treatment Planning**

Successful surgery begins with good preoperative imaging of the involved area. Over the past decade, magnetic resonance imaging (MRI) has greatly enhanced our ability to visualize metastases earlier and has allowed improved visualization of soft tissues such as tumor, neural elements, and critical adjacent structures. MRI is also helpful in differentiating tumor from fractured bone that has retropulsed into the spinal canal, causing neural compression. The information provided by these studies significantly improves treatment planning in patients with spinal metastases.

The definition of spinal instability in the setting of metastatic vertebral destruction remains elusive. Unlike long bones, the spine may continue to exhibit a degree of loadbearing capacity after fracture, making the concept of "at risk for pathologic fracture" less clear in the spine. Although the criteria for spinal stability in the face of metastatic disease have been reported, these have not been particularly useful in predicting which patients may benefit from spinal reconstructive surgery prior to the development of profound instability or neurologic deficit.

In patients with spinal metastases causing neural compression, treating physicians must weigh the relative advantages of initiating treatment with radiation therapy against primary surgical intervention. If the tumor is radiosensitive, and neural progression is gradual, radiotherapy may be the initial treatment of choice. One should, however, bear in mind that if spinal radiation is ineffective in improving neurologic deficit, subsequent surgical decompression is fraught with complications. Operating through a radiated field will significantly increase the risk that wounds will not heal and the surgical site will become infected. In some cases, radiation injury to the skin and soft tissues in the surgical field may prevent or delay surgical intervention. In addition, one must consider the potential advantage of initiating radiation treatments after surgery, when tumor volume has been reduced.

**Isolated Laminectomy**

The article by Gerszten and Welch emphasizes the failure of isolated laminectomy in treating metastatic spinal disease. As the authors point out, in the majority of patients the site of neural compression is anterior to the spinal cord. It follows that laminectomy will not reliably effect neural decompression. This concept is supported by clinical studies reporting improved neurologic outcomes after anterior decompression when compared to those seen after laminectomy.[1,2]

In addition, laminectomy will reduce posterior stability in the face of an already compromised anterior column (eg, a vertebral body weakened by tumor), resulting in global spinal instability. Isolated laminectomy is no longer an acceptable treatment of symptomatic neural compression caused by vertebral body metastases. Decompression is better achieved via posterolateral or anterior approaches.

*Just the Right Amount* of Surgery
Surgery for metastatic disease of the spine is a significant undertaking. Ideally, “just the right amount” of surgery should be performed. This requires a thorough understanding of spinal biomechanics and the role of spinal instrumentation. Performing an anterior and posterior instrumentation surgery, when either approach alone would suffice, exposes the patient to unnecessary risks, morbidity, and a prolonged recovery. For example, when posterior stability has been maintained, reconstructing the anterior spinal column with anterior surgery may be sufficient. The corollary to this concept is that performing “too little” surgery does the patient a similar disservice.

In patients with significant comorbidities and a reduced life expectancy, it is tempting to perform a minimal decompressive procedure. If, however, the patient does not leave the operating room with effective neural decompression and spinal stability, there is a great likelihood of early or late failure. Having to return a patient to surgery after a failed initial surgical procedure is an extremely undesirable and potentially avoidable situation.

**Timing of Postsurgical Treatments**

The optimal timing of treatments such as chemotherapy and radiation therapy after spinal surgery remains poorly defined. From a surgeon’s point of view, these treatments will interfere with wound healing as well as with bone graft incorporation and fusion. Animal research suggests that radiation therapy should be delayed for 6 weeks after spinal reconstruction involving arthrodesis to permit the critical early phases of bone graft revascularization.[3] Obviously, decisions regarding timing of adjuvant treatments need to take into account the likely course of the patient’s underlying malignancy.

**Recent Advances**

Some recent advances in surgical treatment of spinal metastases include the use of less invasive, endoscopic approaches to accomplish anterior decompression and stabilization of vertebral metastases. These techniques hold promise for reducing the morbidity associated with an “open” spinal operation and warrant further study.

Others have suggested a role for percutaneous injection of methylmethacrylate into painful collapsed vertebrae to restore spinal stability and reduce pain.[4] Another promising advance involves a technique of en bloc total vertebrectomy for isolated spinal metastases in the hope of improving cure rates.[5]


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