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EDITORIAL

Complications in the management of metastatic spinal disease

Eilis Catherine Dunning, Joseph Simon Butler, Seamus Morris

Eilis Catherine Dunning, Department of Emergency Medicine, The Adelaide and Meath Hospital, Dublin Incorporating The National Children's Hospital, Dublin 24, Ireland
Joseph Simon Butler, Seamus Morris, Department of Trauma and Orthopaedic Surgery, The Adelaide and Meath Hospital, Dublin Incorporating The National Children's Hospital, Dublin 24, Ireland
Author contributions: All authors contributed to this article.
Correspondence to: Dr. Joseph Simon Butler, PhD, Senior Specialist Registrar, Department of Trauma and Orthopaedic Surgery, The Adelaide and Meath Hospital, Dublin Incorporating, The National Children's Hospital, Tallaght, Dublin 24, Ireland. josephsbutler@hotmail.com
Telephone: +353-1-8032000 Fax: +353-1-8032000
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Abstract

Metastatic spine disease accounts for 10% to 30% of new cancer diagnoses annually. The most frequent presentation is axial spinal pain. No treatment has been proven to increase the life expectancy of patients with spinal metastasis. The goals of therapy are pain control and functional preservation. The most important prognostic indicator for spinal metastases is the initial functional score. Treatment is multidisciplinary, and virtually all treatment is palliative. Management is guided by three key issues; neurologic compromise, spinal instability, and individual patient factors. Site-directed radiation, with or without chemotherapy is the most commonly used treatment modality for those patients presenting with spinal pain, causative by tumours which are not impinging on neural elements. Operative intervention has, until recently been advocated for establishing a tissue diagnosis, mechanical stabilization and for reduction of tumor burden but not for a curative approach. It is treatment of choice patients with diseaseadvancement despite radiotherapy and in those with known radiotherapy-resistant tumors. Vertebral resection and anterior stabilization with methacrylate or hardware (e.g., cages) has been advocated.Surgical decompression and stabilization, however, along with radiotherapy, may provide the most promising treatment. It stabilizes the metastatic deposited areaand allows ambulation with pain relief. In general, patients who are nonambulatory at diagnosis do poorly, as do patients in whom more than one vertebra is involved. Surgical intervention is indicated in patients with radiation-resistant tumors, spinal instability, spinal compression with bone or disk fragments, progressive neurologic deterioration, previous radiation exposure, and uncertain diagnosis that requires tissue diagnosis. The main goal in the management of spinal metastatic deposits is always palliative rather than curative, with the primary aim being pain relief and improved mobility. This however, does not come without complications, regardless of the surgical intervention technique used. These complication range from the general surgical complications of bleeding, infection, damage to surrounding structures and post operative DT/PE to spinal specific complications of persistent neurologic deficit and paralysis.

Key words: Metastases; Spine; Complications

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INTRODUCTION

Metastatic spine disease accounts for 10% to 30% of new cancer diagnoses annually[1]. The spine is the most frequent location for skeletal metastases, found in up to 40% of patients with cancer[2]. The most common presentations are axial spinal and neurological deficit. The clinical examination of a patient with suspected spinal metastases should include an assessment of local tenderness, objective deformity on clinical examination, spinal range of movement and signs of nerve root entrapment or cord compression. Plain radiographs are obtained routinely; and for a suspected or known malignancy, radionuclide studies are essential.

Technetium-99m (^{99m}Tc) bone scintiscanning (i.e., radionuclide bone scanning) is widely regarded as the most cost-effective and available whole-body screening test for the assessment of bone metastases. Conventional radiography is the best modality for characterizing lesions that are depicted on bone scintiscans. Combined analysis and reporting of findings on radiographs and ^{99m}Tc bone scintiscans improve the diagnostic accuracy in detecting bone metastases and assessing the response to therapy. Computed tomography (CT) scanning and magnetic resonance imaging (MRI) are useful in evaluating suspicious bone scintiscan findings that appear equivocal on radiographs. MRI can also help in detecting metastatic lesions before changes in bone metabolism make the lesions detectable on bone scintiscans. CT scanning is useful in guiding needle biopsy, particularly in vertebral lesions. MRI is helpful in determining the extent of local disease in planning surgery or radiation therapy. The first screening test used for the detection of bone metastases depends on the relative availability of MRI and ^{99m}Tc bone scintiscanning. The selection will become less of an issue when more MRI units are established and when its cost decreases. Factors such as cost and relatively long imaging times, as well as considerations of patient throughput, are important. MRI is estimated to cost 2-3 times as much as ^{99m}Tc bone scintigraphy. Fluorodeoxyglucose (FDG) positron emission tomography (PET) scanning costs 8 times as much.

Radiographs are relatively insensitive in the detection of early or small metastatic lesions. Although CT scans are superior to radiographs, CT scanning is also relatively insensitive in showing small intramedullary lesions, and it has the disadvantage of limited skeletal coverage. Bone scintiscan findings are sensitive but nonspecific. Whole-body MRI and FDG-PET scanning are accurate techniques that are currently limited by their high cost[3-5]. Biopsy is indicated whenever the histological nature of the lesion and its degree of malignancy are uncertain. CT-guided needle biopsy frequently fails to yield enough representative tissue for diagnosis, particularly when only a small portion of the tumor mass is located outside of bone; thus, open biopsy is often a better option[6].

TREATMENT OF SPINAL METASTATIC DISEASE OVERVIEW

Treatment for metastatic disease of the spine is multidisciplinary and may involve chemotherapy, corticosteroids, radiotherapy, percutaneous procedures (e.g., vertebroplasty, kyphoplasty) and surgery. Management is guided by three key issues; neurologic deficit, spinal instability and individual patient factors. Site-directed radiation, with or without chemotherapy, is the mainstay of treating painful lesions without neurological deficit[1]. Evidence highlighting the benefits of surgical decompression, as well as improvements in anterior spinal surgical approach has further cemented the place of spinal surgery in the care of these patients[1,4,5]. This role, although in theory beneficial, does not come without complications.

Spinal metastases can occur in 3 locations; extradural, intradural extramedullary, and intradural intramedullary. More than 98% of spinal metastases are extradural because the dura mater provides a relative barrier for metastatic disease[7]. Intradural, intradural extramedullary and intradural intramedullary disease account for less than 1% of spinal metastatic disease[8]. Both intradural extramedullary and intradural intramedullary disease most commonly originate from drop metastases in the setting of patients with either primary or metastatic brain disease[8,9]. Thoracic lesions (70%) are most often symptomatic due to the smaller space available for the spinal cord in this region, followed by lumbar (20%) and cervical (10%) lesions[7-11]. Eighty percent of spinal metastases involve vertebral bodies rather than posterior vertebral elements[7,12,13].

The presentation of bony metastases includes spinal pain, progressive deformity, pathologic fracture, radiculopathy and myelopathy. Spinal cord compression can occur from fracture, tumor invasion, or continuous osteoblastic remodeling. Among patients with spinal cord compression, 90% present with pain and 47% present with neurologic symptoms[14-16]. Symptomatic spinal cord compression occurs in 8.5% to 20% of patients with vertebral column metastases[17,18]. Radiculopathy secondary to posterior element involvement and subsequent nerve root impingement also can occur. Less than 35% of patients presenting with spinal cord compression are ambulatory at diagnosis[19,20]. Sensory neurologic deficit occurs in 70% to 80%[21].

NONOPERATIVE MANAGEMENT

Corticosteroids and bisphosphonates

Although their mechanism of action is not fully understood, intravenous or oral corticosteroid use often brings about an improvement or resolution of neurologic symptoms and pain in patients with spinal metastases. Experimentally they have been shown to bring about a reduction in reactive vasogenic oedema in the spinal cord and nerve roots[22,23]. There is, however no consensus regarding a standard dosage regimen. Bisphosphonates too, are now displaying a greater role in the treatment of metastatic disease of the spine. Slowing of osteoclastic resorption of bone is believed to help with both cancer pain and fracture prevention. Benefit has been seen in patients with breast cancer, prostate cancer, and multiple myeloma[24-26].

Neither of these treatment modalities come without side effects however, and these range from mild to severe, often disimproving the quality of life of the patient. Bisphosphonates, given either daily, weekly, monthly or yearly, all display side effects, which are unpleasant and often dangerous. These include gastritis and oesophagitis, osteonecrosis of the jaw, femoral fractures and electrolyte imbalance, particularly causing hypocalcaemia. They are also nephrotoxic. Steroid side effects are widely known and include bruising and thinning of skin, myopathy, moon-like facies, psychotic mental state, blood sugar and pressure irregularity, weight gain and decreased immunity.

Radiotherapy

External beam radiation is an effective treatment for many patients with radiation-sensitive tumors. In radiosensitive lesions, radiation therapy alone has been shown to be successful in more than 80% of patients[14]. Overall, with radiation, more than 30% of patients experience neurologic improvement from epidural compression, and more than 60% gain significant pain relief[8,19]. Nausea, vomiting, and radiation-induced oesophagitis are common. Delayed radiation myelopathy can occur but is rare with newer treatment plans. Radiation therapy usually is recommended postoperatively in patients with radiosensitive tumours in whom gross or microscopic disease remains.

Chemotherapy

Chemotherapy is rarely considered as an option for treating metastatic spinal tumors due to its systemic nature and extended time to pain relief. Despite its gradual impact, when successful, chemotherapy can shrink tumours and ease pain. Introducing an additional therapy focused on metastatic spinal tumours must ensure minimal interference with the standard chemotherapy usually prescribed to treat the primary cancer. Chemotherapy can be divided into antitumor drugs and drugs that prevent or ameliorate the effects of tumor. Antitumor chemotherapy currently plays a relatively limited role in the treatment of spinal metastases. Antitumor chemotherapy has an important role in the treatment of chemosensitive tumors, such as neuroblastoma, Ewing's sarcoma (PNET)[27] osteogenic sarcoma, germ cell tumors, and lymphoma. Chemotherapy may be used as primary treatment for patients with these tumors even with epidural compression[27].Complications of chemotherapy are probably the most widely written about in the treatment of neoplasm, be it spinal or otherwise and they are also those most feared by the neoplastic patient. These include pain, fatigue, hematologic abnormalities, gastrointestinal disturbance, alopecia, reduced immunity, psychological disturbance and infertility[28].

OPERATIVE MANAGEMENT

The role of surgery

The role of surgery in the treatment of spinal metastasizes still being defined. Results using laminectomy as initial therapy either alone or with adjuvant radiation yielded relatively poor outcomes. Laminectomy does not provide exposure to resect lateral and anterior epidural or vertebral body tumors. Additionally, resection of the posterior elements without instrumentation often leads to progressive kyphosis and increased neurologic deficits. Improved surgical outcomes have been seen using techniques that provide exposure for more radical tumor resection than laminectomy. Reconstruction following these aggressive approaches is now possible using rigid posterior segmental fixation and anterior instrumentation. These approaches include anterior, transcavitary[29,30] and posterolateral, transpedicular[31,32]. The decision to use a particular surgical approach is dependent on the location of the bone, epidural, and paraspinal tumor, type of reconstruction required, patient comorbidities, extent of disease, and surgeon's familiarity.

Resection of the tumor and spinal fixation has resulted in dramatic improvements for both tumor-related pain and mechanical back pain. Multiple series reporting pain outcomes have shown a 76% to 100% improvement[33]. Neurologic outcomes are similar using both anterior and posterolateral approaches. Functional and neurologic improvements have been seen in 50% to 76% of patients. Additionally, patients who were operated on without a deficit maintained function in greater than 95% of cases. Patients with minor or no neurologic deficits represent up to 81% of patients in some recent series[33]. This percentage of ambulatory patients is substantially greater than the previously reported radiation literature.

As with radiotherapy, factors that impact on outcome include preoperative neurologic and functional status and favorable tumor histology. In a review of 101 patients who underwent operation for metastatic spinal tumor prior to receiving adjuvant therapy (radiotherapy or chemotherapy) for their spinal tumour operations included posterolateral (79%), anterior transcavitary (12%), and anterior and posterior approach surgery (9%). Ninety-six percent of patients who were ambulatory preoperatively maintained the ability for at least 3 mo, while only 22% of patients nonambulatory regained ambulation for the same duration[33]. This maintenance or recovery of function is similar to other radiotherapy data[34]. Additionally, 89% of patients maintained continence for 3 mo, but only 31% regained autonomic function. Patients with favorable tumor histology (e.g., breast, kidney, thyroid, prostate) had significantly better neurologic outcome and survival than those with unfavorable histologies (lung, gastrointestinal tract, and unknown primary). In other studies, local recurrence rates are significant. In this study 58% recurred after 6 mo, 69% at 1 year, and 96% after 4 years[35]. Factors predictive of low recurrence rates included preoperative ambulatory status, favorable tumor histology, cervical level, low number of affected vertebral bodies, complete resection, and elective surgery.

Review of multiple series shows complication rates from surgery ranging from 10% to 52% Complications

Table 1 Surgical indications

Primary surgery
Radioresistant tumors (e.g., sarcoma, renal cell carcinoma)
Spinal instability
Pathologic fracture with bone in the spinal canal
Circumferential epidural tumor
Moderate to highly radio-resistant tumors (e.g., colon, lung)
Occult primary tumor
Post-treatment (radiotherapy/chemotherapy) surgery
Progressive neurologic symptoms
Progression of tumor with high grade spinal cord compression
Spinal instability
Rule out residual tumor post radiotherapy/chemotherapy

include deep venous thrombosis, myocardial infarct, and pneumonia[29,30]. Surgical complications include postoperative hematoma and failed fixation requiring revision. Wound dehiscence and infection are complications seen predominantly with posterolateral approaches in up to 15% of cases mortality rates are as high as 13%[36-40]. Frequently these are related to the medical or oncologic condition of the patients. As with radiotherapy, advances in surgical technique may help improve the quality of life for patients with metastatic spinal tumour[41,42]. Preoperative embolization for vascular tumors (e.g., renal cell, papillary thyroid carcinoma, leiomyosarcoma) dramatically reduces operative blood loss. Surgery should be reserved for a variety of indications (Table 1).

The five-category classification system of Harrington for metastatic spinal tumours is based on the destruction of bone and neurological compromise[2]. Patients in categories Ⅰ and Ⅱ are treated conservatively. Patients in categories Ⅳ or Ⅴ are recommended for surgical intervention. Category Ⅲ lesions represent a grey area regarding medical as opposed to surgical intervention. If the spinal cord is significantly compressed by a tumour, which is not radiosensitive, the patient is at greater risk of neurological degradation during radiotherapy and therefore will benefit from initial surgical management. Patients with lesions that are unlikely to respond to conservative treatment are candidates for operative intervention, irrespective of their Harrington category. Nonetheless, patients with a Harrington classification involving a neurological deficit (grade 3-5) before and after surgical intervention are at increased risk of complications[2].

The options for surgical treatment have improved markedly in recent years. The development of better instruments and techniques has spread the catchment net for patients suitable for surgery. Patients reporting mechanical instability of the spine and/or clinically significant narrowing of the spinal canal are included. The anatomy of the spine serves as an obstacle to radical tumour resection in all but a select minority of patients. Therefore, patients with a positive prognosis should undergo postoperative radiotherapy to consolidate their treatment, regardless of the resection achieved. Preoperative radiotherapy, however, should be avoided as it may impair wound healing[43].

A variety of surgical methods are available to treat spinal metastases. Posterior spinal decompression and stabilization can be considered the standard surgical technique to treat metastatic disease of the thoracic and lumbar spine. Cervical metastases may be treated with anterior decompression and corpectomy with vertebral body replacement.

The main goals of the surgery are to reduce tumor bulk and to resect the structures bordering the spinal canal dorsally to decompress any spinal cord compression (para- or tetraplegia). The secondary goals are to stabilize the affected segment of the spine and to enable the patient to be mobilized without a corset. Decompression alone, without instrumentation, should be performed only in exceptional cases. The dorsal portion of the spinal column normally plays the role of a tension band maintaining alignment of the spine; and thus, when left without reconstruction, can lead to a kyphotic deformity. For patients with a solitary spinal metastasis who are in good general health and have a long life expectancy, the indicated procedure is anterior tumour resection with primary stabilizing instrumentation.

"*En Bloc*" spondylectomy, described by *Tomita*, is based on sound oncologic principles. The intent of this surgery is *en bloc* resection of the tumor with negative histologic margins. This surgery is feasible as a one- or two-stage procedure but is technically quite demanding[44]. Results with this approach are encouraging, both in terms of functional outcome and local control; however, we reserve this approach for patients in whom the spine surgery is being performed as a curative, rather than palliative procedure. Based on anatomic considerations, the majority of patients with metastatic tumor are not candidates for this type of surgery because of the extensive epidural disease, multilevel vertebral body involvement, and large paraspinal masses.

In certain patient groups, neo-adjuvant therapy may be required to enable both the resection of the primary tumour and removal of the spinal metastasis. This is particularly true if the metastasis is derived from a highly vascular primary tumour. Preoperative embolization of tumour vessels may reduce blood loss and enables more precise dissection and more tumour extensive resection. The stabilization of vertebral bodies is more problematic from an anterior approach rather than from a posterior approach, because the vertebral bodies consist mainly of thin cortical bone, and because they are often osteoporotic. With improved spinal instrumentation now available for the ventral approach, patients may now be mobilized rapidly and without a corset. After (total or partial) vertebrectomy, the anterior column is not reconstructed with autologous bone, but rather with metal cages, as the postoperative radiotherapy that will be needed to prevent tumour recurrence would also impair the fusion of any bony implant.

SURGICAL APPROACHES

Vertebroplasty and kyphoplasty

These are relatively new techniques used to treat painful vertebral compression fractures secondary to malignancy and metastases. Vertebroplasty is the injection of bone cement, generally polymethyl methacrylate into a vertebral body. Kyphoplasty is the placement of balloons into the vertebral body, followed by an inflation/deflation technique to create a cavity followed by cement injection. These procedures are most often performed percutaneously. It is thought that the stabilization of the fracture allows for the analgesia and evidence favours the use of these procedures for pain associated with metastases. The risks associated with the procedures are low but serious complications can occur. These risks include spinal cord compression, nerve root compression, deep venous embolism, and pulmonary embolism including cardiovascular collapse[45,46]. Vertebroplasty has been found to have a significantly increased rate of procedure-related complications than kyphoplasty in study analysis. Vertebroplasty also appears to have a significantly higher rate of symptomatic and asymptomatic cement leakage than kyphoplasty. The incidence of medical complications is significantly higher in kyphoplasty. The incidence of new fracture was significantly higher in vertebroplasty[37]. That said, the risk/benefit ratio appears to be favourable in carefully selected patients and thus it is a common procedure used in metastatic spinal disease[47,48].

Posterior vs anterior spinal decompression

Despite the predominance of metastatic lesions found anteriorly (80% in the vertebral body)[1], surgery has historically involved posterior decompressive laminectomy alone. The early results of these procedures. Many surgeons recognized that laminectomy had limited value in regaining neurologic function. Furthermore, complications of laminectomy in this patient population were marked, including the acceleration of spinal instability and wound complications[49,50].

The development of anterior surgical approaches, however, has facilitated the re-evaluation of the role of decompressive procedures in treating patients with metastatic spinal disease. Neurologic return has been reported in 40% of patients after posterior decompressions and 71% of patients after anterior decompressions[51]. Patients with anterior metastases isolated to one or two continuous segments have better outcomes when anterior reconstruction was performed[39]. A satisfactory outcome of 37% after posterior decompression and 80% after anterior decompression has been reported[52]. Recent surgical results also have been more satisfactory with the addition of anterior approaches. Anterior (58 patients), posterior (33) or combined (9) approaches for surgical stabilization of 100 patients with metastatic spinal disease demonstrated clinical improvement in 80% of patients[53]. Assessment of outcomes of 80 patients with solitary metastatic spinal lesions treated with a variety of surgical approaches, 48 patients (60%) had been ambulatory preoperatively, 78 (98%) were ambulatory after surgery, including 94% of those who initially had been non-ambulatory[54].

As with all surgical procedures, the anterior approach to spinal surgery carries with it a few risks and potential complications that are unique to this surgical approach. The incidence of injury to the large blood vessels is very small, typically being around 1%-2%[53]. To minimize this risk, a vascular surgeon (or general surgeon with the appropriate skills and training) should be involved in the surgery to manipulate the large blood vessels to help the spine surgeon gain access to the front of the spine. For male patients, a rare complication (< 1%) from the anterior approach to spine surgery is retrograde ejaculation. At the lower end of the lumbar spine, there is a group of small nerves, which can lie over the lowest disc space (L5-S1). These nerves help control a valve needed to express semen, and instead the semen goes up into the bladder after ejaculation. The nerves do not have any effect on erectile function, which is controlled separately by a different set of nerves. In the majority of patients who experience this complication, the condition resolves by itself within 3 to 6 mo, but if necessary, an urologist can be consulted to help with fertility. If the retrograde ejaculation becomes permanent, the patient may be unable to have children (without medical intervention from a fertility expert) but will otherwise have normal sexual function. A transperitoneal approach to the lumbar spine at L4-L5 and L5-S1 has a 10 times greater chance of causing retrograde ejaculation in men than a retroperitoneal approach[55].

The other risks and potential complications associated with the anterior approach to spine surgery are similar problems that one would encounter with a posterior spinal surgery, such as infection, and are not unique to the anterior approach. Infection is very rare.

Although anterior decompression and reconstruction appears to be extremely beneficial in the setting of neurologic compression, the procedure also can be performed using a posterolateral aproach. This approach enables anterior stability and posterior decompression, as well as pedicle screw fixation, through a single incision. This posterolateral approach is particularly useful for lesions in the upper thoracic spine, a difficult area to reach from an anterior thoracotomy or sternal-splitting approach. The posterolateral approach also is useful at the thoracolumbar junction, where an anterior approach necessitates taking down the diaphragm[1]. Conversely, for patients who already have failed radiation treatment, the posterior approach invites a high risk of wound dehiscence and infection.

Endoscopic techniques also are being used in the surgical treatment of thoracic metastatic lesions. Although an endoscope can be used with open procedures, it is most often used in conjunction with a minimally invasive anterior trans-thoracic approach. Thoracic vertebrectomy, reconstruction, and stabilization all have been performed with endoscopic techniques[55,56]. Complications of endoscopic spinal surgery can be related to anaesthesia, patient positioning, and surgical technique. The performance of successful minimally invasive spinal surgery is beset with several technical challenges, including the limited tactile feedback, two-dimensional video image quality of three-dimensional anatomy, and the manual dexterity needed to manipulate instruments through small working channels, which all account for a very steep learning curve. Knowledge of possible complications associated with particular minimally invasive spinal procedures can aid in their avoidance[56]. In a study by reviewing endoscopic spinal surgery technique and outcome, the overall incidence of complications in endoscopic spinal surgery was 42.3% (20/52 cases)[57-59]. Of the intraoperative complications, extensive bleeding was most frequent, and of postoperative complications, respiratory problems and transient neural damage were most frequent.

Reconstruction with autograft, allograft, or methylmethacrylate may follow decompression. Autograft and allograft hold potential for incorporation and biologic fusion, which can provide long-term stability. Solid fusion is often limited in the tumour patient from abnormal tumour biology, effects of radiation, and chemotherapeutics[1]. The use of methylmethacrylate has been suggested for patients with limited expected survival[60]. Methylmethacrylate must be used with caution, however, to avoid thermal injury.

Autograft bone for spinal fusion surgery

Autograft bone is harvested from the iliac crest (hip). This technique has been the gold standard since the 1950s. Autograft bone usually achieves a fusion in 90% to 95% of patients. The principal disadvantage with using autograft bone is that another incision needs to be made over the hip to harvest the bone graft. Possible complications associated with taking out bone graft include; graft site chronic pain (with pain lasting anywhere from 12 to 24 mo 25% to 30% of the time)[61,62], infection, bleeding, damage to the lateral femoral cutaneous nerve and pelvic fracture. The chances of a complication increase with the size of the bone graft and patient obesity. For those who opt to use an autograft, many patients find the bone graft harvest site to be more painful than the cervical surgery site itself.

Allograft bone for spinal fusion surgery

Allograft bone eliminates the need to harvest the patient' s own bone. Basically, the donor graft acts as a bone scaffolding onto which the patient's own bone grows and eventually replaces over years. There are no living cells in the bone graft, so there is little chance of a graft rejection, like with an organ transplant. However, bone graft healing remains an issue, as there is a somewhat greater likelihood of bone graft failure with allograft bone compared to autograft. With that said, it should be known that certain studies have shown allograft to be comparable to autograft in terms of producing successful fusions[63-65].

With allografts, the speed of healing may be slower than an autograft bone fusion. Additionally, allograft yields nearly equivalent fusion rates as autograft bone in one-level spinal fusions. Anterior cervical instrumentation (plates and screws) is commonly employed with allografts to increase fusion rates. With increasing numbers of levels to be grafted/fused, the differences in fusion rates between allograft and autograft become more significant.

There is a theoretical risk of transmission of an infection from a donor. The risk of contracting a disease such as HIV or hepatitis from an allograft has been estimated to be between 1 in 200 000 to 1 in 1 million. However, with modern procurement and sterilization methods for bone tissue, the risk is essentially moot.

Bone graft substitutes for cervical spinal fusion surgery

There are now multiple commercially available bone graft substitute options available. The advantages include no risk of disease transmission and ready availability. Many bone graft substitutes, however, are not structural and need to be combined with a manufactured device that holds it in place while the bone graft substitute heals. Typically, spinal implants are either manufactured out of a metal product (usually titanium), plastic (also known as polyetheretherketone-PEEK), or carbon-fiber. In 2009, the Food and Drug Administration issued a warning letter concerning the use of bone morphogenic proteins in cervical surgery. There have been reports of it causing a large inflammatory reaction postoperatively, which can lead to a subsequent loss of the patient's airway. This is a serious postoperative complication that can be potentially fatal.

In this setting of long posterior constructs, titanium instrumentation may be considered more appropriate than stainless steel. Titanium implants offer less MRI artifact than do stainless steel, and patients with metastatic disease are likely to undergo future MRI. Also, although posterior instrumentation is useful for the previously mentioned indications, such widespread disease typically engenders a poor prognosis. The significant risk of surgical complications must be considered. Postoperative wound infection is the most common complication of metastatic spine surgery. Factors found to be risks for wound infection include morbid obesity, postoperative incontinence, and use of a posterior approach[66]. In the patient with metastatic disease, the risk of infection may be related to radiation and chemotherapy treatments as well as to chronic malnutrition. In patients who have undergone posterior surgical approaches through irradiated tissue, the surgeon should be aware of the risk of wound dehiscence for the remainder of the patient's life, and patient should all be reminded not to remove the sutures at the normal postoperative interval of 10 to 14 d.

CONCLUSION

Metastatic spine disease accounts for 10% to 30% of new cancer diagnoses annually. The most frequent presentation is axial spinal pain. No treatment has been proven to increase the life expectancy of patients with spinal metastasis. The goals of therapy are pain control and functional preservation. The most important prognostic indicator for spinal metastases is the initial functional score. The main goal in the management of spinal metastatic deposits is always palliative rather than curative, with the primary aim being pain relief and improved mobility. This however, does not come without complications, regardless of the surgical intervention technique used. These complication range from the general surgical complications of bleeding, infection, damage to surrounding structures and post operative DT/PE to spinal specific complications of persistent neurologic deficit and paralysis.

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