



METASTATIC SPINAL CORD COMPRESSION: DETECTION AND MANAGEMENT IN THE UNITED KINGDOM AND THE UNITED STATES.

Cardiology

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ABSTRACT

Metastatic spinal cord compression (MSCC) is a cauda equine or spinal cord compression caused by metastatic spread, direct pressure compression, vertebral collapse induction, direct malignancy extension, or metastatic spread related instability that facilitates neurological instability. The real prevalence of MSCC in Wales and England is unclear. However, audit evidence obtained from Scotland between 1997 and 1999, and Canadian research insinuates that approximately 80,000,000 cases are recorded annually (National Institute for Health and Care Excellence, 2008). Narrowed down, this amounts to 4000 annual cases in Wales and England (National Institute for Health and Care Excellence, 2008). Furthermore, a Scottish assessment revealed critical delays for patients from the time they exhibit symptoms to the time doctors and practitioners detect and ascertain the presence of MSCC. The median rates from the commencement from nerve root and back pain to referral were nine weeks and three months, respectively (National Institute for Health and Care Excellence, 2008).

Furthermore, the patients' capability to walk is highly linked to their general survival rates. Presently, a few persons with metastatic spinal cord compression in the United Kingdom access surgery. Besides, research indicates that early MSCC surgery results in better results than radiotherapy in sustaining patients' mobility.

KEYWORDS

DETECTION

According to the UK guidelines, it is essential to emancipate patients with an elevated risk of acquiring bone metastases, cancer patients with spinal pain, and persons diagnosed with bone metastases on MSCC symptoms and detection. In particular, it is necessary to inform patients, their carers and families on the MSCC symptoms through strategies such as leaflets, as well as advising them and their personal medical care providers on the steps to take when they encounter the MSCC related symptoms (National Institute for Health and Care Excellence, 2008). Furthermore, it is essential to emancipate MSCC patients, their carers, and families on who to contact when their symptoms advance while waiting for rapid assessment of a probable MSCC.

It is also vital to promptly reach out to an MSCC coordinator in under 24 hours to deliberate on the care of persons with cancer and spinal metastases related symptoms. In particular, when the patients develop unique symptoms related to spinal metastases such as intensive, constant lower spinal pain, upper cervical pain, thoracic pain, and constant lower lumbar pain, they should reach out to the nearest available MSCC coordinator (National Institute for Health and Care Excellence, 2008). Furthermore, patients having neurological symptoms such as bowel or bladder dysfunction, limb weakness, sensory loss, or radicular pain, or cauda equine compression should contact an MSCC coordinator and treat their condition as an oncological emergency.

Additionally, it is essential to carry out regular clinical reviews for cancer patients who exhibit lower spinal pain that is medically perceived to have no particular origin, aggravated by straining, and lacks comorbid neurological symptoms, and upon detection of spinal metastases related symptoms or progressive pain, an MSCC coordinator must be contacted in under 24 hours (National Institute for Health and Care Excellence, 2008). It is also necessary to carry out regular clinical reviews for patients who exhibit suspicious spinal pain without a past cancer diagnosis, then refer them to the nearest MSCC coordinator within 24 hours.

Early detection is also facilitated by adopting various imaging modalities. For patients questioned of MSCC should be subjected to immediate magnetic resonance imaging of the spine, and the imaging assessed and availed to the radiologist, accompanied by sagittal T1 and T2 sequences to exclude or prove the spinal metastases sequences (National Institute for Health and Care Excellence, 2008). Furthermore, the MSCC coordinator needs to be contacted to establish the most viable imaging methods for persons suspected of MSCC and where magnetic resonance imaging is undesirable. Additionally, spinal

stability can be assessed for suspected patients through a targeted computerized tomography (CT scan) (National Institute for Health and Care Excellence, 2008). Furthermore, if the available imaging modalities are undesirable or insufficient, the myelography should be incorporated. Also, it is undesirable to apply plain spine radiographs to exclude or make MSCC or spinal metastases diagnosis. In the United Kingdom, routine spine imaging is discouraged for asymptomatic patients with a past malignancy diagnosis. Furthermore, serial spine imaging in asymptomatic cancer patients at an elevated likelihood of acquiring spinal metastases need to be only carried out as a segment of a randomized controlled test (National Institute for Health and Care Excellence, 2008)

The UK health sector gives high priority to the timing of MSCC assessment and imaging. In particular, imaging departments need to organize magnetic resonance imaging listings to create enough patient examination time for those questioned with MSCC within short deadlines in extended or existing sessions. Furthermore, when the magnetic resonance imaging is absent in the referral facility, suspected patients need to be transferred to special units with all-round MRI and developed MSCC treatment avenues (National Institute for Health and Care Excellence, 2008). Additionally, it is prudent for suspected patients to carry out MRI for the whole spine unless a particular contraindication is identified. Besides, out of hours, magnetic resonance imaging needs to be only carried out in clinical situations having an emergency, and those cases should be referred for immediate treatment where necessary.

Management and Treatment of MSCC and Spinal Metastases in the United Kingdom.

Treating Painful Metastases

It is essential to offer the patients traditional analgesia such as opiate, non-opiate, and NSAID medication in WHO recommended escalated doses for persons with painful spinal metastases. Intractable pain warrants referral to neurosurgical and invasive procedures. Furthermore, bisphosphonates are viable for patients with vertebral metastases from myeloma and prostate cancer, although they should not be used for other tumor types (National Institute for Health and Care Excellence, 2008). Besides, persons with non-mechanical spinal metastases pain can be offered radiotherapy, although not recommended for asymptomatic spinal metastases. Patients who have vertebral body collapse or analgesic-resistant mechanical spinal can be subjected to kyphoplasty or vertebroplasty (National Institute for Health and Care Excellence, 2008). Patients having spinal instability and metastases with structural pain resistant to analgesics can be subjected to surgery, although it is not feasible for those without instability or pain. All choices for various combinations of the MSCC

treatment methods need to be undertaken by the appropriate tumor operation technicians and specialists with great patient involvement.

Caring for Threatened Spine in MSCC Patients

Mobilization techniques such as gradual sitting, turning beds, and log rolling are appropriate for caring for patients with MSCC repeated spinal instability, mechanical pain, or neurological symptoms, since it facilitates spine alignment. Upon attaining stability of pain and pressure, the patients can be advanced to unsupported sitting, but if their pain increases, they should be returned to normal positions while evaluating their situation (National Institute for Health and Care Excellence, 2008). Additionally, if not contraindicated, corticosteroids such as a daily 16mg of dexamethasone dose can be provided to MSCC patients and those starting radiotherapy or surgery while assessing their blood glucose levels.

MSCC Definitive Treatment

The patient should initiate definitive treatment 24 hours after MSCC diagnosis. During this period, it is essential to assess the spinal metastases' primary histology, anatomical sites' number, and the degree of visceral and spinal metastases (Guideline Central, 2008). Furthermore, when planning definitive treatment, the practitioners should consider the overall prognosis, readiness for anesthesia, probability of anesthesia, surgery extent, past treatments, overall fitness and health, functional status and neurological stability, and any inconsistencies should be attended to within 24 hours (National Institute for Health and Care Excellence, 2008). Furthermore, age should not be used as a determinant for MSCC related surgery. The recommended surgery scoring systems for MSC patients include the American Society of Anaesthetists (ASA) and the Tokuhashi scoring system and include a maximum of three surgeries for patients with positive prognoses (Guideline Central, 2008).

Surgery for MSCC Definitive Treatment

After establishing the viability of surgery after diagnosis, healthcare providers strive to achieve long-term spinal column stability and decompression. After assessing neurological stability, it is essential to do surgery for residual motor function or distal sensory of patients, while excluding tetraplegic or paraplegic patients (Guideline Central, 2008). Furthermore, surgery's timing is essential, entailing assessing the origin site, degree, duration, and onset speed of neurological signs and symptoms. Furthermore, it is essential to consider technical factors such as propagating the likelihood of preserving cord functions without risking the patient's life and performing posterior decompression with precaution by combining it with internal fixation. Besides, vertebral body reinforcement and vertebral body reconstruction are vital for patients expected to last for less than a year and more than a year, respectively. Moreover, excisional surgery should only be carried out in selected situations, such as thyroid or renal metastasis.

Radiotherapy

For patients ineligible for surgery and needing definitive treatment, practitioners should ensure their access to simulator and radiotherapy facilities within 24 hours. Fractionated radiotherapy should be offered for epidural tumors and persons with a good prognosis. If surgery is essential, preoperative radiotherapy is discouraged (Guideline Central, 2008). Furthermore, postoperative radiotherapy is essential for patients with positive surgical outcomes. However, radiotherapy is not essential for patients with complete paraplegia or tetraplegia or estimated poor prognosis. Further radiotherapy is recommended for patients who have exhibited positive results in the past.

Supportive Care and Rehabilitation

MSCC patients can be offered thromboprophylaxis as support. Besides, pressure ulcer risk analysis, pressure score assessment, and pressure-relieving activities should be applied to the patient while on bed rest and when pursuing mobility (Guideline Central, 2008). Moreover, bowel and bladder management is necessary for MSCC patients to detect irregular bowel functions and reduced urinary retention. Furthermore, when monitoring the patients, it is essential to maintain their respiratory and circulatory functioning to help manage blood pressure and heart rate, clear lung secretions, and mitigate hypotension (Guideline Central, 2008). It is also vital to enable the patients' access to specialist transition and rehabilitation to care at home. In particular, MSCC patients need to be offered professional support care for rehabilitation, advice, and assessment while focusing on their desired outcomes and goals.

Metastatic Spinal Cord Compression (MSCC) Detection and Management in the United States

The spinal column is the most prevalent location for bony metastases, possessing an occurrence of 30 to 70% of persons with neoplasms metastatic in nature. In the United States, metastases are the most prevalent tumor in the spinal cord, recording approximately 18,000 emergent cases detected yearly (Ecker et al., 2005). Besides, kidney, prostate, and lung cancers have exhibited the highest spine malignancies involvement.

Detection

The initial MSCC assessment entails evaluating the patient's clinical history, clinical assessments, and informed lab tests. To carry out a preoperative evaluation for MSCC patients, it is necessary to evaluate the patients' nutritional and health status (Ecker et al., 2005). Additionally, MSCC detection entails lab assessments involving neutropenia, coagulopathy, and electrolyte imbalance. Furthermore, computed tomography (CT) and Ultrasonography of the chest and abdomen help locating MSCC related primary neoplasms.

The imaging armamentarium to be utilized by the clinicians in detection include positron emission tomography (PET), myelography radionuclide bone scan (BS), magnetic resonance imaging (MRI), and plain radiography. However, myelography can be detrimental if it raises the neurologic deterioration in the event of a total sub-arachnoid attack (Ecker et al., 2005). Besides, myelography can be utilized for patients with foreign bodies or implanted devices in their bodies; since they cannot undergo magnetic resonance imaging. Additionally, MRI, CT, and plain radiography are the main pillars of imaging modalities for persons having spinal metastases.

Plain radiography is essential and can be applied to many patients. Some of the common MSCC related complications unearthed by plain radiography include pathologic fracture-dislocation, osteolytic and osteoblastic lesions, pedicle erosion, and vertebral body collapse. 30 to 40% of the bone must be eroded to increase visibility in the plain radiography (Ecker et al., 2005). Besides, 90% of patients with asymptomatic MSCC facilitate irregular plain radiography findings (Ecker et al., 2005). In this regard, the Mayo Clinic guidelines provide that it is necessary to assess the symptoms before proceeding to imaging when attempting to detect MSCC.

Additionally, in the United States, the regular and prevalent detection and diagnosis of spinal column metastases entail carrying out intensive magnetic resonance imaging for the patient's whole body. Besides, MRI for the whole vertebral axis is the most common detection method for MSCC than plain radiography. Furthermore, MRI offers significant imaging of occult metastases, multilevel destruction of CSF spaces, as well as epidural and paraspinal masses through superior soft-tissue delineation (Ecker et al., 2005). MRI only trails CT scans in spine imaging.

Custom-made CT having three-dimensional, coronal, and three-dimensional reconstruction offers viable details of the spine's bony anatomy, crucial for intraoperative and preoperative surgical plans. Furthermore, the CT angiography helps to image the foramen transversarium's vertebral arteries and their cranium entry, enabling patient safety and surgical decision (Ecker et al., 2005). CT helps patients to evade traditional angiography risks. The osteoblastic canal degree, erosion of posterior, pedicles, vertebral body elements, total fracture instability, and angulation rotation can jeopardize CT scan visibility. Furthermore, the other imaging techniques such as PET, SPECT, and radionuclide BS are present in various institutions in the United States (Ecker et al., 2005). However, the radionuclide BS is sometimes undesirable because it leads to bone metastases false-negative results in almost 50% of the occasions. Besides, BS fails to precisely differentiate between non-pathological and pathological bone fractures. Due to limited resources and availability, PET and SPECT are not utilized in standard MSCC detection in the United States. Open biopsy or needle can be utilized in acquiring tissue for MSCC detection. Furthermore, CT-informed needle biopsy is a viable and efficient strategy for yielding pathologic diagnosis in unknown primary neoplasm. Furthermore, a surgical incision is needed for patients with open biopsy, non-diagnostic needle biopsies, and progressive neurologic deficiency.

Management and Treatment of MSCC and Spinal Metastases in the United States

In the United States, the present approaches for managing and treating MSCC include radiation, surgery, and medical therapy. Operative intervention is a prevalent MSCC treatment approach in the US and is geared towards facilitating primary stability, neurological function maintenance, and pain control (Ecker et al., 2005). For a long time, numerous persons have perceived surgery as the best treatment approach. However, it necessitates en bloc resection, which is undesirable in some individuals. This is because vital neural elements or spinal cord mostly situate within the tumor margin. Laminectomy is deemed undesirable in the US due to its negative outcomes since it fails to access conventional spinal metastatic disease location in the spine's anterior segments. Furthermore, radiation therapy is more prevalent and desirable, with invasive surgery allocated to adjuvant or salvage therapy.

Additionally, the location of most spine metastases has escalated due to refinement of lateral and anterior strategies to the anterior spine and enhancement in surgical thinking and technique. Furthermore, persons with MSCC treated with postoperative radiotherapy and prompt direct decompressive surgery exhibit higher survival rates and resume walking quicker than those on sole radiation treatment (Ecker et al., 2005). In this regard, most US hospitals require thoracic, vascular, general, orthopedic, and neurosurgeons to locate, decompress, and rebuild the spine. Furthermore, treating persons with MSCC should assess the comparative tumor sensitivity to chemotherapy and radiotherapy, anatomical disease extent, age, overall health, and the person's neurologic status (Ecker et al., 2005). Since the average survival rate of patients with symptomatic MSCC varies from ten to sixteen months, healthcare providers need to assess their prognosis before proceeding to surgery.

Bisphosphonates and Corticosteroids.

Corticosteroids facilitate the resolution or improvement of neurologic pain and symptoms with epidural spinal metastases. In the US, there is no fixed dosage regimen. Mayo Clinic commences treatment with 10mg of dexamethasone, then upscale its intake rate to 4mg four times a day (Ecker et al., 2005). On the other hand, bisphosphonates embrace a significant function in bony MSCC in the axial and spine limbs. The bisphosphonates prevent fracture and reduce cancer pain by inhibiting bone osteoclastic resorption (Ecker et al., 2005).

Vertebral Augmentation

Vertebral augmentation is a viable minimal invasive operation aimed at suppressing painful MSCC devoid of epidural compression. The most common augmentation strategies in the US include kyphoplasty and vertebroplasty. Kyphoplasty involves methyl methacrylate injection into the spinal column, while vertebroplasty entails methylmethacrylate injection into the compressed fracture for pain relief (Ecker et al., 2005). Above 80% of US patients encounter essential pain relief and return to mobility after undergoing kyphoplasty and vertebroplasty (Ecker et al., 2005).

Radiation

Beam radiation helps treat numerous persons with radiation-oriented tumors such as germ cell, prostate, and hematopoietic malignancies. Above 30% of patients encounter relief in epidural compression in the US, and above 60% testify impressive pain relief. The typical dosage entails 30Gy in ten portions (Ecker et al., 2005). With the modern treatment modules, delayed radiation myelopathy is seldom realized. Besides, radiation therapy is viable after surgery for individuals having radiosensitive tumors with remnants of the disease. Furthermore, stereotactic radiosurgery has significantly facilitated the treatment of persons with intracranial metastases.

Surgical Treatment

Surgery aims to reconstruct or stabilize the spine, decompress neural components, and detect the onset of MSCC. Furthermore, performing surgery aims to mobilize the patient, improve or preserve neurological function, and reduce pain. Furthermore, the surgical procedure relies on the surgical tool and tumor location. Presently, in the United States, technical enhancement enables tumor resection in all the spinal column levels. Besides, the surgical options vary depending on the reconstruction, surgical approach, and timing.

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