Caring for patients with central nervous system metastases

CANCER is a complex cellular process and results from an imbalance in the regulation of growth control due to inaccurate deoxyribonucleic acid (DNA) replication. Accurate cell replication is essential in ensuring that the genetic code in the DNA molecule remains unchanged.

Metastasis of the central nervous system (CNS) brings devastation. For some patients it is the first indication that they have cancer. For others with controlled systemic disease, it is the realisation that the cancer is back. This group of patients generally has a poor prognosis and, if possible, they need to understand that the treatment on offer is being prescribed for symptom control and not cure or to prolong their survival. Nurses need to provide clear and accurate information to patients and families so they can make an autonomous decision about the proposed treatment or, indeed, plan future care.


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**Metastases**

Metastases is the name given to cancer cells that have spread from the primary tumour to other body sites. Metastasis of the central nervous system (CNS) brings with it the awareness that cure is no longer possible and that any future medical treatment is palliative and aimed at controlling symptoms. Tumour spread occurs through the lymphatic system to local lymph nodes and via the blood vessels to more distant sites. Some tumours have a greater ability than others do to spread and metastasise. For example, gliomas (primary malignant brain tumours) are generally confined to the CNS, while systemic tumours such as lung and breast cancer, commonly metastasise to bone, lung, brain and spinal cord. Approximately 20–40 per cent of patients with cancer will develop CNS metastasis, with breast and small cell lung cancer more frequently spreading to the brain.

The nervous system is divided into the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS consists of the brain and spinal cord and the PNS consists of the cranial and spinal nerves.

**Angiogenesis**

Once a tumour has spread, the formation of new blood vessels occurs. This is known as angiogenesis and is an important factor for successful tumour seeding as it provides nutrients to the new growth. In the CNS, metastases are well protected from systemic chemotherapy by the blood-brain barrier.

**Blood-brain barrier**

The blood-brain barrier is an anatomical-physiological feature of the brain separating the parenchyma of the central nervous system from blood. It prevents or slows the passage of chemical compounds and harmful exogenous substances such as cytotoxic agents from the blood entering the brain. Because many cancer drugs are hydrophilic (water soluble) and cell membrane is composed of fatty substances, drugs need to be lipophilic (fat soluble) to penetrate the blood-brain barrier.

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metastases can be numerous. These often include X-rays, bone scans, computerised tomography (CT) and/or magnetic resonance imaging (MRI). The latter assist in diagnosis, the planning of treatment and in the follow-up of disease and treatment (Britton and Ng, 1998). In the context of CNS metastases, an MRI scan is preferable to a CT one because MRI is more sensitive in detecting small CNS metastases. The investigations undertaken depend on what imaging techniques are locally available (Guerrero and Mead, 2000).

Treatment
When treatment for CNS metastases is being considered and discussed, patients need to understand the purpose of the proposed treatment. Nurses play a pivotal role in ensuring that patients understand not only the practicalities of what is involved but also, most importantly, the consequence of the treatment on them as individuals.

In the case of patients with CNS metastases, medical treatment is generally palliative, aimed at symptom control. Issues such as the maintenance of psychological and physical wellbeing are therefore paramount. Nurses should not underestimate their role when caring for this group of patients, particularly when the patient’s survival is poor, as care issues play a pivotal part. For example, the survival of a patient with brain metastases from lung cancer is approximately three to six months. These patients and their carers require an array of services to maintain their quality of life. Services often include community palliative care teams to ensure that the patient receives expert symptom control.

Surgery
Whether or not surgery will be undertaken will depend on factors such as the location of the tumour/s, the patient’s performance status as well as any other relevant medical history. Neurosurgery carries with it a significant risk of stroke, haemorrhage, neurological impairment and even death, so any neurosurgical option is not to be taken lightly (Addison and Shah, 1998).

Brain surgery: For patients with single brain metastases on MRI, surgical removal of the tumour, if amenable, is generally the preferred option (Brada et al, 2001). Surgical intervention can relieve symptoms caused by tumour pressure as well as provide tissue for histological diagnosis. This is important, as a definitive histological diagnosis will affect subsequent oncological management. Surgery can be in the form of a debulking procedure or biopsy of the lesion.

When considering surgery, the most important factor is to consider the status of the primary tumour. Longer survivals will be expected in patients with absent, controlled, or limited primary disease (Scarantino et al, 2001). Patients with extensive brain metastatic disease, poor performance status and/or uncontrolled systemic disease may just be treated with steroids to improve symptoms.

Spinal surgery: For patients with spinal metastases, a laminectomy to decompress the spinal cord or vertebral body resection to allow for the removal of the tumour can be undertaken. Spinal compression as a consequence of metastatic disease can lead to major disabilities severely affecting a patient’s independence and quality of life. Disabilities such as hemiparesis/plegia, which can render the patient bedbound with urinary and bowel incontinence requiring intimate care such as bladder and bowel management are devastating. Surgery to the spinal metastases may help to preserve mobility and allow for a further period of independence.

Radiotherapy
Radiation treatment is often used to relieve symptoms from solitary or multiple CNS metastases. Radiotherapy can maintain/delay neurological deterioration from brain and spinal metastases and therefore helps in the maintenance of a patient’s quality of life. The type, technique and total dose of radiation given depends on factors such as surgical excision of the metastases and the radiosensitivity of the primary tumour.

Various side-effects are associated with CNS irradiation. These are classified as acute reactions, early delayed reactions and late delayed reactions. Late delayed reactions, in the form of dementia and brain necrosis, tend to happen months to years following radiotherapy. Often, however, patients with CNS metastases have a poor prognosis and do not live long enough for such side-effects to occur.

Generally, when treating CNS metastases with radiation, lower doses are used to palliate symptoms. This helps to avoid unnecessary treatment-related side-effects. Nevertheless, regardless of the total radiation dose given, there are always some specific side-effects associated with this type of treatment. For example, some patients experience an acute reaction after starting radiotherapy. This may manifest as an exacerbation of the patient’s presenting symptoms and occur within 24 to 76 hours of starting treatment. For example, a patient presenting with headaches may experience an initial worsening of these, while another patient with epilepsy may experience an increase in seizure activity. These acute reactions are transient and tend to resolve within a couple of days, although some patients may require a short course of corticosteroids if the condition persists. The aetiology of the acute reaction in not well understood but may be due to tumour or brain oedema, causing an elevation of the intracranial pressure (Posner, 1995).

Early delayed radiotherapy side-effects include skin reactions, hair loss (alopecia) and somnolence (radiation-induced fatigue). Hair loss can be temporary or permanent depending on the total radiotherapy dose given. Erythema often precedes alopecia. It causes discomfort of the treated area and manifests as redness and inflammation. To alleviate the discomfort of erythema, hydrocortisone cream can be applied two to three times a day to the affected skin. During the dry desquamation stage, patients should be advised to use an unperfumed moisturising cream to keep the skin supple. Moist desquamation can maintain/delay neurological deterioration from brain and spinal metastases and therefore helps in the maintenance of a patient’s quality of life. The type, technique and total dose of radiation given depends on factors such as surgical excision of the metastases and the radiosensitivity of the primary tumour.

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REFERENCES


Chemotherapy

Chemotherapy is used in patients with metastatic chemoresponsive tumours. For example, patients with small cell lung cancer and systemic lymphomas may be given chemotherapy treatment appropriate to their primary disease. But one of the limitations of chemotherapy is the blood-brain barrier, which precludes the delivery of many cancer drugs into the CNS.

Side-effects of cytotoxic chemotherapy can be numerous and depend on the drug used. Nurses need to be familiar with the chemotherapeutic régime proposed to a patient so as to be able to provide the best possible care as well as realistic information. The most common side-effects of cytotoxic drugs are nausea and vomiting, bone marrow suppression and hair loss. However, individual cytotoxic drugs have specific side-effects and when they are given in combination, they can enhance the toxic reaction to normal tissue. Site-specific clinical nurse specialists (where available) often provide a supportive as well as educational link, not just to the patient and his/her family but also to community colleagues who often have to provide much of the care when a patient is at home.

Steroids

Steroids in the form of dexamethasone are the most frequently used drugs in neuro-oncology (Evans and Guerrero, 1998). Dexamethasone has a long biological half-life, ranging from 36 to 54 hours. As such, it can be taken once a day, thereby preventing steroid-induced insomnia, which can be experienced if tablets are taken late in the day. Often, patients are started on H2-receptor antagonists such as ranitidine to prevent steroid-induced gastric irritation.

Because steroids have multiple side-effects that are generally not very pleasant, they should be prescribed only when medically required: they are not the panacea for all ills. Common side-effects include cushingoid features, acne, fungal infection, and steroid-induced diabetes. The list of side-effects is exhaustive. Steroids often contribute to alteration in the patient’s body image, which may cause great distress, not just to the patient but also to those close to him/her. Psychological help may be necessary.

Apart from its effect on body image, steroids can give rise to physical handicap such as proximal myopathy. This is often devastating, particularly for patients with existing functional deficits who, as a consequence, become even more disabled. It is best, therefore, not to use steroids if possible. If they are required, the dose used should always be the lowest possible to keep the patient comfortable and avoid unnecessary side-effects.

Organ donation

Patients with metastatic cancer are not deemed suitable as organ donors because of the risk of the transplanted organ containing metastases. Some patients may be distressed by this, particularly those who may have had a long-standing wish to be a donor. Local transplant co-ordinators will be able to provide a list of the types of tumours that a patient may have in order to be considered suitable as an organ donor.

Conclusion

Nurses play a pivotal role in the care of patients with metastatic disease of the central nervous system. This group of patients generally has a poor prognosis, therefore they need to understand that the treatment on offer is being prescribed for symptom control and not as a means of cure or indeed to prolong survival. The benefits of any treatment must be considered carefully, and no treatments should be used as a placebo as this can generate false hope, which is contrary to the principles of good palliative care.

Some patients experience major cognitive as well as physical disabilities, which can make nursing management a particular challenge. It is important that nurses have expert knowledge of the disease process, as this will assist in the planning and delivery of care and may help them detect any potentially devastating problems such as spinal cord compression.

Families of patients with metastatic disease of the CNS are often exhausted, and require support as well as understanding and care. Offering a sympathetic ear and shoulder may be enough support for some families; others may require more structured support – educational and financial as well as psychological.

If clinical trials are discussed with patients, it is important that they are aware of the usefulness of such research for them as individuals so that they and their families are able to make an autonomous decision about the proposed treatment or indeed to plan future care.

The care of patients with CNS metastases is often complex, requiring expertise from the multidisciplinary team. To be able to care for patients effectively, nurses must work closely with their colleagues, whether in hospital or the community.