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Research Article

Analysis of Malignant Spinal Cord Compression Patients Treated In a Radiotherapy Centre

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Abstract: Malignant Spinal cord compression (MSCC) is a common neurologic complication of advanced malignancies where neurologic function may be permanently compromised without immediate medical attention. We aim to review the symptoms and signs of malignant spinal cord compression in patients with malignancies so that patients and all health care professionals are aware of the early symptoms and signs of malignant spinal cord compression for early diagnosis and treatment so as to prevent permanent neurologic damage. From 2005 to 2011, 53 patients were hospitalised for spinal cord compression due to metastatic cancer. Data were obtained from medical notes, radiotherapy and radiology databases. 53 patients were surveyed, 32 (60.4%) were male while 21 (39.6%) were female. 21 (39.6%) had breast malignancy, 54.7% prostate, 1.9% soft tissue, and 3.8% renal cancer. 43(81.1%) had previous knowledge of malignancy while 10 (18.1%) did not. Only 1(1.9%) case was stage I, 13 (21.2%) stage II, 14 (26.4%) stage III, 24 (45.3%) stage IV at the time of initial (diagnosis)presentation. Thirty five point nine percent (35.9%) had lumbar vertebrate cord compression, 24.53% had lumbar with thoracic vertebrae, 11.32% had lumbar with sacral, (1.9%) each for cervical and sacral vertebrates compression, while 3(5.7%) had metastatic deposit in all their vertebrae. 36 (67.9%) had radiotherapy, 15 (28.3%) chemotherapy with radiotherapy and 1 (1.9%) patient received neither. The time lapse between onset of symptoms and commencement of therapy is vital in determining the prognosis of malignant spinal cord compression.
Keywords: Malignant, spinal cord, compression, Radiotherapy, malignancy, neurologic, prognosis

INTRODUCTION

Malignant Spinal cord compression (MSCC) is a common neurologic complication of advanced malignancies where neurologic function may be permanently compromised without immediate medical attention.[1]
It is defined as the compression of the dural sac and its contents by an extradural tumour mass.[2]

Metastasis to the spinal column occurs in 3-5% of all patients with cancer, most commonly those with breast cancer, prostate cancer and lung cancer, in whom the incidence may be as high as 19%. Up to 40% of all cancer patients develop spinal metastasis. Ten to twenty per cent of these may produce symptomatic cord compression. A population based study in Canada estimated that at least 2.5% of all people with cancer experienced one or more episodes of spinal cord compression in the five years preceding death.[3] Non-Hodgkin's lymphoma, myeloma and renal cell carcinoma account for 5%-10% each, and colorectal carcinoma, sarcoma & primary cancer of unknown origin account for most of the remaining cases.[4] These may cause pain, vertebral collapse and malignant spinal cord compression.[5]

Breast and lung cancer typically cause thoracic lesions, whereas colon and pelvic carcinomas commonly affect the lumbosacral spine.[6] Rapid onset (less than 48hrs) and progression of symptoms are poor prognostic indicators. Patients who are not mobile at presentation do not generally regain the ability to walk. Of patients who are paraplegic pretreatment, only 10% will regain ambulation after treatment. If the patient has been paralysed for more than 48hrs, the chance of neurological recovery is poor.[7]

We aim to review the symptoms and signs of malignant spinal cord compression in patients with malignancies so that patients and all health care professionals are aware of the early symptoms and signs of malignant spinal cord compression for early diagnosis and treatment so as to prevent permanent neurologic damage.

EXPERIMENTAL SECTION

From 2005 to 2011, 53 patients were hospitalised for spinal cord compression due to metastatic cancer. Data were obtained from medical notes, radiotherapy and radiology databases. Spinal cord compression occurred commonly in ages above 65years.

RESULTS:

53 patients were surveyed, 32 (60.4%) were male while 21 (39.6%) were female. 21 (39.6%) had breast malignancy, 54.7% prostate, 1.9% soft tissue, and 3.8% renal cancer. 43(81.1%) had previous knowledge of malignancy while 10 (18.1%) did not.

Table 1: Shows the demographic profile of the study Population (n=53)

PARAMETER	**NUMBER (PERCENTAGE)**
SEX	
Male	32 (60.4)
Female	21 (39.6)
AGE	
31-40	11 (20.8)
41-50	9 (17.0)
51-65	14 (26.4)
ABOVE 65	19 (35.8)

Table 2: Showing the distribution of malignancies/histological grades, subjective knowledge of malignancy, stage at presentation and duration between diagnosis and onset of cord compression symptoms

PARAMETER	NUMBER (PERCENTAGE)
MALIGNANCY	
Breast	21 (39.6)
Prostate	29 (54.7)
Soft tissue	1 (1.9)
Renal	2 (3.8)
PREVIOUS KNOWLEDGE OF MALIGNANCY	43 (81.1)
Yes	10 (18.1)
No	
STAGE AT PRESENTATION	
I	1 (1.9)
II	13 (24.5)
III	14 (26.4)
IV	25 (47.2)
DURATION BEFORE PRESENTATION	7 (13.1)
<6Months	4 (3.8
6Months – 1year	1(1.9)
>2yrs	
DURATION BETWEEN MALIGNANCY AND ONSET OF CORD COMPRESSION	9 (17.0)
At presentation	15 (28.3)
<12months	20 (37.7)
12-24months	9 (17.0)
>24months	
HISTOLOGICAL GRADE OF THE TUMOR	1 (1.9)
High grade	2 (3.8)
Intermediate grade	50 (94.3)
Unknown	

Onset of cord compression was noticed in 9 (17%) of the patients at presentation, 15 (28.3%) in less than 12 months after diagnosis, 20 (37.7) in between 12 and 24 months, and 9 (17%) 24months after diagnosis. 39.6% were investigated through X-ray, 24.5% with MRI, 1.9% with CT-Scan and MRI. Thirty five point nine percent (35.9%) had lumbar vertebrate cord compression, 24.53% had lumbar with thoracic vertebrae, 11.32% had lumbar with sacral, (1.9%) each for cervical and sacral vertebrates compression, while 3(5.7%) had metastatic deposit in all their vertebrae.
36 (67.9%) had radiotherapy, 15 (28.3%) chemotherapy with radiotherapy and 1 (1.9%) patient received neither.

Only 1(1.9%) case was stage I, 13 (21.2%) stage II, 14 (26.4%) stage III, 24 (45.3%) stage IV at the time of initial (diagnosis)presentation.

13.2% had been diagnosed with malignancy in less than 6 months before presentation at the Radiotherapy facility, while 3.8% presented between 6 months and one year ,and 1.9% presented was more than 2 years later.

Table 3: Shows the distribution of Investigations done, vertebrae affected and treatment modalities

PARAMETER	NUMBER (PERCENTAGE)
INVESTIGATION DONE	
Bone X-ray	21 (39.6)
Bone/CT Scan	10 (18.9)
MRI	13 (24.5)
X-Ray + Bone/CT-Scan	3 (5.3)
X-Ray +MRI	4 (7.5)
CT-Scan + MRI	1 (1.9)
None of the Above	1 (1.9)
VERTEBRAE AFFECTED	
Cervical	1 (1.9)
Thoracic	5 (9.4)
Lumbar	19 (35.8)
Sacral	1 (1.9)
Sacral +Lumbar	6 (11.3)
Sacral+ Lumbar+ Thoracic	5 (9.4)
Lumbar+ Thoracic	13 (24.5)
Entire	3 (5.7)
TREATMENT MODALITIES	
Radiotherapy	36 (67.9)
Chemotherapy + Radiotherapy	15 (28.3)
All of the above	1 (1.9)
None of the above	1 (1.9)

DISCUSSION

The effect of time delay in the interval between onset of symptoms and commencement of therapy may result in deterioration in ambulatory function and may cause irreversible damage.[8]

Loblaw et al describes a cumulative probability of experiencing at least one episode of

malignant spinal cord compression in the 5 years preceding death from cancer of 2-5% overall with a 40-fold variation in the cumulative incidence of malignant spinal cord compression among different types of cancer.[9]

MSCC usually present with a history of progressive back pain, paralysis, sensory loss and loss of sphincter control.[9]

From our study, it was discovered that spinal cord compression occurred commonly in ages above 65 and the median is between 51 and 65 which is comparable to the median age of 65 in a study carried out by Loblaw et al 2003.[9]

Advanced breast, prostate and lung cancer have the highest incidence of MSCC among all cancers.[9] In our study incidence of MSCC were 29(54.7%), 21(39.6%), 2(3.8%), 1(1.9%) in prostate, breast, soft tissue sarcoma and renal cell cancer, respectively.

The site of metastasis is proportional to the volume or mass of bone in each region; 60%to 70% of metastasis occur in the thoracic spine which has a smaller ratio of spinal cord canal diameter than the other spinal segments.[10, 11] Multiple contiguous levels 10%-38%, lumbar spine 20% and cervical spine 10%.[11, 12]

From our study, MSCC involving the thoracic spine account for 9.4% while that involving thoracic and lumbar 24.5%, lumbosacral and thoracic was 9.4%. Involvement of lumbar spine alone was 35.8% and lumbosacral was 11.9%. MSCC involving the entire spine was 5.7%.

This revealed that thoracic spine whether alone or in combination with other segment (i.e. Lumbar or sacral) account for the most common site of cord compression from our study.

Back pain is the most common symptom, occurring in 83-95% of patients, hours to months before the compression is diagnosed, but it is not an independent predictive factor.[13]

The location of pain does not always correspond to the site of compression. In a prospective study of patients with spinal cord compression, the site of the pain and the sensory levels did not predict the site of the compression. 54% of patients with T1-T6 compression had lumbosacral pain and a like percentage of patients with lumbosacral compression had thoracic pain. In only 16% of patients did the sensory level correlate with the level of compression seen on magnetic resonance imaging (MRI).[4]

Other common symptoms after pain included radiculopathy, weakness, sensory changes (e.g.paraesthesias, loss of sensation), sphincter incontinence and autonomic dysfunction. Upper motor neuron weakness is usually symmetric. Early lower motor neuron weakness is often asymmetric and begins in the distal extremities, as do sensory findings.[14]

MRI is the gold standard in detecting epidural metastatic disease and frank cord compression (sensitivity 95%, specificity 97%; overall accuracy 95%).[15]

From our study, 39.6% of the MSCC was diagnosed by plain X-Rays which have inadequate sensitivity and false negative rate of 10-17%. Vertebral metastasis is visible on X-Ray films only when 50% of the bone is lost. In addition, 25% of patients with MSCC have no bone loss.

Loblaw et al suggested that a longer interval between diagnosis and presentation of MSCC symptoms reflects tumours with a less aggressive biology. It was also found that large differences in survival existed amongst different disease groups and these differences may be essential in making treatment decisions. Take for example, lung cancer patients who develop MSCC may be poor candidates for aggressive interventions since few live long enough to benefit, as compared to prostate cancer or myeloma patients who may benefit because they are longer-term survivors and aggressive treatment would be justified in their case.[9] 17% of the patients present with spinal cord compression at presentation while 28.3%,37.7% and 17% present at <12 months, between 12 and 24 months and more than 24 months respectively.

It is believed that they will have faster and more complete functional recovery if treatment is started when the patent has more intact neurology. Hence, it is of great importance to educate this group of patients to recognize the symptoms and signs of MSCC and to seek help on time.

The goal of therapy is palliative and it is aimed at relieving the pain, decompressing the spinal cord by debulking the tumour and maintaining ambulation.[16]

Various options include opium, corticosteroid, radiotherapy, surgery, chemotherapy and Biophosphonate.

Opiums are needed to control the pain from malignant cord compression while corticosteroids reduce injury from traumatic spinal cord injury presumably via their antioxidant or antioxidant like activity, reducing the release of total free fatty acids and prostenoids and peroxidation.

Dexamethasone inhibit prostaglandin E2 and vascular endothelial growth factor production and activity and therefore decrease vasculogenic oedema.[14] However, a phase II trial by Maranzano et al reported that corticosteroids may not be necessary for patients with good motor functions.[17] Aggressive treatment to relieve constipation resulting from

autonomic dysfunction, Opiods or inactivity will prevent pain from the use of the Valsalva maneuver.[18]

Post radiation ambulation outcome depend on certain identified prognostic factor which include E COG performance status, type of primary tumour, interval between primary tumour diagnosis and malignant spinal cord compression, visceral metastasis at the time of radiation.[19]

Ambulation outcome after radiotherapy depend on pretreatment ambulation and bony compression. In a pooled studies where ambulation before and after radiotherapy were reported, it was found that patients without bony compression treated with radiotherapy who are ambulatory, ambulatory with assistance, paraparetic or paraplegic, have ambulatory rates of 100%, 94%,60% and 11% respectively. In contrast, 92%,65%,43% and 14% respectively of patients where bony compression is not excluded retain or regain ambulation (with or without ambulation). Patients with bony compression particularly those who have mild to moderate paraparesis, who are treated with radiotherapy seem less likely to recover ambulation compared with paretic patients without bony compression.Surgical decompression followed by radiotherapy in patients with bony compression resulted in ability to walk as reported by patchell et al.[20]
Chemotherapy and hormonal therapy in hormone sensitive tumour is effective in the epidural space because it is the only systemic side. These has been used sometimes effectively for patients with Hodgkins disease, and for non-Hodgkins disease, breast cancer or neuroblastoma, and prostate cancer.[4]

CONCLUSIONS

The effect of time delay in the interval between onset of symptom and commencement of therapy may result in deterioration in ambulatory function and may cause irreversible damage.

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