

# Epidural spinal cord compression: A single institution's retrospective experience

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Epidural spinal cord compression (ESCC) is a common metastatic complication occurring in 5% of patients with cancer. We sought to determine retrospectively the frequency of multiple sites of ESCC at presentation and the risk of recurrence of ESCC. Of the cancer patients seen by the University of California San Diego's Neuro-Oncology Service between August 1986 and January 1997, 108 developed ESCC that was documented both clinically and by MRI of the spine. In 77 patients (71%), a single site of ESCC was seen; 31 patients (29%) had multiple sites of ESCC. All sites of ESCC were irradiated. In 7% of patients with single-site ESCC and in 9% of patients with multiple-site ESCC, the disease recurred. Length of survival was similar for patients with single- or multiple-site ESCC (median, 4.5 months) versus patients with recurrent ESCC (median, 7 months). An MRI of the entire spine in patients with suspected ESCC demonstrated multiple sites of ESCC in nearly one-third of patients. In 8% of patients with ESCC, symptomatic ESCC recurred. *Neuro-Oncology* 1, 120-123, 1999. (Posted to *Neuro-Oncology* [serial online], Doc. 98-02, April 30, 1999. URL <[neuro-oncology.mc.duke.edu](http://neuro-oncology.mc.duke.edu)>)

Compression of the spinal cord by tumor mass represents a major cause of morbidity in 1 of 5 cancer patients (Barron et al., 1959; Black, 1979; Boogerd and van der Sande, 1993; Chamberlain et al.,

1990; Gilbert et al., 1978; Rodichok et al., 1986). Barron et al. (1959) has estimated that ESCC<sup>2</sup> develops in 5% of patients with cancer who come to autopsy. Black (1979) has estimated that approximately 18,000 new cases of ESCC occur annually in the United States.

The frequency of MEM has variously been reported from 3-30% (Helwig-Larsen et al., 1995; Kaminski et al., 1991; van der Sande et al., 1990).<sup>3</sup> However, most studies have used myelography, and in most, myelography did not encompass the entire spine (Helwig-Larsen et al., 1995; Kaminski et al., 1991; van der Sande et al., 1990). Additionally, the frequency of a second occurrence of ESCC following initial treatment has not been well defined.

This retrospective study of 108 cancer patients, evaluated by the University of California San Diego's Neuro-Oncology Service using complete-spine MRIs, defines both the frequency of MEM at presentation and the recurrence risk of ESCC.

## Patients and Methods

### Study Population

Of 108 patients ranging in age from 26 to 77 years (median age, 52), 55 men and 53 women with pathologically documented cancer developed ESCC (Table 1). All patients were seen by the University of California San Diego's Neuro-Oncology Service between August 1986 and January 1997. All data were collected retrospectively. In 80 patients (74%), the disease was active and systemic. In 28 patients (26%), systemic disease was either stable (18%) or in remission (8%).

Patients presented with either pain only ( $n=64$ ; 59%) or pain plus a neurologic disturbance ( $n=44$ ; 41%). The latter group included patients with myelopathy (19; 18%), radiculopathy (14; 13%), cauda equina syndrome (6; 6%), plexopathy (3; 3%; 1 brachial and 2 lumbosacral), and conus medullaris syndrome (2; 2%). The

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<sup>2</sup>Abbreviations used are as follows: ESCC, epidural spinal cord compression; MEM, multiple epidural metastases.

<sup>3</sup>Schiff, B., and O'Neill, B.P. (1997) Neuroimaging implications of multiple spinal epidural metastasis. Platform presentation at the Second Annual Meeting of the Society for Neuro-Oncology. Charlottesville, Virginia, personal communication.

**Table 1.** Tumor histology and number of sites of epidural spinal cord compression

Tumor histology <sup>a</sup>	No. of sites of ESCC			% Multiple sites of ESCC
	One	Two	Three	
Breast (32)	21	10	1	34
Lung (26)				
Non-SCLC (10)	12	3	1	25
SCLC (10)	7	3	0	30
Prostate (22)	16	5	1	27
Non-Hodgkin's lymphoma (10)				
Non-AIDS (6)	4	2	0	33
AIDS-related (4)	3	1	0	25
Melanoma (8)	5	2	1	37.5
Adenocarcinoma unknown primary (5)	4	1	0	20
Renal (2)	2	0	0	0
Gastric (1)	1	0	0	0
Colon (1)	1	0	0	0
Sarcoma (1)	1	0	0	0

AIDS, acquired immunodeficiency syndrome; ESCC, epidural spinal cord compression; SCLC, small-cell lung cancer.

<sup>a</sup>The numbers in parentheses are the number of patients.

group consisted of both ambulatory (74%) and nonambulatory (26%) patients, the latter divided equally between weight-bearing (walked only with assistance; 13%) and non-weight-bearing (13%) individuals.

### MRI

All patients underwent complete-spine MRI performed on a 1.5-T superconducting magnet (SIGNA, General Electric, Milwaukee, WI) using T<sub>1</sub>-weighted sagittal imaging and T<sub>1</sub>-weighted axial imaging of regions of interest. Gadolinium-pentetic acid dimeglumine contrast (Berlex Laboratories, Cedar Knolls, NJ) was given following non-contrast T<sub>1</sub>-weighted sagittal and axial imaging. ESCC was defined by a clinically consistent syndrome and neuroradiographically by spine MRI evidence of a mass both effacing the thecal sac and, at a minimum, contacting the spinal cord. Multiple epidural lesions were defined by lesions separated by at least one vertebral body.

### Radiotherapy Schedule

All patients were treated with irradiation from 6-mV photon beams given with two parallel-opposed anterior and posterior fields encompassing the site of ESCC and one vertebral body above and below the lesion. A total dose of 30 Gy was given in 3.0-Gy fractions over 10 consecutive days to each ESCC lesion in the manner described above. The first dose of irradiation was given within 2–16 h (median, 8 h) after diagnostic spine MRI. All sites of ESCC were treated including distant asymptomatic sites of ESCC. All patients received 16 mg of oral dexamethasone daily given as 4 mg four times per day at time of diagnosis of ESCC. Dexamethasone was maintained at 16 mg per day during the first week of radiotherapy and subsequently tapered as patients' clinical status permitted. No standard protocol was used for tapering of dexamethasone dose.

### Evaluation

Neurological examination was performed at time of diagnosis, weekly during radiotherapy, and monthly thereafter. Repeat spine MRI was performed for clinically suspected recurrent ESCC irrespective of site of involvement. An attempt was made in all patients to taper oral dexamethasone, which was instituted at the first evaluation for ESCC.

## Results

A single site of ESCC was demonstrated in 77 patients (71.3%). Multiple sites of ESCC (MEM) were seen in 31 patients (28.7%), of whom 27 (25%) had two sites of involvement and 4 (3.7%) had three sites of involvement. All patients with MEM had only a single symptomatic site. No significant differences were seen between the number of sites of ESCC by tumor histology as seen in Table 1.

Concurrent metastatic disease to the CNS was seen in 26 patients (25%), of whom 20 (19%) had parenchymal brain metastases (multiple in 12; solitary in 8), and 6 (6%) had leptomeningeal metastases. Among patients with concurrent metastatic disease to the CNS, 75% had a single site of ESCC and 25% had MEM. These percentages were not significantly different from those of patients without concurrent CNS metastatic disease.

Of 80 patients with active systemic cancer, 60 (75%) were treated with a variety of tumor-specific chemotherapy regimens. All patients with parenchymal brain metastases (*n*=20) were symptomatic and were treated with whole-brain irradiation (30 Gy given in 10 3-Gy fractions). Six patients with leptomeningeal metastases were treated with single-agent regional chemotherapy.

Radiotherapy treatment of ESCC is outlined in Table 2; 144 sites of ESCC were identified and treated as follows: 1 site, 77 patients; 2 sites, 27 patients; and 3 sites,

**Table 2.** Radiotherapy treatment of epidural spinal cord compression

Radiotherapy	No. of patients	No. of sites	% Sites by spinal level
Spine	108	144	100.0
Cervical	11	15	10.4
Thoracic	76	97	67.4
Lumbar	21	32	22.2

ESCC, epidural spinal cord compression.

4 patients. Regional site of involvement of ESCC is seen in Table 2. Oral dexamethasone was given to all patients (median dose, 16 mg; range, 4–32 mg). Most patients (92) were successfully tapered off oral dexamethasone; however, some (16) required continuation of dexamethasone for either control of pain or neurologic symptoms.

Improvement in pain occurred in 75% of patients; neurologic deficit improved in 60%. In 35% of patients neurologic deficit(s) stabilized and in 5% of patients neurologic deficit(s) deteriorated. Functionally, all ambulatory patients remained ambulatory after treatment. Among nonambulatory patients, 80% of the weight-bearing individuals improved (two-thirds walked independently and one-third walked with an assistive device) and 20% remained stable. In non-weight-bearing patients, 5% improved, manifested as weight-bearing; 80% remained stable; and 15% deteriorated.

Length of survival is seen in Table 3. Survival was determined from time of diagnosis of ESCC to time of death. Six patients (7%) with a single site of ESCC had a recurrence, one patient at a site previously irradiated and five patients at a new site. Similarly, three patients (9%) with MEM had a recurrence, one patient at a site previously irradiated and two patients at a new site. Survival and recurrence rates in patients with initial single- or multiple-site ESCC did not appear different from those in patients with recurrent ESCC; however, the number of patients analyzed for these outcomes was small, and differences that were statistically significant would only have been seen in a larger study population. All episodes of recurrent ESCC were at a single site.

## Discussion

This retrospective study highlights several important features regarding the care and management of patients with ESCC. First, complete-spine imaging is necessary in all patients with suspected ESCC due to the high incidence of multiple sites of involvement. The frequency of multiple sites in this study (28.7%) corresponds with that

**Table 3.** Length of survival as a function of number of sites of epidural spinal cord compression

Patient groups (no. of patients)	Survival (months)	
	Median	Range
Single presentation of ESCC (99)		
One site (71)	4.5	1–22
Multiple sites (28)	4.0	1–14
Recurrent ESCC (9)		
One site initially (6)	7.0	8–22
Multiple sites initially (3)	7.5	3.5–14

ESCC, epidural spinal cord compression.

reported by Helwig-Larsen (1995) from Denmark (35%) and Schifft (1997)<sup>3</sup> from the Mayo Clinic (31%). Cervical spine MRI in patients with symptomatic lumbar or thoracic ESCC had the lowest yield for detecting MEM; only 3 lesions (4.5%) were detected among a total of 66. Nonetheless, sagittal T<sub>1</sub>-weighted MRI of the entire spine is a both rapid and sensitive screening test, associated with modest cost.

Second, ESCC may recur, and in this series, approximately 8% of patients manifested a second symptomatic recurrence, predominantly at a new and distant site. Therefore, patients and physicians need to maintain a high vigilance for possible disease recurrence because timely treatment effectively palliates and maintains neurologic quality of life.

Finally, the decision to treat asymptomatic sites of ESCC and its impact on ESCC recurrence is problematic. We recommend, as does the Mayo Clinic, treatment of asymptomatic sites, whereas Helwig-Larsen et al. advocates no treatment of asymptomatic sites of MEM (Helwig-Larsen, 1995). Notwithstanding these different approaches, approximately 8% of patients have recurrent symptomatic ESCC. Our definition of asymptomatic ESCC and that of the Mayo Clinic were defined similarly. However, that of Helwig-Larsen is less precise, making direct comparisons difficult (Helwig-Larsen, 1995). The best management therefore for asymptomatic sites of ESCC is unclear and would best be addressed by a randomized phase III clinical trial.

In conclusion, multiple sites of ESCC are frequent, occurring in approximately one-third of patients who present with a single symptomatic site. Consequently, the entire spine needs to be imaged, optimally with a screening sagittal-spine MRI. Furthermore, recurrent ESCC seen in 8% of patients indicates that patients treated with ESCC need follow-up and evaluation for possible disease recurrence.

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