

# Treatment of Patients With Spinal Metastases From Head and Neck Neoplasms

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**Background:** Spinal metastases are uncommon in patients with advanced head and neck cancer. Treatment strategies in this patient group have not been defined. Although it has been established that neurologic dysfunction in patients with spinal metastases and cord compression constitutes an oncologic emergency, the role of surgical treatment remains controversial.

**Objective:** To clarify the treatment options in patients with head and neck cancer who develop spinal metastases.

**Methods:** The clinical course of patients seen at our institution with head and neck neoplasms and spinal metastases from January 1992 to January 2000 was reviewed.

**Results:** Eleven patients were identified. Nine developed spinal metastases more than 3 months after the diagnosis of advanced head and neck cancer. The other 2 presented with synchronous spinal involvement and skull base neoplasms. Patients without neurologic symptoms were offered intravenous steroids and palliative radia-

tion. Patients with neurologic symptoms were treated with either intravenous steroids and radiation or surgical decompression and spinal fusion. In 1 patient, no improvement occurred within the first 2 days of radiotherapy, and the patient underwent surgical decompression. Patients with an unstable spine underwent surgical decompression and spinal fusion. Patients with a life expectancy of more than 6 months and neurologic symptoms were offered surgical therapy. In the 9 patients with advanced cancer, the average survival time was 3 months. Two of these patients have survived longer than 6 months.

**Conclusions:** We propose that surgical decompression is a viable, justifiable option for selected patients with advanced head and neck cancer and spinal cord compression. Furthermore, we recommend surgical decompression as a first option in patients with an unstable bony spine and/or in whom survival is expected to be longer than 6 months. Finally, we propose a patient management algorithm in these cases.

*Arch Otolaryngol Head Neck Surg.* 2002;128:539-543

**E**PIDURAL SPINAL cord compression from metastatic disease constitutes a major source of morbidity for cancer patients. More than one third of patients with spinal compression and neurologic symptoms will develop complete, irreversible paraplegia within 1 week if treatment is delayed.<sup>1,2</sup> Early detection and treatment of spinal compression result in improved quality of end-stage life in patients with advanced cancer. The most important factor in determining neurologic outcome in this setting is the degree of preserved neurologic function before treatment.<sup>2-4</sup> Overall, the incidence of spinal metastases from cancer is approximately 5%<sup>1,5</sup>; in certain malignancies, such as lung and breast carcinomas, it may be as high as 12% to 20%.<sup>6</sup> The incidence of spinal metastases from head and

neck cancer seems to be lower, with previous reports<sup>4,7</sup> estimating it to be less than 2%. Most of the literature dealing with spinal compression in head and neck cancer is limited to case reports and small case series. Management strategies in this patient population have not been defined.

In general, treatment modalities for spinal compression from metastatic cancer include intravenous steroids, radiation therapy, and/or surgical decompression. Although individual tumor and case-specific characteristics may help determine which treatment modality to use, the management decision is not always clear. It has been shown that the average length of survival after spinal metastases varies significantly, depending on the primary cancer site. Enkaoua et al<sup>8</sup> showed that patients with spinal metastases from thyroid tumors survived

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## METHODS

A retrospective review was performed of all patients with spinal involvement from head and neck neoplasms at our institution from January 1992 to January 2000. Patient age, stage of primary tumor, treatment of primary tumor, location of spinal metastases, presenting symptoms, treatment of spinal metastases, outcome, and survival were recorded in each case. The motor function scale as outlined by Greenberg et al<sup>11</sup> was used as an index to determine neurologic response to treatment.

significantly longer than those with metastases from unknown primary or renal tumors. It has been proposed that radioresistant malignancies (such as lymphoma and small cell lung cancer) with cord compression should be treated with surgery as the first step if there are no contraindications and the life expectancy is longer than 6 months.<sup>9</sup> If no known history of cancer exists, then surgery should be performed, not only as a therapeutic but also as a diagnostic measure. On the other hand, because of potential associated morbidity, it has been argued that surgery should be deferred in patients with a short life expectancy, comorbid disease, or poor performance status.<sup>9,10</sup> These characteristics are common in patients with advanced head and neck cancer, and therefore, primary surgical treatment of the spinal metastases remains controversial. The purpose of our study is to clarify the treatment options in patients with head and neck cancer who develop spinal metastases by reviewing our experience and analyzing the established literature.

## RESULTS

Eleven patients were identified. Nine developed spinal metastases with epidural compression at least 3 months after the diagnosis of advanced (stage III through stage IV) head and neck cancer. Two others presented with synchronous spinal involvement and skull base neoplasms. Specifically, the primary sites (before discovery of metastases) consisted of 7 stage IV squamous cell carcinomas of the head and neck (which in turn included 4 of the oropharynx, 1 of the larynx, 1 of the hypopharynx, and 1 of the parotid gland), 2 stage IV adenoid cystic carcinomas of the maxillary sinus, 1 temporal bone epithelioma, and 1 skull base chordoma. In the 9 patients with advanced cancer, the average survival time was 3 months (range, 2 weeks to 9 months). Two of these patients survived longer than 6 months. The location of the spinal metastases was varied, involving the cervical spine in 4 cases, both the cervical and thoracic spine in 4 cases, and the thoracolumbar spine in 3 cases. Synchronous metastases were present in 4 patients. Three of these patients had adenoid cystic carcinoma as their primary malignancy. The average survival time of the patients with mul-

iple metastatic sites at the time of spinal metastasis presentation was 3.5 months. One other patient developed multiple other metastatic sites months after treatment to the spinal metastasis site.

All patients presented with severe, progressive spinal or back pain requiring high doses of narcotic medication. The pain improved in all cases, regardless of treatment. It, however, continued to be a source of morbidity for all 11 patients. Patients with life expectancies of longer than 6 months, unstable spinal cords, or good performance statuses were treated primarily with surgery. All patients were given intravenous steroids once neurologic dysfunction developed. The 4 patients without neurologic compromise were treated for pain, primarily with radiation therapy. Of these, 1 did not respond and underwent surgical tumor extirpation and spinal decompression.

Of the 7 patients with neurologic dysfunction, 5 presented with grade I (ambulatory without assistance and weakness), 1 with grade II (not ambulatory but able to move legs against gravity), and 1 with grade IV (paraplegia) neurologic function on the Greenberg scale. The grade I patients had numbness and weakness in the involved spinal dermatome. Of these, 3 patients underwent surgery, 1 underwent radiation therapy (2000 rad [20 Gy] with 2.2 mCi [81.40 MBq] of strontium chloride Sr 89), and 1 refused radiation or surgery. All of these patients resolved their neurologic symptoms except for the patient who refused treatment, who progressed to a grade III (unable to move legs against gravity but can contract muscles) Greenberg score and died after 3 months. One patient presented with the spinal metastasis while undergoing treatment, in the form of radiation and chemotherapy, to the primary site. He presented with grade II function and underwent decompressive laminectomy with spinal fusion. He improved to grade I postoperatively, but died 1 month later. The patient who presented with non-acute paraplegia (grade IV neurologic function) had metastatic adenoid cystic carcinoma. He underwent emergent, high-dose (6000 rad [60 Gy]) radiotherapy and improved to grade I, regaining his ability to ambulate. These results are summarized in the **Table**. The following is an illustrative case example.

Patient 1 was a 50-year-old man who presented with an exophytic mass of his left tonsil and tongue base and had multiple, ipsilateral, enlarged neck nodes. A biopsy specimen confirmed the oropharyngeal mass to be a squamous cell carcinoma. On clinical and radiologic examination, the lesion was staged as T3 N2b M0 according to the TNM staging system. The patient was randomized in a study protocol to receive radiation therapy (7000 rad [70 Gy] to the primary and neck metastases) and chemotherapy (3 cycles of cisplatin and 5-fluorouracil) as primary treatments. The masses resolved with treatment. Six weeks after completion of radiation, a left modified radical neck dissection was performed. No residual tumor remained in the neck. Six months after original presentation, the patient developed severe pain behind his left ear along with a rapidly growing mass of his left mastoid. The mass was diagnosed as metastatic squamous cell carcinoma. The patient underwent left lateral temporal bone resection, which provided him with good pain relief. One month later, the patient returned with

## Patient Characteristics

Patient No.	Patient Date of Birth*	Primary Metastasis† (Date of Occurrence‡)	Spinal Metastasis (Date of Occurrence‡)	Other Metastases	Greenberg Grade and Symptoms	Treatment	Outcome	Survival Time
1	11/16/1948	T3 N2b tonsil SCC (12/1998)	C6, C7, T1 (6/1999)	Temporal bone, lung	Grade I; weakness, pain	Decompression, fusion, steroids	Grade 0; full use of arm	13 mo
2	1/30/1941	T4 N2 base of tongue SCC (7/1996)	C5-C6 (6/1997)	None	Grade I; weakness, pain	Steroids, refused radiation therapy, surgery	Grade III; nonambulatory, pain	3 mo
3	3/7/1938	T4 N2c base of tongue SCC basaloid (12/1993)	C5, T2 (1/1997)	Lung	Grade I; weakness, pain	Radiation therapy (2000 rad [20 Gy]) and strontium chloride Sr 89 (2.2 mCi [81.40 MBq])	Grade 0; improved pain	1 mo
4	10/2/1960	Epithelioid hemangioma (5/1999)	C1 (5/1999)	None	Grade I; weakness, pain	Decompression, halo	Grade 0; resolved pain	Alive 12 mo
5	5/23/1985	Chordoma (3/1999)	C2-4 (3/1999)	None	Grade I; weakness, pain	Decompression, C2-4 fusion	Grade 0; resolved pain	Alive 9 mo
6	6/4/1927	TX N3 neck SCC (3/1999)	C3, C4 (5/1999)	None	Grade II; nonambulatory, pain, incontinence	Decompression, C2-6 fusion, steroids chemotherapy with cisplatin and fluorouracil	Grade I; ambulatory	1 mo
7	5/31/1953	T4 N0 maxillary, adenoid sinus cystic (8/1994)	T12 (8/1996)	Liver, lung	Grade IV; paraplegia, pain	Radiation therapy (6000 rad [60 Gy]) and steroids	Grade I; ambulatory	2 mo
8	10/6/1961	T4 N0 maxillary sinus adenoid sinus cystic (1/1998)	C6-T2 (5/17/1999)	Liver, lung	Neck pain	Radiation therapy (3000 rad [30 Gy]) decompression, C5-T1 fusion, steroids	No improvement; improved pain	7 mo
9	9/22/1935	Parotid SCC (8/1996)	T11-L5 (7/1997)	None	Low back pain	Radiation therapy (250 rad [2.5 Gy]), steroids	Mildly improved pain	2 wk
10	5/7/1962	T3 N2b tongue base adenoid cystic (4/1993)	T10-L2 (8/1997)	Lung	Low back pain	Chemotherapy with etoposide, radiation therapy (3600 rad [36 Gy]), steroids	Continued pain, worsening; improved pain	5 mo
11	1/1/1938	T4 N2c hypopharynx SCC (3/1994)	T12-L1 (5/1997)	None	Low back pain	Radiation therapy (2000 rad [20 Gy]), intravenous dexamethasone	Improved pain	5 mo

\*Given as month/day/year.

†SCC indicates squamous cell carcinoma.

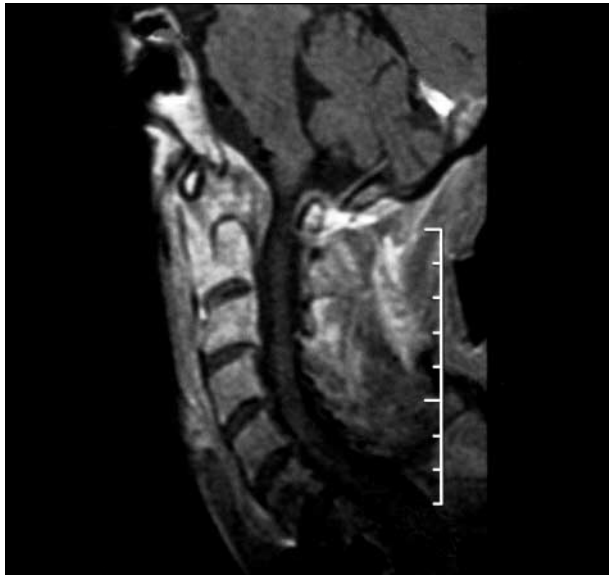
‡Given as month/year.

numbness and weakness of his right arm and posterior low cervical spine pain. Magnetic resonance imaging of his spinal cord showed a mass at the C6 through T1 vertebrae, causing collapse of the T1 vertebral body and secondary central spinal stenosis. He underwent anterior spinal decompression and fusion of the involved segments. As an inpatient, his cervical pain was treated with intravenous morphine. Postoperatively, his pain was much improved, and the patient was prescribed oral oxycodone elixir and discharged from the hospital. Four months after his spinal surgery, the patient developed another spinal metastasis at the high dens process of C2 (**Figure 1**). He again underwent decom-

pression and fusion. Two months later (13 months after his original presentation), he died with diffuse distal metastases.

### COMMENT

The treatment of patients with spinal metastases is difficult. Consideration must be given to the patients' overall survival expectancy, health status, and degree of neurologic involvement. Few series have addressed this problem in patients with head and neck cancer, and this review attempts to clarify the issue. Unfortunately, with only a small number of patients in the series, it is not

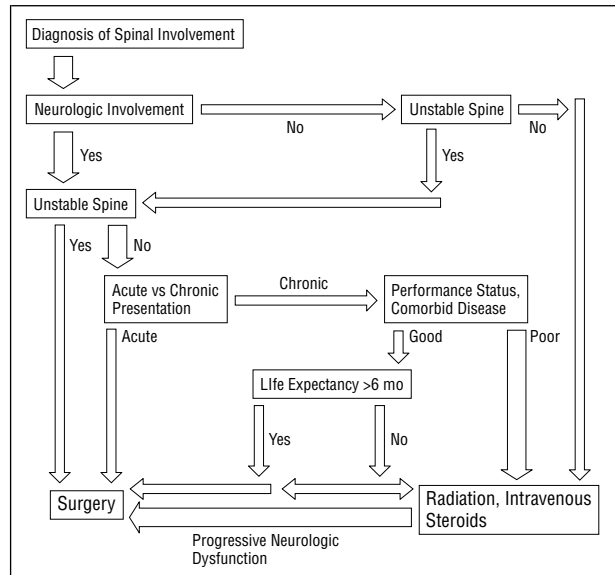


**Figure 1.** Sagittal T1-weighted magnetic resonance contrast-enhanced image showing metastases to the high cervical spine with secondary spinal stenosis.

possible to arrive at clear-cut conclusions based on hard statistical data. However, by combining our experience with proposed treatment plans in patients with spinal metastases from other neoplasms described in the literature, a preliminary management algorithm can be formulated for patients with head and neck cancer.

Some authors<sup>8,12,13</sup> have argued that the choice of surgical treatment depends on the type of primary cancer and the extent of disease spread. These reviews have shown that spinal metastases from certain primary tumors, such as thyroid and renal cancers, are associated with survival times of longer than 8 months. On the other hand, patients with spinal metastases from unknown primary sites seem to fare poorly, with survival times of less than 3 months. Average survival rates for patients with advanced head and neck cancer are between 22% and 48%, depending on the primary site of the cancer.<sup>14</sup> For obvious reasons, survival in patients with advanced head and neck cancer with spinal metastases is expectedly much worse. In our series, the average survival time was 3 months. Two of 9 patients, however, did survive longer than 6 months. It is not always clear what the actual survival will be in individual cases.

Harrington<sup>15</sup> proposed management principles in these patients based on the degree of neurologic impairment and/or evidence of spinal bony collapse. He proposed that patients with bony collapse and neurologic involvement should undergo surgical decompression. His review, however, did not take into account overall expected survival as a decision making factor. Tokuhashi et al<sup>16</sup> proposed a scoring system that took into account multiple variables for facilitating the decision of whether to operate. They stressed the following categories: general condition, number of extraspinal bone metastases, number of vertebral metastases, metastases to internal organs, primary site of cancer, and spinal cord deficit. In general, the more widespread the disease, the lower the score and the less inclined a surgeon



**Figure 2.** Management of algorithm for spinal involvement from head and neck neoplasia.

would be to operate. They did not look at evidence of bony instability or acuteness of neurologic presentation. In a classic study, Tarlov and Klinger<sup>17</sup> used dog experiments to show that the acuity of spinal compression should dictate the aggressiveness in reversing the compression. This work has led to the general conception that acute neurologic decompensation (throughout less than 24 hours) dictates rapid, aggressive treatment.

The role of chemotherapy in these patients is not established. In our series, 1 patient presented with the spinal metastasis while undergoing radiation and 3 rounds of fluorouracil with cisplatin for treatment to the primary tumor. Because of acute neurologic compromise, this patient underwent surgical decompression and debulking of the tumor. Although the patient did regain neurologic function, it is not clear whether the chemotherapy conferred any benefit. He died 1 month later. Chemotherapy was used in one other case. This was in a patient with a history of adenoid cystic carcinoma of the tongue base who presented with lower back pain as his only symptom. He was given etoposide in attempts to treat the metastasis and palliate his pain. However, the pain worsened through treatment and the patient underwent radiation 4 months later. Progression of pain while undergoing chemotherapy has been noted in other studies. These studies<sup>18</sup> suggest that the relief of symptoms from radiotherapy seem to be better than with combined chemotherapy and radiation therapy or from chemotherapy alone. Furthermore, it seems that chemotherapy adds little benefit in patients with neurologic impairment.<sup>15,19</sup> In general, spinal metastases from tumors that are notoriously relatively resistant to chemotherapy are unlikely to respond to chemotherapy.<sup>20</sup>

Combining these treatment proposals with our experience, we propose a simple management algorithm that includes most of the variables discussed herein (**Figure 2**). Because of individual variability, the algorithm may not be applicable in every case. Nevertheless, the algorithm is applicable to most patients with head and

neck cancer. In summary, once the diagnosis of spinal metastasis is made, the first and most important determination is the degree of neurologic involvement. If none is present and the patient presented because of pain, intravenous steroids and/or radiation therapy should be adequate palliation. Second, the stability of the spine should be determined. An unstable spine represents a neurosurgical emergency that should be fixed, because radiation cannot stabilize the vertebral framework. Third, the acuity of the presentation should be established. Rapidly progressive neurologic compromise warrants surgical intervention. The next 2 decision questions are the most open to subjectivity and variability. The overall health status of the cancer patient should be determined and clinical judgment must be used to evaluate surgical candidacy. Factors addressed by Enkaoua et al<sup>8</sup> and Tokuhashi et al,<sup>16</sup> such as degree of generalized metastatic spread, are to be considered at this point in the decision tree. Finally, an estimate of the patient's overall survival expectancy must be made.

In conclusion, it is proposed that surgical decompression is a viable, justifiable option for selected patients with advanced head and neck cancer and spinal compression. We propose surgical decompression as a first option in patients with an unstable bony spine, acute and rapidly progressive neurologic deterioration, and/or expected survival times of longer than 6 months. Individual case variables must be analyzed in each particular instance to arrive at the most appropriate clinical decision.

Accepted for publication October 26, 2001.

This study was presented as a poster at the Fifth International Conference on Head and Neck Cancer, San Francisco, Calif, August 1, 2000.

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