

## Metastatic Disease of the Spine

### EPIDEMIOLOGY

- Most common tumor seen in the spine.
- Spinal epidural metastases seen in 10% of cancer patients. Spinal distribution proportional to vertebral bodies number. The vertebral body is the most common site of involvement.
- Extradural site in 97%, intradural in 2%, and intramedullary in 1%.
- The behavior of the primary tumor will determine the perceived prevalence (i.e. those seen for decompression by the neurosurgeon).
- Incidence of origin from a prospective study evaluating backpain in cancer patients by MRI.

Breast	31%
Lung	24
GI	9
Prostate	8
Lymphoma	6
Melanoma	4
Thyroid	2-6
Kidney	1
Other (including myeloma)	13
<b>Total</b>	<b>100%</b>

### PATHOLOGY

#### Path physiology

1. Tumor emboli enter the blood stream (arteries, veins) and arrest in the capillary beds of the bone marrow. For example, lung tumors seed the vertebral column through segments arteries, and breast prostrate carcinoma reach the vertebral system through the paravertebral plexus (Batson) during a Valsalva maneuver.
2. Tissue receptivity to embolic neoplasms, tumor cells find it easier to escape from the circulation and multiply within the fine network of cancellous bone.
3. Intrinsic factors inherent to the tumor which may give one cell line a particular advantage in surviving and growing in the medullary space (e.g. elaboration of prostaglandins and osteoclastic activity by breast cancer cells causes lytic mets).

### CLINICAL FEATURES

#### Pain

- Progressive and persists despite the patient's attempts to limit activities.
- Persists in recumbence.
- Localized and at least initially worse at night.

#### Neurological Involvement

- 8% may have neurologic involvement as the initial symptom of their cancer.

- Myelopathy (weakness, paresthesias, autonomic dysfunction) is often the presenting problem. 76% have weakness by the time of diagnosis.
- Cauda equina lesions classically present with pain (radicular type), asymmetric sensory deficit, asymmetric motor loss and late autonomic dysfunction.
- Pre-treatment neurological status clearly correlates with post-treatment outcome.
- Only 35-65% of patients who are paraparetic at the time of diagnosis will retain their ability to walk following treatment. <5% of paraplegic patients will regain ambulation.
- No difference in outcome between cord, conus or cauda lesions.

## Imaging

- Plain films. 80% are abnormal. Some findings are the "winking owl's eye" due to pedicle involvement, pathological compression fracture, vertebral body scalloping, osteoblastic changes (prostate cancer, multiple myeloma, Hodgkins, occasionally breast cancer).
- Bone scan. Abnormal in 66% of patients with SEM and 20% abnormal in patients with normal plain films.
- Most metastatic lesions of the spine are osteolytic, and appear as collapsed vertebrae, absent pedicles, ghost vertebrae, or localized lytic lesions of various parts of the vertebra.

## Myelogram/CT/MRI

- Hour glass deformity if incomplete block and paint brush appearance if complete block. In a complete block 14% of patients deteriorate after the procedure (esp if CSF removed), therefore imaging of choice is MR. Metastatic lesions are hypointense on T1WI and hyperintense on T2WI.
- Advantages of MRI.
  1. Non-invasive.
  2. No risk of neurological deterioration.
  3. Demonstrates paraspinal lesions.
  4. Can image area between 2 blocks.
  5. Can image bony mets that do not cause distortion of the SAS.
- Disadvantages are a lack of cytology and availability.

## TREATMENT

- No treatment has been shown to prolong life. The most important determinant in prognosis is tumor type. In one series overall survival was 11.3 months.
- In general, the literature describing metastatic disease of the spine is marked by a paucity of Class I evidence. Treatment guidelines must be gleaned from inconclusive results and poorly controlled studies. A recent paper examined the existing literature from a methodological viewpoint and found little clear evidence to support the majority of decision making that guides the management of metastatic disease of the spine. (Loblaw DA, Laperriere NJ. *J of Clin Oncology* 16:1613, 1998.) The only Class I evidence available supports the use of high dose dexamethasone.

## Goals

All treatment modalities must be weighed to maximize the following goals:

1. Pain relief.
2. Preservation of neurological function.
3. Preservation of spinal stability.

## Medical

- Steroids. Decadron 100 mg IV immediately followed by 24 mg q6h. This is supported by a single randomized control study examining the use of steroids in conjunction with radiotherapy. (Sorenson S, et al. *Eur J Cancer* 1:22, 1994). Moderate dose dexamethasone (4 mg q6h) may also be as useful but has not been compared against high dose treatment.
- Braces are an important adjunct in patients with cervical instability who present with instability and/or pain. In conjunction with XRT, pain relief and healing of bony lesions is possible. Most importantly neurological injury can be prevented with no morbidity. TLSO (thoracolumbar sacral orthosis) can also be used as a therapeutic adjunct.

## Radiation

- Radiation is as effective as surgery (laminectomy) with fewer complications.
- Dose used is 4000 cGy over 7-10 days to ports extending one vertebral level above and one below the extent of the lesion.
- Surgery is selected over XRT if any of the below indications are present.
- Anterior and posterolateral procedures, however, have a better outcome in retrospective studies, when compared to laminectomy. No trial compares anterior decompression versus XRT alone.

## Surgical Considerations

### Stability

- Approximately 10-30% of patients with metastatic disease of the spine may demonstrate some form of instability.
- For assessment of stability in metastatic disease, consider the spine divided into three (anterior, middle, and posterior) by two (right, left) columns.

Feature	Stability
< 2	stable
3-4	probable unstable
5-6	grossly unstable

- Other factors that may indicate spinal instability in metastatic disease.
  1. Anterior and middle column destruction (greater than 50% collapse of vertebral body height).
  2. Collapse of two or more adjacent vertebral bodies.
  3. Tumor involvement of middle and posterior columns (possible forward shearing deformity).
  4. Iatrogenic (laminectomy with failure to recognize anterior and middle column disease).
  5. Angulation greater than 20 degrees.

## References

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