

## Minimal Invasive Spine Surgery: Painkiller In Spinal Metastasis

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### Abstract:

**Introduction:** Metastatic spine tumors are a frequent problem in patients afflicted with cancer and are often associated with significant morbidity and mortality. The most common symptom is pain, present in up to 85–96 % of cases. Pain can be caused from periosteal stretching and inflammation from local tumor growth, which results in constant, dull, nocturnal pain. Spinal metastases can also result in spine instability, which can lead to mechanical pain that worsens with movement or axial loading.

**Case report:** We report the successful management of a 57 year old neurologically sound patient with dorsal spine metastasis associated with morphine dependency due to severe pain; treated with combo minimal invasive procedures- **percutaneous vertebroplasty and posterior percutaneous transpedicular stabilization.**

**Discussion:** Thoracic spine lesions comprise the majority of these cases (approximately 70 %) followed by lumbosacral and cervical lesions. Skeletal system is the third most common site of metastasis. The purpose of MIS in these cases of spinal metastasis is to alleviate pain- not to cure, but as an adjunct to chemo-radiotherapy, even in immuno-compromised patients, short hospital stay.

**Conclusion:** The rationale behind this form of treatment with combined minimal invasive procedures- percutaneous vertebroplasty and posterior percutaneous transpedicular stabilization is that it balances the need to stabilize the spine while avoiding the morbidity associated with open procedures.

**Keywords:** spine tumors, metastasis, vertebroplasty, percutaneous transpedicular stabilization

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### I. Introduction

Metastatic spine are often associated with significant morbidity and mortality. The skeletal system is the third most common site of metastasis. Among the skeletal system, the spine is most frequently involved, with autopsy studies showing spinal metastasis in up to 70 % of patients who die of cancer. Thoracic spine lesions comprise the majority of these cases (approximately 70 %) followed by lumbosacral and cervical lesions.<sup>1</sup> Breast cancer is the most common primary tumor to metastasize to the spine. Other common primary tumors include prostate, bladder, lung, kidney, and thyroid tumors. Tumor cells can spread via various routes including: hematogenous spread, direct extension, and CSF seeding. The hematogenous spread is believed to be most common, either through segmental arteries to the vertebral marrow (e.g., lung cancer) or through the valveless extradural Batson's venous plexus (e.g., breast cancer). Alternatively, tumors in the thorax, abdomen, and pelvis including lung, prostate, bladder and colorectal cancers can extend or invade directly into the vertebral column.

The most common symptom is pain, present in up to 85–96 % of cases. Pain can be caused from periosteal stretching and inflammation from local tumor growth, which results in constant, dull, nocturnal pain. Spinal metastases can also result in spine instability, which can lead to mechanical pain that worsens with movement or axial loading. Alternatively, they can compress nerve roots and cause radicular pain, that is typically sharp or shooting in character.<sup>2</sup> Other clinical presentations include weakness (in up to 85 % of patients), pathologic fractures, motor and/or sensory deficits, and/or bladder and sphincter dysfunction. In addition, patients with spinal metastasis can present with more constitutional symptoms such as weight loss, anorexia, and/or organ dysfunction.<sup>3</sup>

Devising a management plan is therefore a highly individualized process that typically involves a multidisciplinary approach with specialists from oncology, hematology, surgery, pain, and radiology. The extent of treatment with associated morbidities must be balanced with the patient's pain, function, and life expectancy.

## II. Case Report

A 57 year old male who was diagnosed of bladder carcinoma in 2006 and for which he had undergone cystectomy with ileostomy-bag dated then; presented to us with the chief complaint of upper back pain with pain on movement, difficulty in ambulation and carrying out activities of daily living since 5 years and increased in severity for the last eight months. The patient was diagnosed of dorsal spine metastasis in 2007 and was on chemotherapy since 2010. Meanwhile patient has taken radiotherapy, allopathy, ayurvedic and local treatment for backpain with no relief. On presentation, patient had dorsal spine and costochondral area tenderness around nipple-level. Neurologically patient was stable. Pain severity [ Visual Analogue Score- VAS of 9/10 ] was so much that the patient required injectable painkillers along with oral morphine [requiring daily 120 mg in divided dose] and transdermal analgesic patch; but still patient experienced excruciating pain thereby affecting his quality of life.

His roentgenograms of the dorsal spine demonstrated vertebral body lesion at T8, T9, T10 ( Fig 1 ). Magnetic resonance imaging of the dorsal spine demonstrated T-2 weighted osseous lesion involving T8, T9, T10 vertebral body and the posterior elements - lamina, pedicle, transverse process and spinous process of all three vertebrae with minimal epidural compression at T9 ( Fig.2 ).

Computed Tomography with 3-D reconstruction of the dorsal spine was performed to define the bony anatomy and assess the extent of bony involvement and bony destruction at T8, T9, T10. The CT-3D recon demonstrated some involvement of the costal articular facets and ribs at these levels (Fig 3 ).

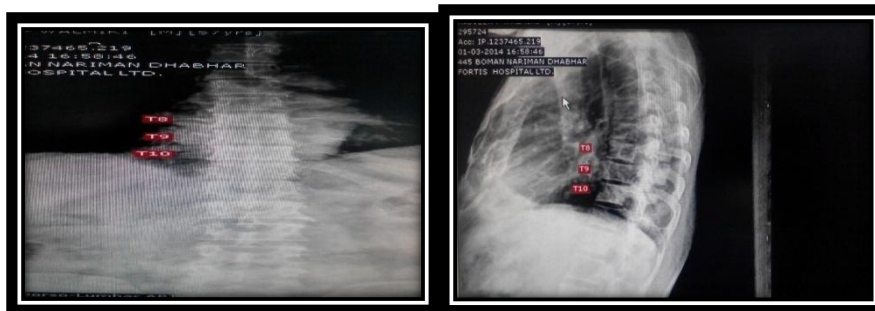


Fig1 : Vertebral body lesion at T8, T9, T10

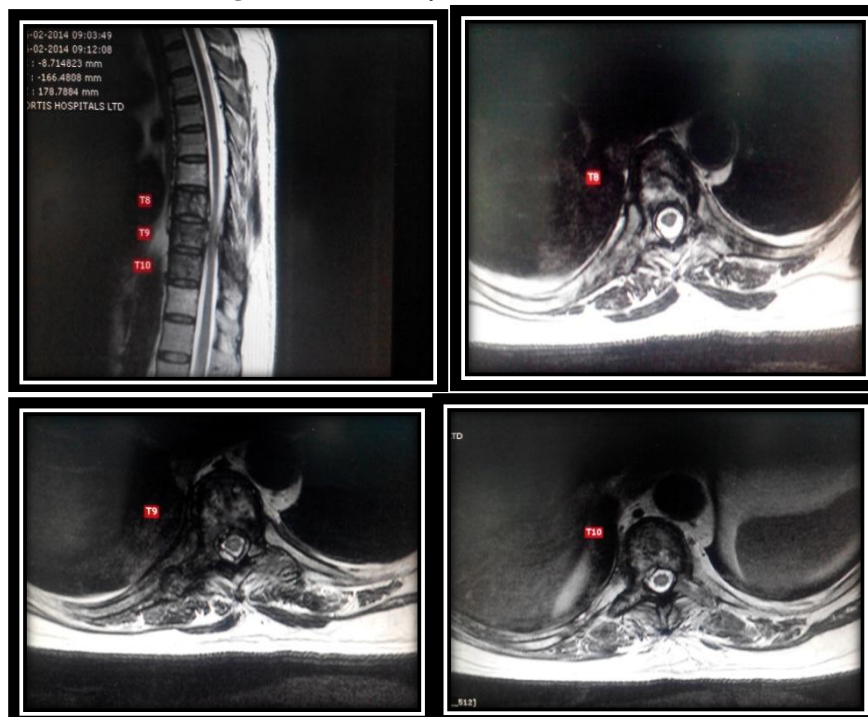
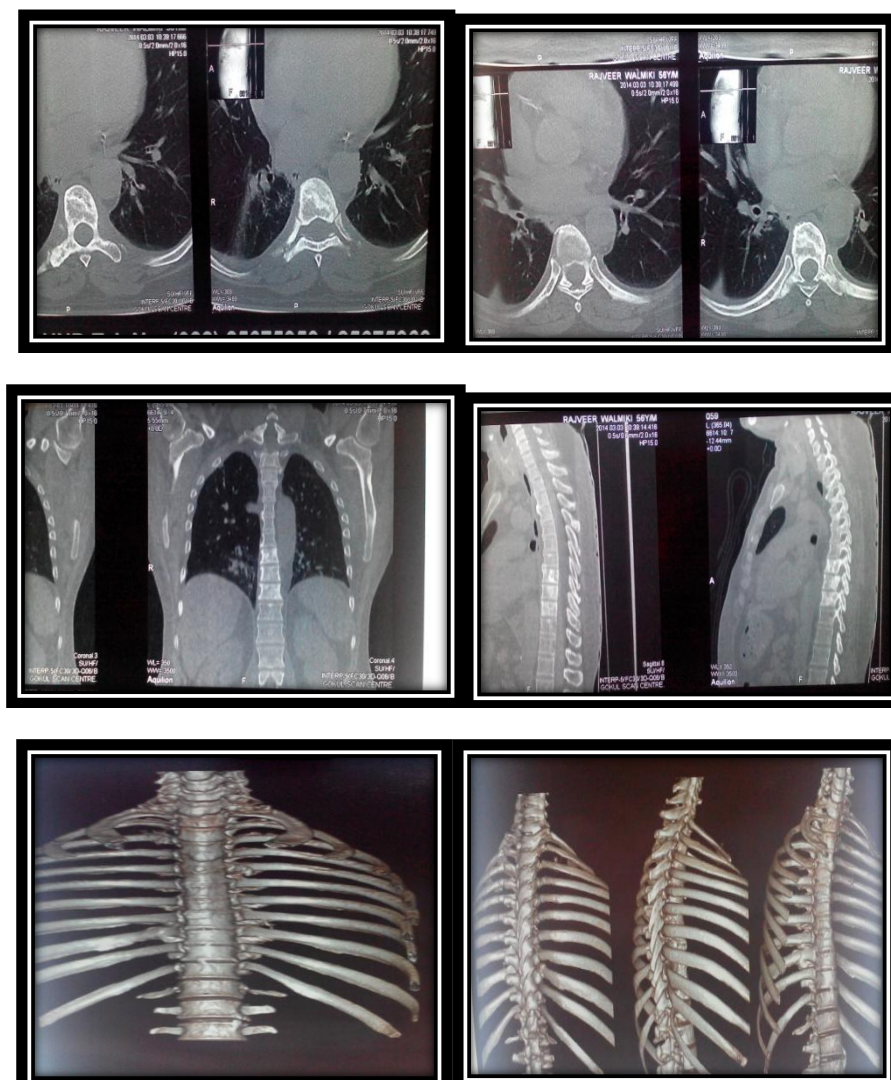


Fig2 : MRI T-2 weighted sagittal and axial images showing osseous lesion of T8, T9, T10 vertebrae involving anterior and posterior bony elements with minimal epidural compression at T9.



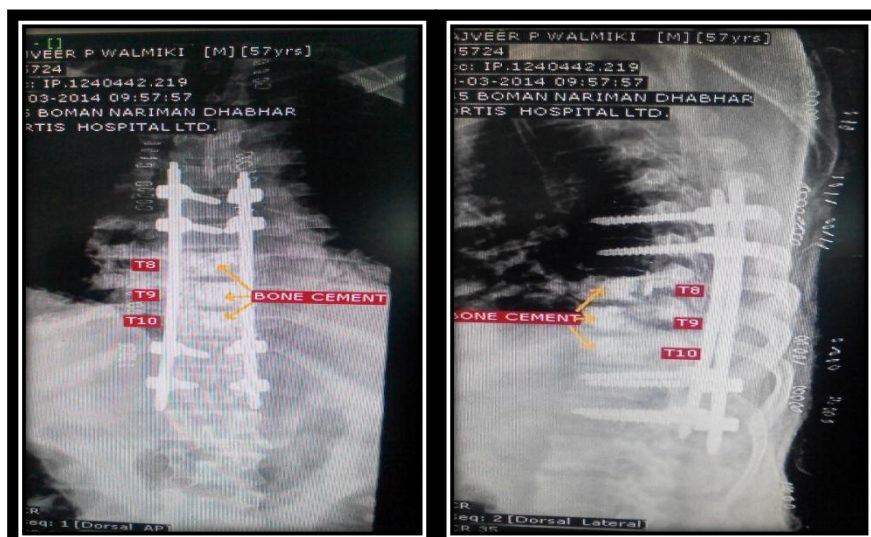
**Fig 3 :** CT scan with 3-D reconstruction of the dorsal spine demonstrates the bony involvement of T8, T9, T10 vertebrae and costal articulating facet and rib.

Surgical option Minimal Invasive Spine surgery Technique was preferred with Percutaneous Vertebroplasty at T8, T9, T10 with Percutaneous dorsal spine stabilization using Medtronic Longitude system ( Fig 4, 5 ).



**Fig 4 :** Medtronic Longitude Minimal invasive dorsal spine stabilization system [ For Illustration].

In the Operation theatre with patient under general anaesthesia and in prone position; pedicles from T6 to L1 were outlined and marked using C-arm. It was noticed while marking the pedicles on the patient's skin with a needle, patient experienced pain despite being under general anaesthesia. This vital observation confirmed that the patient was morphine-dependent and his pain threshold was on the lower side. Adequate analgesia was thereby given by our expert anaesthetist and the surgery went on to be uneventful.



**Fig 5 :** Post-operative roentograms of the dorsal spine showing bone cement in the vertebral bodies of T8, T9, T10 and percutaneous dorsal spine stabilization with pedicle screws and rods at T6, T7, T11, T12.

Post-operatively, patient's pain decreased significantly by day 4 with a VAS of 4 out of 10. Patient was able to sit, stand and walk comfortably with Taylor's spinal brace. Since patient was on morphine for a long time, the dosage was tapered to 80 mg on post-op day 1 and 40 mg on day 2 and stopped on day3; finally patient requiring only oral paracetamol for pain at the surgical site. Patient was not only pain-relieved but also weaned-off from morphine post-operatively and quality of life improved day by day.

### III. Discussion:

The role of vertebroplasty in the management of metastatic spinal disease is evolving. These techniques appear to be safe and effective in well-selected patients with refractory spinal pain from metastatic disease<sup>4</sup>. Minimally invasive posterior stabilization improved ambulation and pain scores in patients with plasmacytomas and metastases of the spine.<sup>5</sup> Acosta et al concluded that vertebroplasty supplementation may improve long-term integrity of short-segment pedicle screw constructs and allow improved fusion rates and better clinical outcomes in traumatic lumbar burst fractures.<sup>6</sup> A systematic review of the literature yielded class iv data suggesting that MIS modalities are efficacious means of achieving neurological improvement and alleviating pain in the treatment of metastatic spine disease.<sup>7</sup>

The purpose of MIS in these cases of spinal metastasis is to alleviate pain - not to cure, as an adjunct to chemo-radiotherapy, even in immuno-compromised patients. The advantages of MIS surgeries in these patients are minimal soft tissue surgical trauma, decreased pain, less blood loss, early mobilization, shorter hospital stay..

### IV. Conclusion:

The rationale combined minimal invasive procedures- percutaneous vertebroplasty and posterior percutaneous transpedicular stabilization is that it balances the need to stabilize the spine while avoiding the morbidity associated with open procedures.

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