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*Case Report*

# Spinal cord compression caused by a brown tumor secondary to primary hyperparathyroidism

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Received : 30 January 2023
Accepted : 10 February 2023
Published : 24 March 2023

**DOI**
10.25259/SNI_92_2023

**Quick Response Code:**

## ABSTRACT

**Background:** Brown tumors (BTs) are rare non-neoplastic lesions that arise secondary to hyperparathyroidism largely involving mandible, ribs, pelvis, and large bones. Spinal involvement is extremely rare and may result in cord compression.

**Case Description:** A 72-year-old female with the primary hyperparathyroidism developed a thoracic spine BT causing T3–T5 spinal cord compression warranting operative decompression.

**Conclusion:** BTs should be included in the differential diagnosis in lytic-expansive lesions involving the spine. For those who develop neurological deficits, surgical decompression may be warranted followed by parathyroidectomy.

**Keywords:** Brown tumor, Primary hyperparathyroidism, Spinal cord compression

## INTRODUCTION

Brown tumors (BTs) are rare benign and non-neoplastic lesions that arise secondary to hyperparathyroidism (i.e., primary, or rarely secondary).[6-11] They most commonly involve the mandible, ribs, pelvis, and large bones, and only rarely the spine.[7] Here, a T3–T5 thoracic BT, arising secondary to hyperparathyroidism, contributed to cord compression and a paraparetic deficit that resolved following decompressive surgery.

## CASE REPORT

### Clinical presentation

A 72-year-old female presented with the upper back pain of 6 months' with one month of acute worsening associated with the onset of paraparesis (i.e., 3/5 deficit). Laboratory studies showed; a serum calcium level of 144 mg/L (normal: 90–105 mg/L) and a slightly high parathyroid hormone level (pg/mL; normal is 10–53 pg/mL). A thyroid ultrasound proved negative, but the parathyroid scintigraphy with Tc-99 m showed focal activity in the inferior right thyroid lobe consistent with a parathyroid adenoma.

**Table 1:** Reported cases of spinal brown tumor secondary to primary hyperparathyroidism.

| Authors (year of publication) | Sex | Age | Spinal level involved | Symptoms | Treatment |
|---|---|---|---|---|---|
| Shaw and Davies (1968)[19] | F | 58 | Thoracic | Paraparesis, radicular pain | Resection of lesion and parathyroidectomy |
| Shuangshoti *et al.* (1972)[20] | M | 32 | Lumbar | Paraparesis, urine retention | Resection of lesion and parathyroidectomy |
| Sundaram and Scholz (1977)[23] | F | 63 | Thoracic | Paraplegia, urine retention | Resection of lesion and parathyroidectomy |
| Siu *et al.* (1977)[21] | F | 64 | Thoracic | Paraparesis, radicular pain | Resection of lesion and parathyroidectomy |
| Ganesh *et al.* (1981)[5] | M | 40 | Thoracic | Paraparesis, numbness | Parathyroidectomy only |
| Yokota *et al.* (1989)[24] | F | 58 | Thoracic | Paraparesis | Resection of lesion and parathyroidectomy |
| Daras *et al.* (1990)[3] | F | 54 | Thoracic | Paraparesis | Resection of lesion |
| Kashkari *et al.* (1990)[10] | F | 51 | Thoracic | Paraparesis, radicular pain | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Sarda *et al.* (1993)[17] | F | 23 | Thoracic | Radiculopathy | Resection of lesion and parathyroidectomy |
| Motateanu *et al.* (1994)[15] | M | 57 | Lumbar | Radiculopathy, numbness | Resection of lesion, instrumentation and fusion |
| Mustonen *et al.* (2004)[16] | M | 28 | Lumbar | Paraparesis/numbness | Parathyroidectomy only |
| Haddad *et al.* (2007)[6] | F | 62 | Thoracic | Radiculopathy | Resection of lesion and parathyroidectomy |
| Khalil *et al.* (2007)[13] | M | 69 | Thoracic | Radiculopathy/low back pain | Resection of lesion |
| Altan *et al.* (2007)[2] | F | 44 | Sacral | Radicular pain | Resection of lesion and parathyroidectomy |
| Hoshi *et al.* (2008)[8] | F | 23 | Sacral | Low back pain/radicular pain | Parathyroidectomy only |
| Lee *et al.* (2013)[14] | M | 65 | Lumbar | Paraparesis, sphincter dysfunction | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Khalatbari and Moharamzad (2014)[12] | M | 16 | Lumbar | Paraparesis low back pain | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Khalatbari and Moharamzad (2014)[12] | F | 46 | Lumbar | Radiculopathy, neck pain | Resection of lesion and parathyroid adenoma |
| Khalatbari and Moharamzad (2014)[12] | F | 52 | Cervical | Paraparesis, sphincter dysfunction | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Khalatbari and Moharamzad (2014)[12] | M | 38 | Thoracic | Paraparesis, sphincter dysfunction | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Sonmez *et al.* (2015)[22] | M | 50 | Thoracic | Radicular pain, quadriparesis | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Alfawareh *et al.* (2015)[1] | F | 26 | Cervical | Paraparesis | Parathyroidectomy only |
| Hu *et al.* (2018)[9] | F | 50 | Thoracic | Tetraparesis | Parathyroidectomy only |
| Hammou *et al.* (2020)[7] | F | 65 | Cervical | Paraparesis | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Shaaban *et al.*(2020)[18] | M | 37 | Thoracic | Paraparesis | Resection of lesion and parathyroidectomy |
| Zainordin *et al.* (2022)[25] | F | 48 | Thoracic | Paraparesis, numbness | Resection of lesion, instrumentation, fusion and parathyroidectomy |
| Our present case | F | 72 | Thoracic | Paraparesis, back pain | Resection of lesion and parathyroidectomy |

F: Female; M: Male

### Spine computed tomography (CT) and magnetic resonance (MR) studies showing cord compression due to BT at T3–T5 levels

Both the CT and MR studies showed BTs compressing the cord from T3 to T5 secondary to hyperparathyroidism. The thoracic CT demonstrated multiple osteolytic lesions of the vertebral bodies and posterior elements from Th3 to Th5 level [Figure 1]. The thoracic MR thoracic revealed a large expansile T3–T5 vertebral mass with extradural extension resulting in significant cord compression; it was isointense on T1, and hyperintense on T2-weighted images [Figure 2].

### Surgery, pathology, and outcome

Following an emergent Th3-5 laminectomy, the extradural mass was totally excised, and the cord was adequately decompressed. The histopathological examination confirmed a BT secondary to hyperparathyroidism. Postoperatively, the patient's symptoms resolved within 3 weeks. Subsequently, she was referred for a parathyroidectomy.

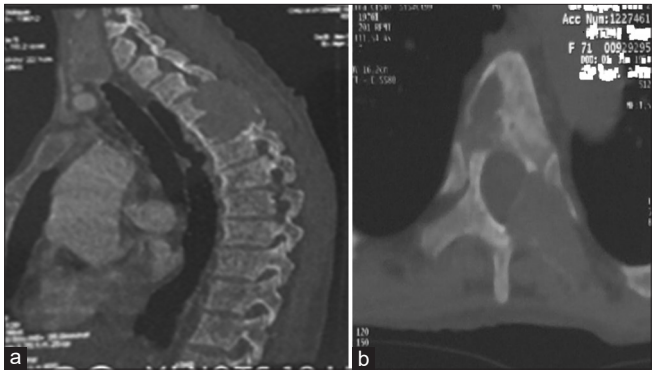

**Figure 1:** Computed tomography of the thoracic spine sagittal (a) and axial (b) images showing an osteolytic lesion regarding T3-T4-T5 with endocanalar extension.

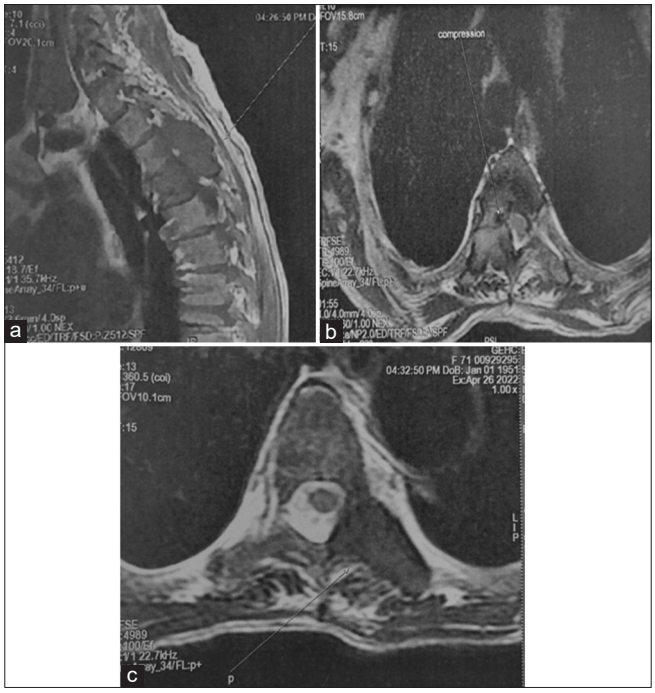

**Figure 2:** Sagittal T1-weighted (a), axial T2-weighted (b and c) images showing an expansile mass lesion with spinal cord compression at T3-4-5 level.

## DISCUSSION

We identified 25 similar cases of BTs attributed primary hyperparathyroidism impacting the spine (since 1968 to present) [Table 1].[1-25] Most patients were female (62.9 %) averaging 46.5 years of age who presented with predominant thoracic lesions (59%) contributing to varying degrees of myelopathy [Table 1].[7-22] Surgical options included; biopsy, decompression/resection, or decompression/instrumentation with fusion. Of the 25, 23 benefitted from parathyroidectomy. Typically, CT imaging documented BTs as well-defined soft-tissue masses with local bony erosion, expansion, while on magnetic resonance imaging studies, these lesions appear hypointense on T1, hypo- or hyperintense on T2-weighted images, with homogenous contrast enhancement.[7-22] The differential diagnoses these spinal lesions included; metastatic tumors, multiple myeloma, plasmacytoma, giant cell tumors, lymphoma, and aneurysmal bone cysts.[12-18]

The gold standard for the treatment for BTs due to primary hyperparathyroidism remains gross total removal of the spine lesion (i.e., biopsy, decompression with/without fusion for those with neurological deficits) followed by parathyroidectomy.[7-18]

## CONCLUSION

BTs should be included in the differential diagnosis of spinal lytic-expansive lesions with or without neurological deficits. The standard treatment is gross spinal total tumor excision followed by parathyroidectomy.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

### Financial support and sponsorship

Publication of this article was made possible by the James I. and Carolyn R. Ausman Educational Foundation.

### Conflicts of interest

There are no conflicts of interest.

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**How to cite this article:** Elmi SM, Djimrabeye A, Makoso JD, Hamdaoui R. Spinal cord compression caused by a brown tumor secondary to primary hyperparathyroidism. Surg Neurol Int 2023;14:108.