



## Case Report

# Subaxial cervical Castleman's disease: A rare cause of myelopathy

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## ABSTRACT

**Background:** Castleman's disease (CD) is a rare lymphoproliferative disease of unknown origin which rarely affects the spine. Here, we present CD involving a lytic, destructive C3 lesion with extension into the spinal canal contributing to upper cervical cord compression. Notably, the lesion mimicked other primary bone lesions, metastatic tumors, and/or lymphoma.

**Case Description:** A 52-year-old male presented with progressive quadriparesis (i.e. weakness, instability of gait) and loss of dexterity in both hands over 2 weeks. The MRI, X-ray, and CT scans revealed a destructive lytic lesion involving the C3 vertebral body (i.e. including both anterior and posterior elements). The patient underwent a C3 total and C4 partial laminectomy followed by a C2-C4/5 instrumented fusion (i.e. included C2 pedicle screws/laminar screws, and C4/C5 lateral mass fixation). Histopathology showed a lymphoproliferative disorder with follicles of different sizes, central abnormal germinal structures, and a Mantle zone (i.e. expanded germinal centre with concentric layering with an "onionskin" appearance). These findings were all consistent with the diagnosis of CD (i.e. hyaline-vascular type).

**Conclusion:** CD, a rare lymphoproliferative disease of unknown origin rarely affects the spine. Here, we presented a 52-year-old male with a C3 lytic lesion resulting in C3/4 cord compression that favorably responded to a C3/4 laminectomy with posterior instrumented fusion.

**Keywords:** Castleman's, Cervical spine, Lymph node, Myelopathy

## INTRODUCTION

Castleman's disease (CD) is a rare lymphoproliferative disease of unknown origin that generally affects lymph nodes, rarely the chest, neck, abdomen, pelvis, axilla, sometimes the lung, parotid gland, pancreas, and spine.<sup>[10]</sup> Other terms for CD include - angiofollicular hyperplasia, localized nodal hyperplasia, giant lymph node hyperplasia, angiomatous lymphoid hamartoma, follicular lymphoreticuloma, and CD.

The differential diagnoses for CD include - infection, malignancy, autoimmune, and/or collagen vascular disease. Eight other cases of spinal CD [Table 1] were identified by the authors; six of them presented as extradural/intracanalicular masses requiring decompression procedures for

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the resultant myelopathy, followed by adjuvant radio and/or chemotherapy.<sup>[5,7]</sup> Here, we present a 52-year-old male with a C3 CD lesion with resultant cord compression/myelopathy who's favorably responded to a C3-4 laminectomy with C2-C4, 5 posterior fusion.

## CASE DESCRIPTION

A 52-year-old male presented with 2 weeks of a progressive quadriparesis (i.e. loss of dexterity in both hands and lower extremity weakness) and urinary incontinence. He also had cervical lymphadenopathy (i.e. anterior/posterior and post-auricular lymph nodes). On exam, he had 4/5 weakness in both lower extremities, diffuse lower extremity hyper-reflexia with bilateral Babinski responses, and a T2 sensory level (mJOA-10/18).

## Radiological studies

The X-rays and CT scan revealed a destructive lytic C2-C4 lesion focused at the C3 level vertebral body (i.e. destructive lytic lesion of anterior/posterior C3, the C2 spinous process, and anterior C4 vertebral body) [Figure 1]. MRI showed multiple enlarged lymph nodes in the neck along with lytic lesions involving C3 (i.e. both anterior and posterior elements). Furthermore, an epidural soft-tissue mass causing spinal cord compression was seen posteriorly at the C3-4 level. Although predominantly dorsal, the lesion wrapped circumferentially around the spinal cord bilaterally. The lesion was isointense to hypointense as compared with the spinal cord on T2 weighted images and hyperintense to cord on the T2-weighted image [Figure 2] The PET CT confirmed increase uptake at C3 alone [Figure 3]. The predominant differential diagnoses included lymphoma or metastatic tumors or infection.

## Surgery

In view of a Spinal Instability Neoplastic Score of 14, the evidence of spinal cord compression and likely instability, the patient underwent a C3-4/laminectomy with C2-4/5 posterior fusion. At surgery, the posterior cervical paraspinal musculature infiltrated by tumor and had to be removed. A novel "three rod construct" fusion was performed that included C2 pedicle screws, laminar screws, a C4 left pedicle screw with lateral mass fixation of C4 and C5 [Figure 4]. The frozen section diagnosis was lymphoma. Postoperatively, the patient had complete neurological recovery except for bladder dysfunction.

## Histopathology

Histopathology was consistent with a lymphoproliferative disorder (i.e. with follicles of different size with abnormal germinal structures at their centres with hyaline-vascular or "burnt-out" appearances) [Figure 5]. The Mantle zone was expanded with concentric layering and an "onion skin"

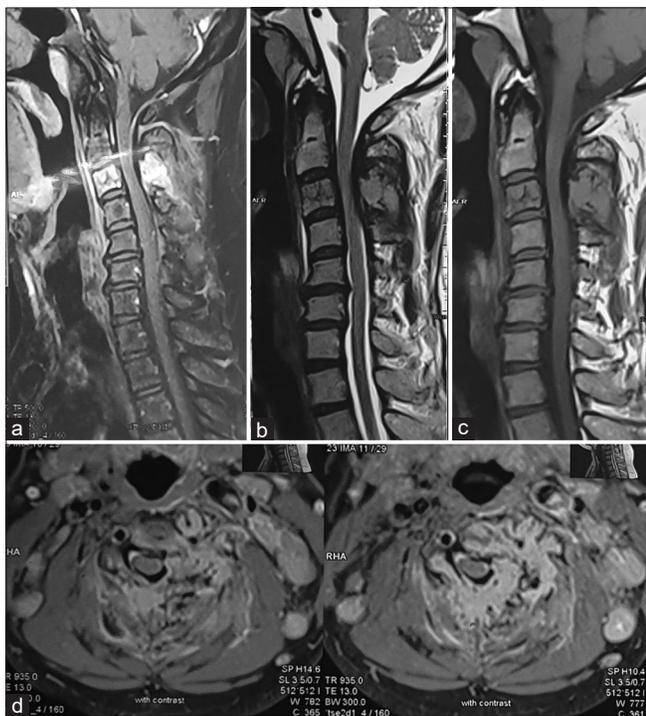


**Figure 1:** Anteroposterior (a) and Lateral (b) radiograph showing lytic expansile lesion in the posterior elements of C3 spinous process with cervical spine in mild kyphosis. Computer tomography images Sagittal (c), Coronal (d) and Axial images (e) showing lytic expansile lesion involving C3 vertebral body and posterior elements more onto the left side.

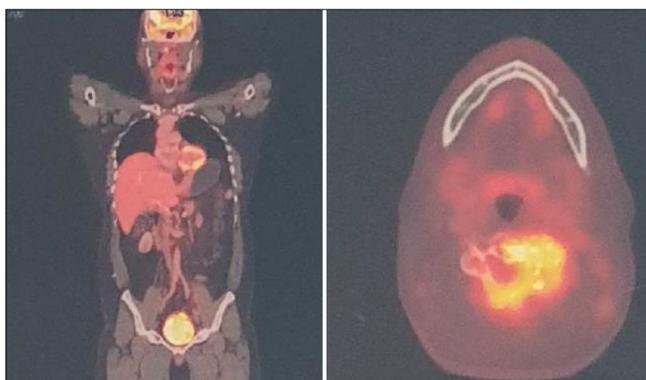
appearance. Immunohistochemical stains revealed a normal distribution of B and T cells and intact germinal centres with a normal distribution of dendritic reticulum cells. The final diagnosis was CD of hyaline-vascular type.

## Adjuvant therapy

The patient was started on methylprednisolone for the lymphadenopathy, and diagnosis of CD. This was followed by radiotherapy (total dose 3960cGy in 22 fractions).



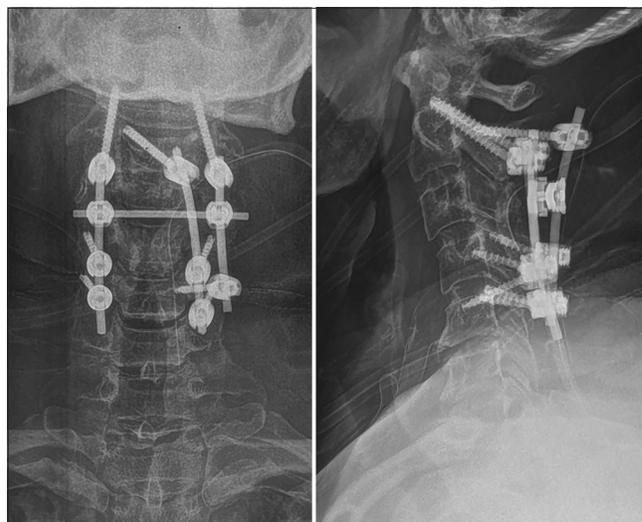
**Figure 2:** Sagittal section of STIR (a), T2 weighted (b) and T1 weighted (c) images showing high signal intensity on Stir images in C3 vertebral body and posterior elements and hypointense signal on T1 weighted images. Cord compression due to epidural mass effect can be appreciated from posterior aspect. (d) Axial T2 weighted images at C3 vertebral body level showing destruction of Spinous process and left sided lamina and lateral mass with epidural tissue compressing and displacing the spinal cord.



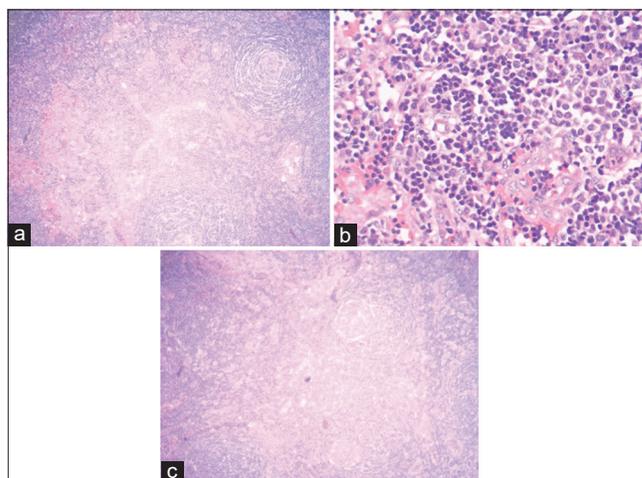
**Figure 3:** PET-CT scan images showing solitary lesion involving the C3 vertebral body with destruction of posterior and anterior bony elements with hot spots noted in C3 body, spinous process, lamina and lateral mass more towards the left.

### Follow-up 1 year later

At the last follow-up 1 year later, patient remained asymptomatic without evidence of lesion progression [Figure 6].



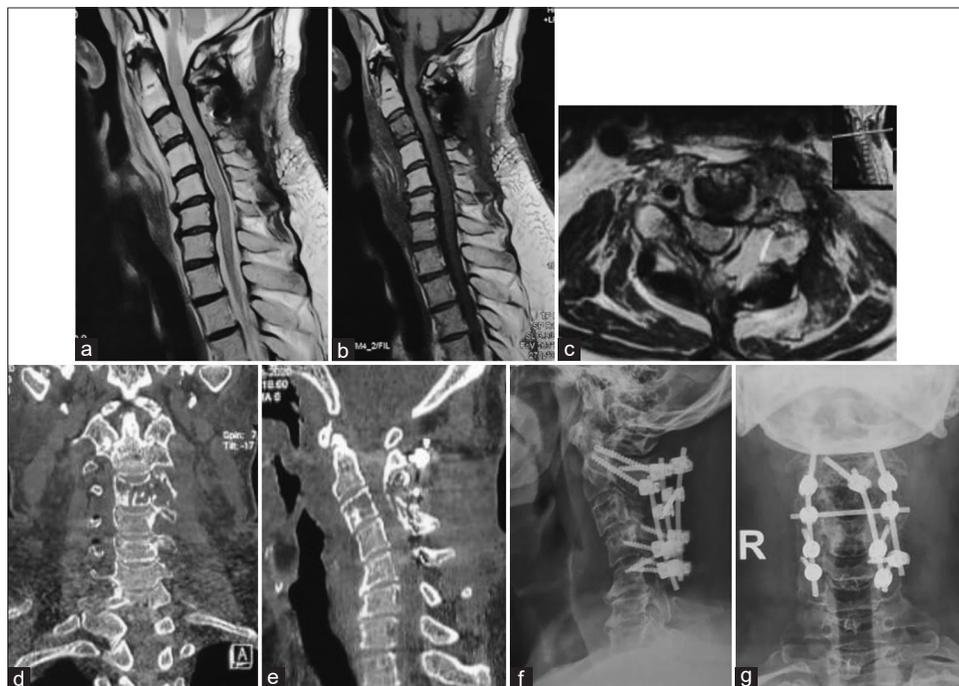
**Figure 4:** Anteroposterior and lateral radiographs in the immediate post-operative period showing resection of posterior elements and laminectomy at C3 and fixation with a novel three rod construct utilizing C2 and C4 (left) pedicle screws and C2 laminar screw with C4, C5 lateral mass screws.



**Figure 5:** Haematoxylin and Eosin photomicrographs demonstrating (a) a germinal centre with hyaline deposits and penetrated by sclerotic blood vessels and typical concentric rings of small lymphocytes in an onion skin composition. (b) Dense lymphoid infiltrate with hyperplastic lymphoid follicles with small, hyalinised germinal centres, mantle cell hyperplasia. (c) Low power view of the tissue showing vascular and lymphoid proliferation hyalinised blood vessels penetrating radially into the follicles.

### DISCUSSION

CD is a rare lymphoproliferative disorder that is histologically categorized as a benign, hyaline-vascular type, representing approximately 80–90% of cases; the remaining 10–20% are aggressive multifocal form - plasma cell type lesions.<sup>[2,3]</sup> Our patient had the more common hyaline-vascular form of



**Figure 6:** Follow-up T2 weighted (a) and T1 weighted (b) sagittal MR images showing adequate decompression of cord and axial MRI (c) showing adequate resolution of tumour. Coronal (d) and sagittal (e) images showing resolution of tumorous mass and lateral (f) and anteroposterior (g) radiographs showing no signs of implant failure.

**Table 1:** Literature review of Castleman's disease involving the spine.

Author	Age/sex	Clinical presentation	Location	Treatment	Outcome
Alper <i>et al.</i>	10/M	Myelopathy	C6-T2	C5-T1 laminotomy with subtotal resection	Residual left-hand weakness and evidence of disease on magnetic resonance imaging at 5 months
Eisenstat <i>et al.</i>	54/M	Myelopathy	T8-T11	T7-T12 laminectomy with gross total resection	No evidence of recurrence
Lee <i>et al.</i>	34/M	Myelopathy	T2-T3	T2-T3 laminectomy with gross total resection	No evidence of recurrence at 1 year
Kachur <i>et al.</i>	44/F	Myelopathy	T3-T5	T2-T6 laminectomy with gross total resection	Myelopathy resolved at 6 months
Finn and Schmidt <sup>[10]</sup>	19/F	Bronchitis	T7-T8 involving neural foramen	Thoracotomy with subtotal resection	Full recovery with no evidence of recurrence at 1 year follow-up
Stevens <i>et al.</i>	31/F	Left midback pain radiating to chest	T3-T4 neural foramen	Adjuvant radiation post-op Thoracotomy and enbloc resection	Full recovery with no evidence of recurrence
Gupta <i>et al.</i> <sup>[5]</sup>	30/F	Myelopathy	T2-T5	CHOP regimen and radiotherapy	Complete remission and no evidence of recurrence at 24 months
McMillan <i>et al.</i> <sup>[6]</sup>	60/M	Sacral pain	Right side S4, S5 and coccyx	Lower sacrectomy and coccyx excision	Full recovery with no evidence of recurrence at 1 year follow-up
Present study	52/M	Myelopathy	C2-C4	Partial excision C3-4 laminectomy and fixation and radiotherapy	Complete recovery of myelopathy with no recurrence

CD. CD lesions on MR typically appear hypointense on T1-weighted images, and hyperintense on T2-weighted studies.<sup>[9]</sup> In this case, the MR showed CD tumor involving both anterior and posterior elements of C3 vertebrae and also seen

epidural soft-tissue mass causing spinal cord compression at C3-4 posteriorly. The lesion was predominantly dorsal and wrapped around the spinal cord bilaterally. On CT, extensive destructive bony-lytic lesions are often better appreciated

involving the posterior elements/vertebral bodies rather than anterior vertebrae.

The treatment modalities for CD include surgical excision for single lymph node involvement. Complete surgical resection generally offers complete cure in those with a localized variant, while those with more extensive diffuse unresectable lesions typically warrant additional chemotherapy, immunotherapy, and/or radiation therapy. Histopathology of CD may resemble other conditions such as lymphoma, autoimmune disorders like rheumatoid arthritis, Sjögren's syndrome, monoclonal gammopathy, and acquired immunodeficiency syndrome. A definitive diagnosis of CD requires pathological-histological confirmation (i.e. biopsy or tumor resection). Those patients with the localized form may be treated with local resection or radiation therapy<sup>[8]</sup> as well as systemic chemotherapy.<sup>[1]</sup> Recent developments suggest a major role of interleukin-6 (IL-6) in the treatment of CD. MCD treatment may include prednisolone or novel human-mouse chimeric immunoglobulin G1κ monoclonal antibody against human IL-6 siltuximab.<sup>[4,6]</sup> Sometimes, it may require treatment like lymphoma with R-CHOP regimen (rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone). Radiotherapy may be necessary for rare cases that are not surgically resectable.<sup>[9]</sup>

## CONCLUSION

CD rarely involves the spine. Here, it presented involving the C2-C4 levels (i.e. focused at C3) with cord compression warranting a C3/4 laminectomy and C2-C4/5 posterior fusion.

## Declaration of patient consent

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

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## Conflicts of interest

There are no conflicts of interest.

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