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Subacute Combined Spinal Cord Degeneration and Deep Venous Thrombosis in a Vitamin B12 Deficient Patient: A Case Report

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1 Introduction

Subacute combined degeneration (SCD) is a neurodegenerative demyelinating disease that affects the posterior and lateral columns of the cervical and upper dorsal parts of the spinal cord and is caused primarily by vitamin B12 deficiency. In addition to SCD, vitamin B12 deficiency produces various other neurological and psychiatric symptoms as well as a wide spectrum of hematological abnormalities [1]. Chronic vitamin B12 deficiency has been identified in the majority of patients with hyperhomocysteinaemia (HHcy), which promotes venous thrombosis and atherosclerosis via various mechanisms [2]. One such case report of a young patient demonstrated severe HHcy secondary to vitamin B12 deficiency as a cause of pulmonary embolism and myocardial infarction [3]. Although the association of deep venous thrombosis with HHcy has been well established [4, 5], its presentation with SCD is not reported in literature to our best of knowledge. The current report describes a 68 years old female who presented with SCD of the spinal cord coexisting with deep venous thrombosis (DVT).

2 CASE HISTORY/EXAMINATION

A 68-year-old female patient, functional class I, with no known comorbidities. presented to the emergency department with left arm pain and progressive weakness, along with left leg pain for one and a half months. No preceding respiratory or gastrointestinal symptoms were reported. Her family history was unremarkable, and she denied using tobacco, alcohol, or other drugs. In addition, there was no history of gastrointestinal disorders, weight loss, diabetes, ischemic heart disease, or thyroid disorders. On examination, the patient was pale with no associated jaundice or lymphadenopathy. She was in sinus tachycardia with a B.P of 183/109 and was afebrile.

On neurologic examination, left upper limb power was 2/5 with claw hand and associated tremors. The lower limb power on the left was 4/5 with normal tone. Power and tone on the right side were normal. Higher neurological functions were normal and bilateral Babinski sign was negative. Rest of the systemic examination was unremarkable.

3 METHODS (DIFFERENTIAL DIAGNOSIS, INVESTIGATIONS, AND TREATMENT)

Laboratory examination showed a low red cell count (2,28 x 10E12/L) with a hemoglobin level 9.0g/dl and a raised mean corpuscular volume (114.9 fL). Ultrasound Doppler was done, which showed Multifocal chronic recanalized thrombosis (Figure 1). Vascular surgery was consulted, and the patient was started on low

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molecular weight heparins (LMWH). Neurologist advised a follow up in OPD with MRI C-spine with contrast, electromyography and nerve conduction study (EMG/NCS)), vitamin B12, hemoglobin A1C (HbA1C), and thyroid stimulating hormone (TSH). In ER, symptomatic treatment was given, electrolyte imbalance was corrected, and the patient was discharged in stable condition on LMWH for DVT and pregabalin for neuropathic pain.

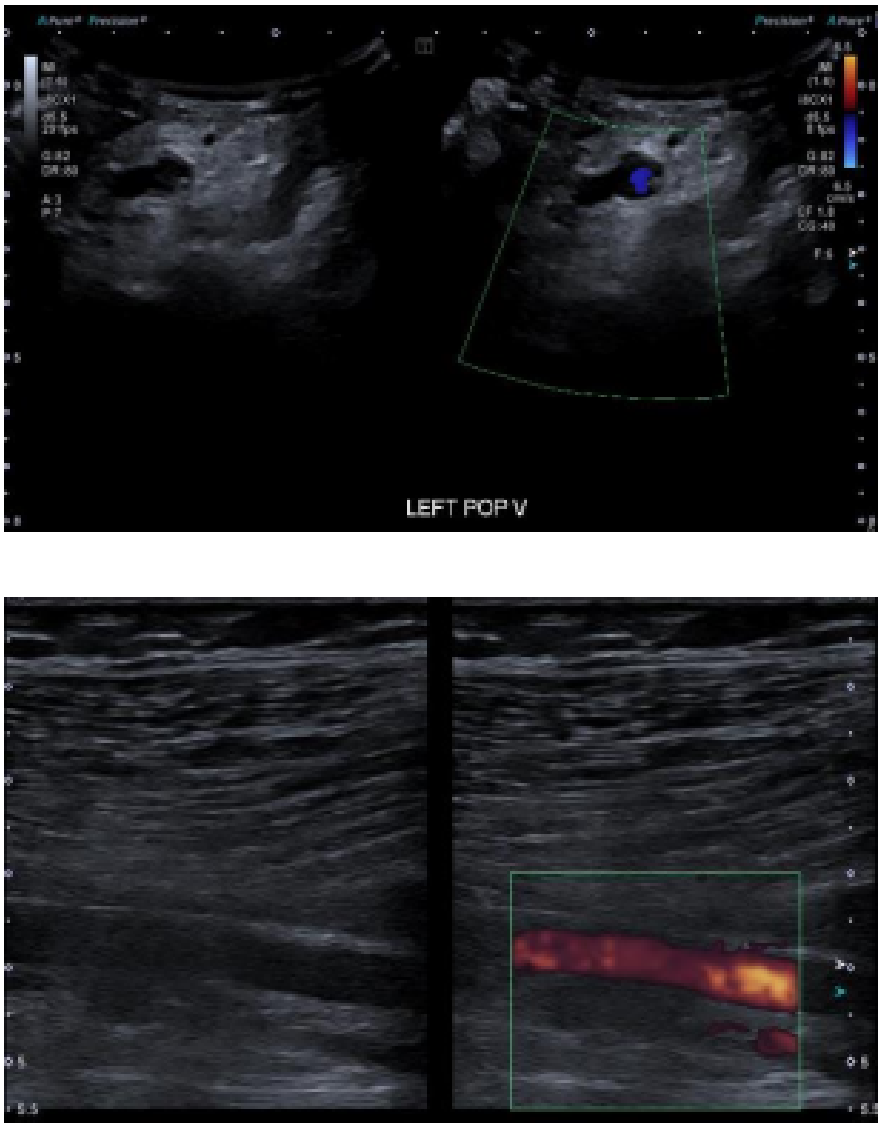
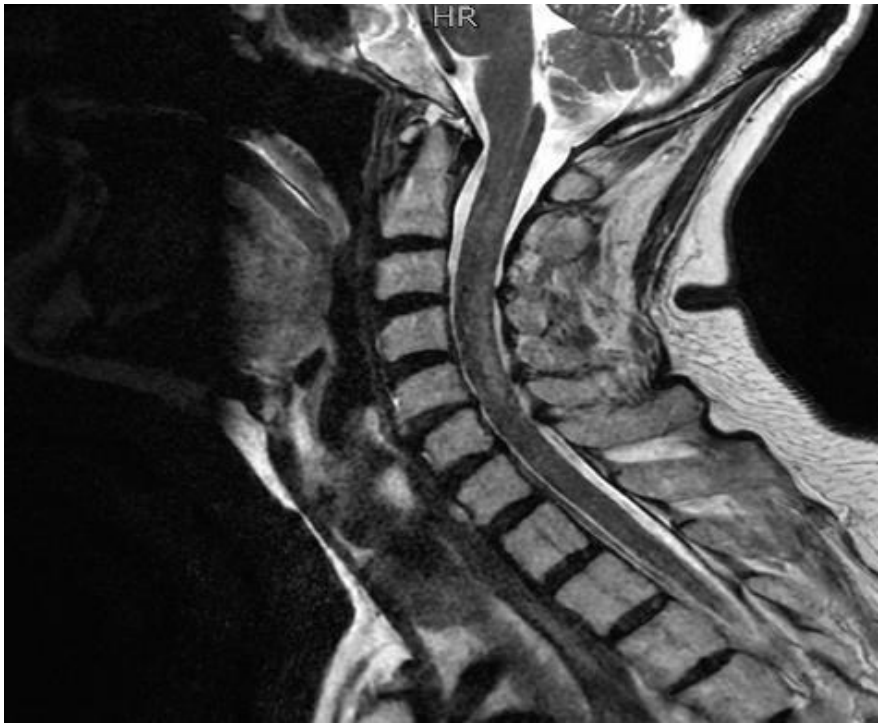


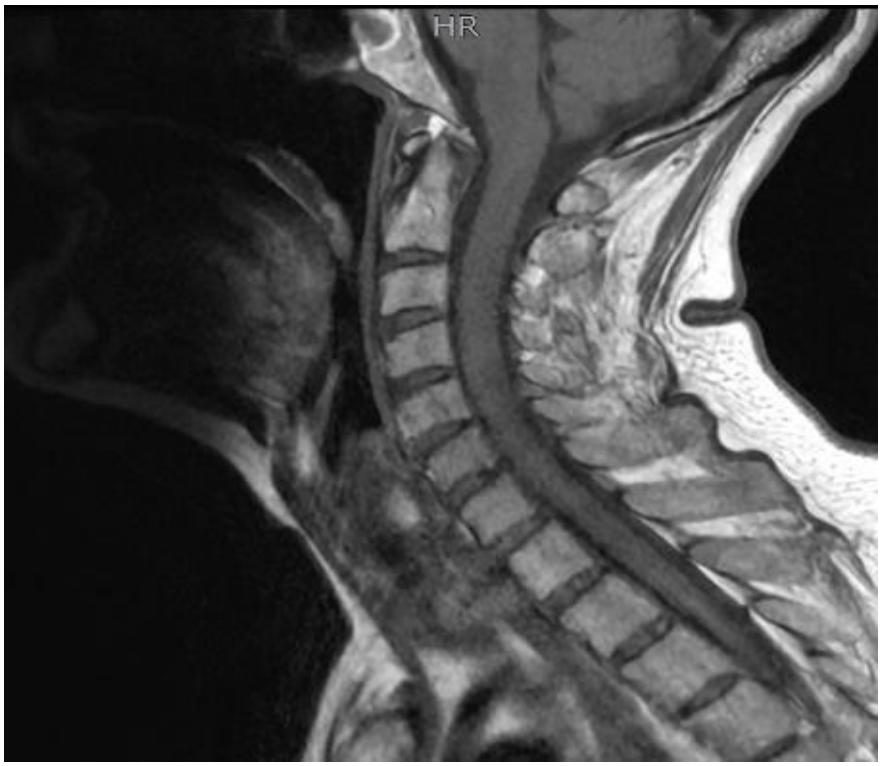
Figure 1: Multifocal thrombosis in left lower extremity with partial recanalization.

4 CONCLUSION AND RESULTS (OUTCOME AND FOLLOW UP)

Follow up cervical spine MRI showed bilaterally symmetrical T2 hyperintense signals in the posterior aspect of the cord in the dorsal columns, showing an inverted V sign without post-contrast enhancement and extending from C2 to C6 vertebrae (Figure 2). Vitamin B12 was 115pg/ml (<200 is deficient, 200-300 is borderline and>300pg/ml is sufficient). TSH was normal and HbA1C was 5.7% (prediabetes range). EMG/NCS revealed acute on chronic motor axon loss changes affecting L5-S1 and left C8-T1 segments/myotomes with evidence of a mild sensory polyneuropathy affecting lower limbs with reduced bilateral sural nerve sensory

amplitudes. These findings were suggestive of vitamin B12 deficiency and macrocytic anemia, which led to SCD with DVT.





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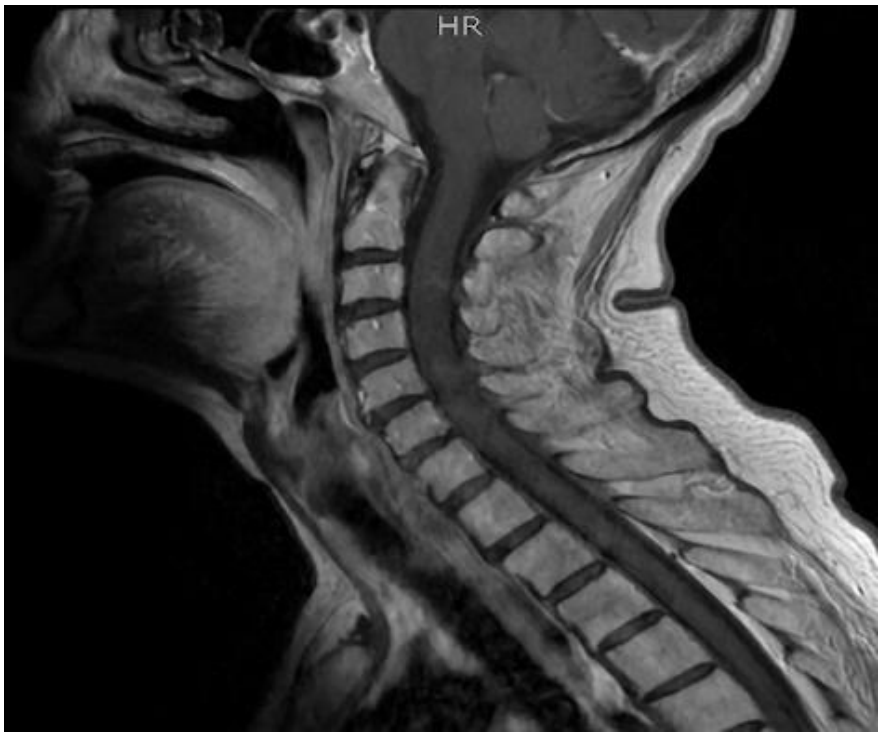

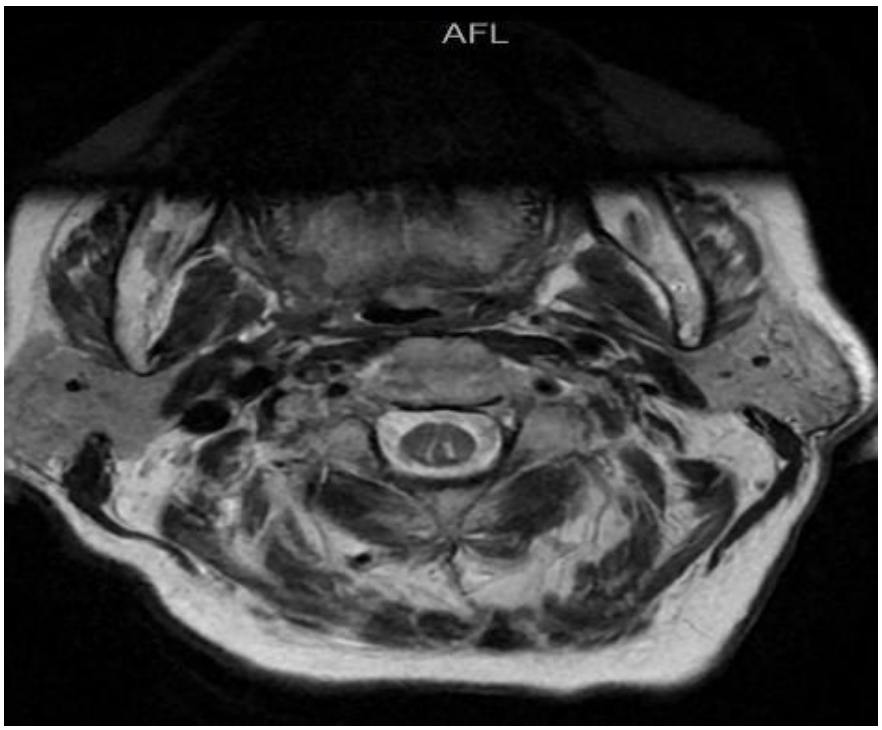

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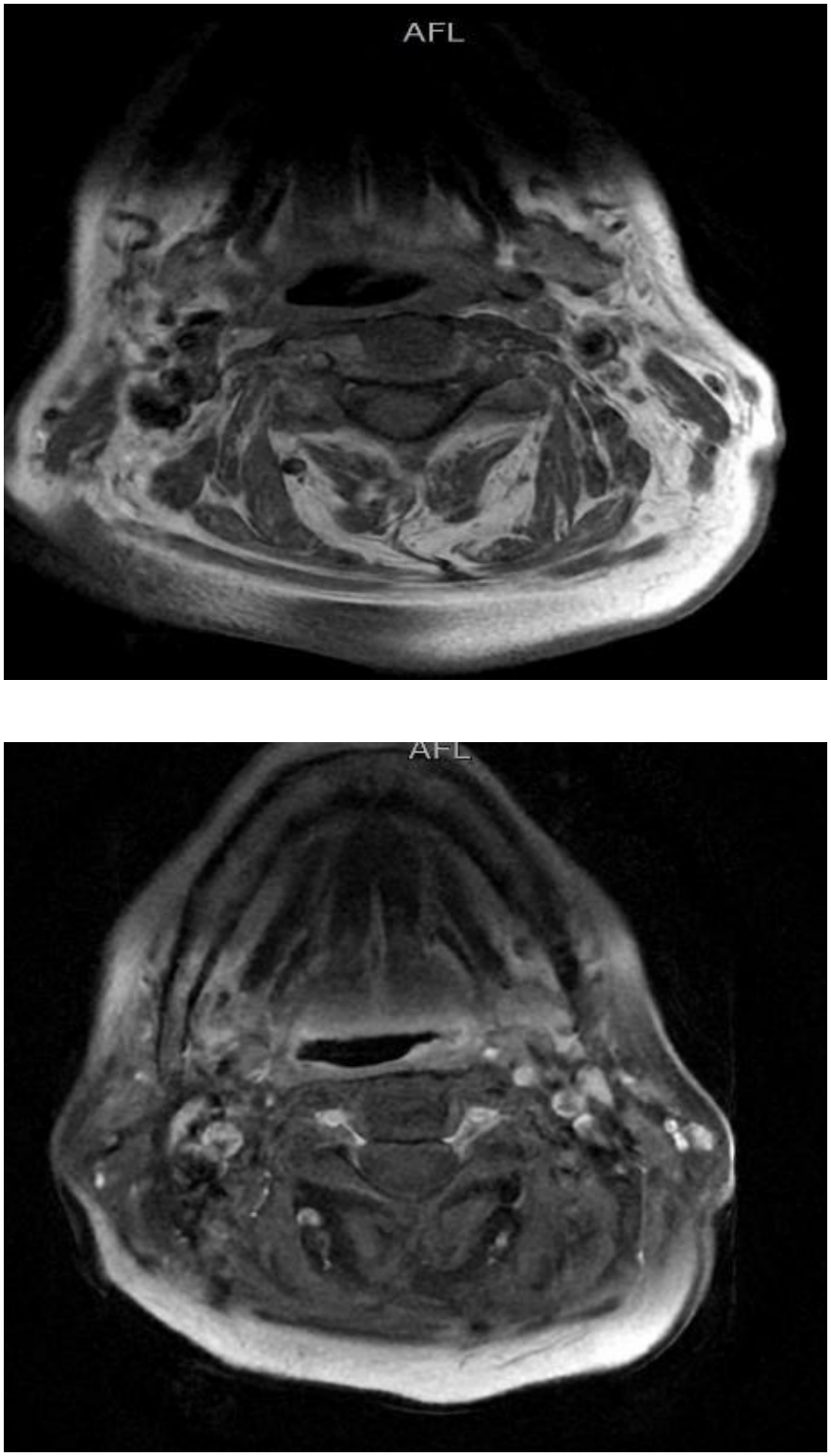

Figure 2: T2, T1 and post contrast images of sagittal and axial sections. Fig A. Sagittal T2-weighted MR image shows abnormally increased signal intensity (arrows) along the posterior columns of the spinal cord

extending from C2 through C6 level. Fig d. Axial T2-weighted MR image shows abnormal signal intensity (arrows) along posterior columns showing inverted V sign. It appears isointense on T1-weighted MR images (figures b & e). No post contrast enhancement noted (figures c & f)

5 DISCUSSION

Vitamin B12 deficiency is a significant public health issue worldwide, with various adverse effects [6]. Vitamin B12 is required as an enzyme co-factor to convert methylmalonyl coenzyme A to succinyl coenzyme A and homocysteine to methionine. Its deficiency results in accumulation of methylmalonyl Co-A causing defective myelin sheath synthesis that leads to various central and peripheral dysfunctions. SCD is one such neurological manifestation [1]. HHcy, on the other hand, is a modifiable risk factor for atherothrombotic diseases such as myocardial infarction, stroke, and DVT [2, 4]. The underlying mechanism of these events is not very well understood, however, some studies suggest it may cause endothelial dysfunction by decreasing the availability of nitric oxide (which maintains vascular homeostasis), while other studies propose HHcy induced alteration in the function of plasma proteins such as fibrinogen [2, 7]. The daily requirement of vitamin B12 is 2 mcg(micrograms) and the common causes of vitamin B12 deficiency include nutritional deficiency, malabsorption syndromes such as pernicious anemia and gastritis [8], with a high prevalence of this deficiency seen in the elderly [9]. In our case study, spinal MRI of the patient showed the typical lesions seen in patients with SCD. Moreover, EMG/NCS and hematological findings were also consistent with the condition [1,10]. Although our study has limitations in testing for genetic mutations involved in the metabolism of homocysteine, however, in the absence of other major risk factors and a negative family history for thrombosis, it can be assumed that HHcy secondary to vitamin B12 deficiency was the most probable cause of DVT in this patient. Nevertheless, comprehensive cohort studies with fewer limitations are required to fully understand the association.

To our knowledge, this is the first case of SCD concomitant with DVT, which demonstrates that vitamin B12 deficiency may cause SCD and can also predispose a patient to an increased risk of thrombosis. Early detection through screening of vitamin B12 levels, especially in high risk patients, can help prevent life threatening complications of thrombosis.

AUTHOR CONTRIBUTIONS

Muhammad Nadeem Ahmad: Conceptualization; data curation; investigation; project administration, writing – original draft; writing – review & editing. **Muhammad Sami Alam:** Conceptualization; Writing – original draft; writing – review & editing. **Shayan Sirat Maheen Anwar:** Conceptualization; data curation; supervision; validation.**Shazia Baig:** Conceptualization; data curation; supervision.**Anwar Ahmed:** Conceptualization; data curation; validation.**Saba Akram:** Conceptualization; data curation; validation. **Fareed Khan:** Conceptualization; data curation; validation. **Faheemullah Khan:** Conceptualization; supervision; validation. **Hatem Eltaly:** Conceptualization; data curation; investigation; validation; writing – original draft. **Uffan Zafar** : Conceptualization; data curation; investigation; project administration, writing – original draft; writing – review & editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethics Statement

The study is exempt from ethical approval in our institution.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Patient consent

Written informed consent was obtained from the patient for the publication of the case report.

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