Case Report

Spontaneous anterior cervicothoracic spinal epidural hematoma extending to clivus in SARS-CoV-2 infection

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INTRODUCTION

Epidural spinal hematomas have an estimated incidence of 0.1/100,000 patients/year. Most occur in the second and seventh decades, due to hematological, infectious, neoplastic conditions, or the use of anticoagulants. They are more frequently seen in the posterior vertebral canal and can be spontaneous or secondary (e.g., traumatic and iatrogenic) in origin. Treatment of spontaneous spinal epidural hematomas (SSEHs) can be surgical or conservative, depending on...
the lesion size and neurological deficit (i.e., myeloradicular involvement). The COVID-19 infection may result in severe thromboembolisms, cardiovascular/cerebrovascular accidents, or hemorrhagic complications occurring even months following active infections. Here, we report a 55-year-old chronically immunocompromised female who, following a recent COVID-19 infection, spontaneously developed a SSEH extending from the clivus to T6 which spontaneous resolved on successive MR studies without the need for surgery.

**CASE DESCRIPTION**

**History and neurological examination**

A 55-year-old female had a history of Hodgkin’s lymphoma (nodular sclerosis variant CD15− and CD30+) diagnosed 17 years earlier based on a left hypertrophic/confluent supravacular lymph nodes biopsy. She had 4 cycles of chemotherapy (ABVD scheme) and supravacular lymph nodes excision. The subsequent repeated PET studies were negative (i.e., without radiopharmaceutical captures).

**Recent COVID-19 infection**

She recently had a paucisymptomatic SARS-CoV-2 infection treated with nonsteroidal anti-inflammatory agents (NSAIDs). She reported the sudden onset of cervicodorsalgia after a routine cervical flexion/extension maneuver. The pain increased despite the administration of NSAIDs (VAS score 7/10), and she remained neurologically intact. Her laboratory studies, however, demonstrated an elevated white blood cell count, a low mean platelet volume, and elevated erythrocyte sedimentation rate [Table 1].

**MR imaging**

The patient underwent brain, cervical, and thoracic spine MR studies that documented a clival through T6 anterior spinal epidural hematoma. There was a high signal in the cord opposite the T1-T2 level of maximum compression. Further, T1-weighted Gd-enhanced MRI sequences confirmed peripheral epidural and meningeal contrast enhancement consistent with the diagnosis of a SSEH [Figure 1].

**Medical course**

The patient underwent a multidisciplinary assessment that required serial MR/other imaging and hematological evaluations. Notably, the cervico/thoracic spine MRI repeated 14 days later showed a progressive SSEH reduction; this also correlated with near-complete pain regression [Figure 2]. The patient was discharged asymptomatic on the 15th hospital day.

**DISCUSSION**

The ability to treat SSEH with/without surgery depends on their location, severity of MR-documented cord compression, and neurological deficits. Groen showed that 80% of patients with SSEH could be managed conservatively and fully recovered.[1] Lim and Wong recently reported a 79-year-old patient who did not require surgery following a SARS-COVID-19-related SSEH extending from the C3 to C6 levels.[3]

**COVID-19 hypocoagulability syndromes**

Although the correlation between anticoagulant therapy (i.e., NSAIDs) and SSEH risk has long been known, it is newly documented that COVID-19 infections may lead to disseminated intravascular coagulation and/or other bleeding diatheses (MOD).[6] In this case, on admission with COVID-19, the patient was placed on enoxaparin (i.e., protocol low dose and in combination with tranexamic acid). Recently, it has been postulated that the early use of tranexamic acid with anticoagulant therapy may reduce the progression of COVID infectious damage, although only in selected cases with normal D-Dimer values.[5] In a patient such as ours with a history 17 years previously of Hodgkin’s lymphoma, there was an increased potential for evolving hyperinflammation and hyperclotting.[7]

**Chronic vasculitis/hyper-hypocoagulation syndromes persist long term after COVID-19**

It is likely that a vascular phlogistic processes may persist even after regression of COVID-19. The malacia of post-COVID...
vasculitis would be an essential prerequisite to explain the subsequent SSEH in this patient.

**Two pathogenic hypotheses leading to SSEH**

There are two enteropathogenic hypotheses attributed to COVID-19 that could have led to the SSEH in this patient. The first related to increasing in intrathoracic pressure, the second to microtrauma between vessels – pathological structures (i.e., spondylosis-osteophytes or hypertrophic posterior longitudinal ligament).

**Evolution of SSEH**

Slow progression of bleeding with SSEH is mostly of venous origin, although there are cases of rapid progression as reported by Liao et al. The epidural vascular plexus consists of low-pressure thin-walled veins, without valves that are in communication with the thoracic-abdominal venous system. They can, therefore, “erupt” after sudden intrathoracic pressure increases (i.e., Valsalva maneuvers). In the 1960s, Markham et al. described the “SSEH Syndrome” variously attributed to sudden bending, rapid turning in the bed, explosive sneezes, intense cough, and even coitus, due to the transient pressure. The more mechanistic hypothesis occurs due to rupture of the anterior venous plexus due to microvascular trauma (blood vessels against an osteophyte as in abrupt flexion-extension maneuvers).

**CONCLUSION**

The authors described a peculiar case of a 55-year-old female with a recent COVID-19 infection, and a likely persistent postinfection vasculitis that developed an extensive...
spontaneous anterior clivus-T6 SSEH, spontaneously resolved on successive MR studies without surgery.

**Declaration of patient consent**

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

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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