Cervical Ligamentum Flavum Hematoma: A Case Report

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Introduction

Ligamentum flavum (LF) hematoma (LFH) is an extremely rare entity. It should be considered in the differential diagnosis of nerve root compression. So far, five reports of LFH in the cervical region have been presented in the literature.1–5 To the best of our knowledge, we report the first case of LFH that occurred 11 years after cervical spine instrumentation.

Case Report

History

A 29-year-old male truck driver presented with a 4-month history of neck pain that was accompanied by left arm radiating pain and numbness that had an increasing trend from the onset, worsening significantly during the 15 days prior to the presentation. He denied any recent trauma. He did not experience any bowel or bladder problems. His past medical history and family history were not significant. Eleven years prior to the current presentation at our department, he had undergone posterior cervical spine fixation and fusion for a C2–C3 left-sided locked facet and C3–C4 subluxation that developed following a car accident. The patient's first operation back in 2002—when cervical lateral mass screw fixation was not popular—involved application of six sublaminar hooks (C2 supralaminar hooks, C3 sublaminar hooks, and C5 supralaminar hooks) and was followed by rod fixation and application of autologous bone chips around the instrument. The patient did not take any medications.

Physical Examination

On physical examination, the patient's upper extremity and lower extremity muscle power was 3/5 and 5/5, respectively. No abnormality in sensory modalities was detected. He had a spastic gait. Hoffmann's sign was positive. Deep tendon reflex (upper, lower limbs) was 3/4. Rectal tone and perianal sensation were not examined, but the patient denied incontinence.

Laboratory Workups

Laboratory studies, including coagulation profile, were within normal range.

Abstract

Study Design Case report.
Objective To report the first case of ligamentum flavum hematoma after cervical spine instrumentation 11 years after the index surgery.
Methods After performing bilateral C3 and C4 laminectomy, we observed a dark greenish discoloration over the ligamentum flavum, which was opened. We evacuated 15 mL of subacute hematoma.
Results The first ligamentum flavum hematoma of the cervical spine that occurred after spinal instrumentation with sublaminar hooks.
Conclusion Ligamentum flavum hematoma might happen even after a long delay (in our case, 11 years) from spinal instrumentation (sublaminar hooks). In symptomatic patients, evacuation is the treatment of choice. In cases of instrument adhesion to the surrounding intracanal tissues, removal should be done meticulously after performing a complete release.

Keywords
► cervical
► ligamentum flavum hematoma
► spinal instrumentation
Imaging Studies
Chest X-ray and electrocardiogram did not elicit any positive findings. X-rays (Figs. 1 and 2) showed cervical kyphosis with C4 apex. There was no coronal plane deformity. In his CT myelography (Fig. 3), cord compression by an extradural mass lesion was evident. Additionally, the C3 hooks touched the dura. T1- and T2-weighted magnetic resonance imaging (Figs. 4 and 5) showed a hyperintense elliptical cystlike mass posterior to the dura matter that obviously split the LF and remained confined to its layers.

Operation
The patient was scheduled for surgical decompression. After performing bilateral C3 and C4 laminectomy, we observed a dark greenish discoloration over the LF, which was opened. A subacute hematoma (15 mL) was evacuated. The hematoma consistency was a mixture of acute and chronic hematoma that resembled machinery oil with clots. A clear posterior wall separated the dural sac from the cavity of the hematoma. Figs. 6 and 7 display the intraoperative findings. We thought of the possibility that the instruments implanted during the previous fixation and fusion operation could have irritated the vascularized LF and resulted in the subsequent hematoma formation; therefore, we removed the instruments to prevent re-collection of the hematoma. The epidural space was free of the hematoma. The right middle hook was adhered to the dura matter and while removing it, we had a dural tear, and a cerebrospinal fluid leak was evident. The dural tear was repaired and covered with Gelfoam (Cutanplast, Italy). The postoperative imaging results are depicted in Figs. 8 and 9.
Postoperative Course
Immediately after the operation, the patient developed quadriplegia (2/5), which lasted 3 days and was followed by right-sided motor weakness accompanied by left-sided sensory deficits (Brown-Séquard syndrome). The motor power of left upper and lower limbs was 3/5. The muscle power of the right limbs was unaffected. The deep tendon reflexes for the right and left limbs were 1 and 2, respectively. Pinprick and temperature sensation were diminished in the left side. Examination of cranial nerves detected no abnormalities. Physiotherapy was initiated. At the first follow-up (3 months postoperation), the patient’s muscle power of the right limbs showed improvement (3/5). With continuation of rehabilitation, further muscle power recovery was achieved (5/5) for the right limbs by 8 months postoperation.

Discussion
The LF in its normal state is an elastic tissue with minimal blood vessels.\(^1\) Spinal flexion, rotation, or shearing forces can cause injury to the degenerated LF and result in intraligamentary bleeding.\(^2\) With fibrinolytic and hemolytic changes, expansion in the size of the resulting hematoma leads to neural compression. Tamura et al reported cervical spine LFH in an individual with occipital assimilation with the atlas, partial aplasia of the arch, and C2–C3 block vertebra.\(^3\) In their case, the hematoma was found at C3–C4 adjacent to the C2–C3 block vertebra. They speculated that the increased mechanical stress because of this anomaly could have been a contributory factor in the formation of the LFH. In our case, an iatrogenic-created block at C2–C3 (during our patient’s first operation) could have played a role in the development of the LFH.

We presented the first LFH of the cervical spine that occurred after spinal instrumentation with sublaminar hooks. The uniqueness of our case lies in three points. (1) As a long-term complication of spinal instrumentation, sublaminar hooks implanted 11 years prior to the recent presentation might have caused irritation and subsequent degeneration to the LF alone or in association with a trivial injury. Although our patient denied any trauma, one must think of minor to moderate acceleration-deceleration or other brisk cervical movements considering the patient’s job as a truck driver. (2) Our patient is the youngest reported case in the literature diagnosed with a cervical LFH after an operation for trauma. All previous case reports of LFH included middle-aged or advanced-aged individuals. (3) Taking into account the location of the hematoma (at the level of C4), kyphotic deformity at C4 level, and the solid fusion at the level of

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**Fig. 4** Preoperative T1-weighted magnetic resonance imaging.

**Fig. 5** Preoperative T2-weighted magnetic resonance imaging. Arrows show the hematoma confined to the layers of ligamentum flavum.
**Fig. 6** Hematoma.

**Fig. 7** Arrow points to ligamentum flavum.

**Fig. 8** Postoperative T1-weighted magnetic resonance imaging.

**Fig. 9** Postoperative T2-weighted magnetic resonance imaging.
C2–C3, we may conclude that the hematoma was a result of deformity and hook irritation on the LF.

In conclusion, a LFH might happen even after a long delay (in our case, 11 years) from spinal instrumentation (sublaminar hooks). In symptomatic patients, evacuation is the treatment of choice. In case of instrument adhesion to the surrounding intracanal tissues, removal should be done meticulously after performing a complete release.

Disclosures
Ali Haghnegahdar, none
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